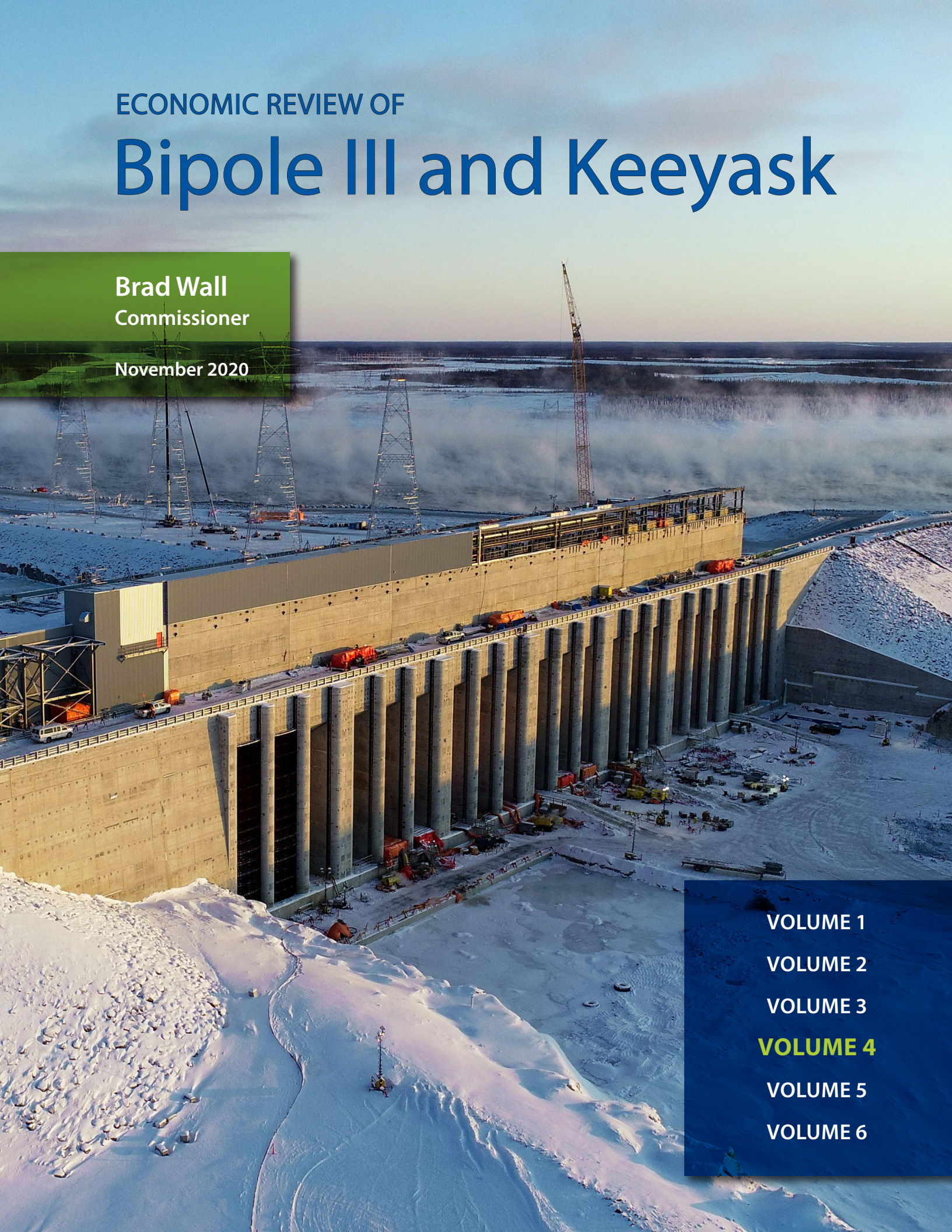
ECONOMIC REVIEW OF

Bipole III and Keeyask

Brad Wall
Commissioner

November 2020



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Government of Alberta

P3 Value for Money Assessment and Project Report

Alberta Schools Alternative Procurement (ASAP) Project Phase 1



June 2010

Alberta

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Value for Money Assessment and Project Report on Public Private Partnership (P3) for 18 New Schools

June 2010

1. Summary: Using a P3 for 18 new schools - did it work?

By using a Public Private Partnership (P3) to design, build, finance and maintain 18 schools in Calgary and Edmonton, the Alberta government saved $97 million over 32 years (in today's dollars) compared to a traditional approach ($634 million instead of $731 million, a 13% savings)[1]. It will also deliver the schools two years earlier than with traditional methods. The government chose a P3 to deliver the Alberta Schools Alternative Procurement Phase 1 project, known as ASAP 1. The following assessment shows that using a P3 delivered value for money and that it was the right way to procure the 18 schools.

In June 2007, the Minister of Education announced the ASAP 1 project as an innovative approach to new school construction by the government, the largest Kindergarten to Grade 9 (K-9) schools project in Canada.

The P3 project was developed to consolidate the design and construction of the new schools. They are built on a standard core design to allow for future expansion if needed. The 18 schools were identified by Edmonton and Calgary school boards as essential to meet demand for educational programming in outlying areas of the cities where students live.

The government signed the P3 contract, with a 32-year term, in September 2008 with BBPP Alberta Schools Limited (the contractor). The contract requires the schools to be ready for school boards in June 2010 so they can be available for students in September 2010, two years earlier than with traditional methods.

The cost savings and earlier completion were due to:

- economies of scale
- construction efficiencies
- building innovations
- risks shifted from government to the contractor
- fixed cost contract

This report explains what a P3 is and why it may be used, provides a value for money assessment of the P3 for 18 new schools, and provides a project report.[2]

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[1] This savings calculation is based on the amounts in the bids for the ASAP 1 Request for Proposals.

[2] This report was developed by Alberta Infrastructure and Alberta Education following the value for money methodology in the Government of Alberta's *Management Framework: Assessment Process*.

2. Background

What is a P3?

A P3 is a different, non-traditional way for government to create capital assets (such as roads, schools, and other types of government facilities). In the case of ASAP 1, the government entered into one agreement with a contractor, responsible for designing, building, partially financing, and maintaining the schools over a 32-year period (2 years design and construction; 30 years maintenance). [3]

A P3 can save time, money and reduce risk to the government by having one contractor design, build, finance, and maintain a facility. For Alberta P3 projects, the public sector owns the facility and provides public services to Albertans, the same as it does with a traditional approach. In this P3, the school boards own the 18 schools and deliver education as they do in their other schools.

What is a traditional approach?

In a traditional approach, the public sector hires an architect to design a school or other facility, and then hires a construction contractor to build it. Once the facility is built, the public sector operates it and maintains it, typically by awarding numerous individual contracts for repairs and renewal. The government pays for the construction of the facility by making progress payments (for its own infrastructure) or by making capital grants to entities such as school boards, health authorities, and post-secondary institutions. Grant funding is also used to operate and maintain the facility.

What does a Value for Money (VFM) Assessment do?

A VFM assessment measures whether a P3 is the best option for a particular project. In the case of ASAP 1, it compared the cost of building and maintaining the same schools using the two different methods: traditional and P3. The VFM for a project is the difference between the two costs. The goal of a P3 is to provide value: to do so, the P3 must cost less – measured by net present value – than the traditional method over the life of the contract.

What is net present value?

Net present value is the current value of a future sum of money. It is a standard method to compare the value of money over time (a dollar today is worth more than a dollar tomorrow because of interest and inflation) to assess long-term projects. It is produced by applying an interest rate and an inflation rate (collectively called the "discount rate") to a future sum. The amount and timing of cash flows differ in the two options for producing the schools (traditional and P3) and the calculation of net present value accounts for those differences. The net present value of the cost to produce and maintain a facility using the traditional approach is called the Public Sector Comparator, or PSC.

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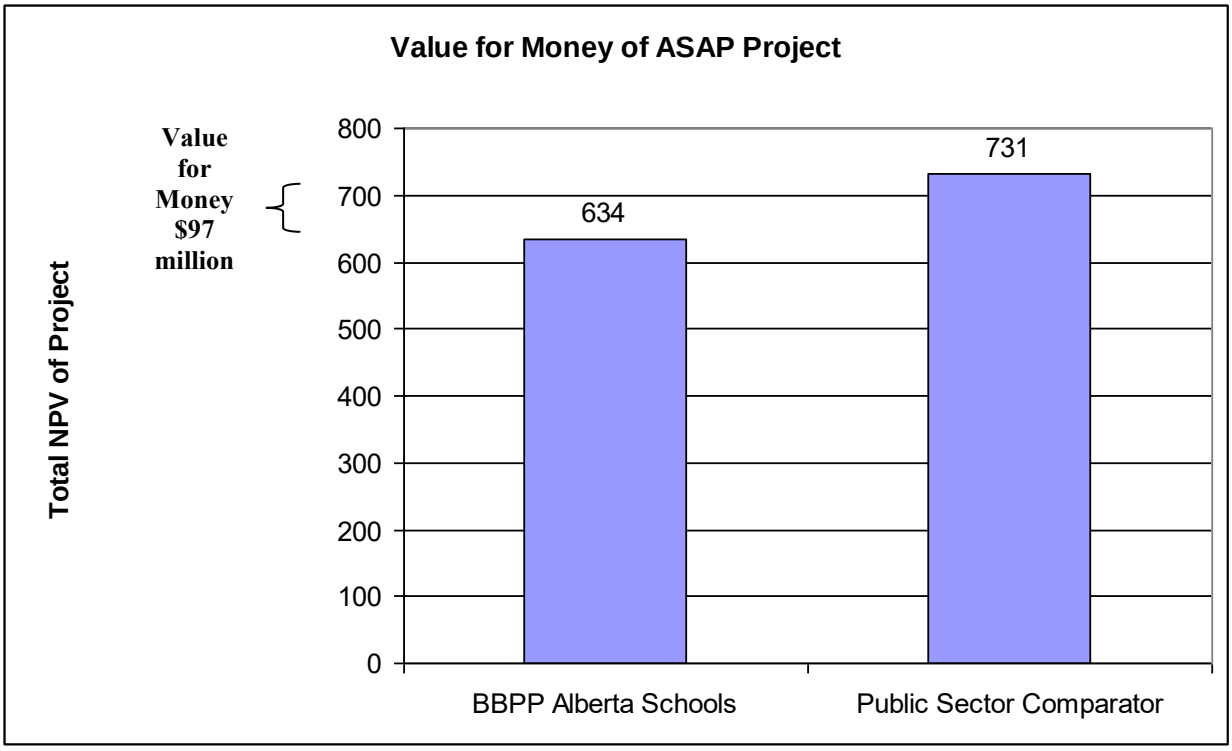
[3] For detailed discussion on P3s, see the Annual Report of the Auditor General of Alberta 2003–2004, at pages 49 to 72 (www.oag.ab.ca/files/oag/ar2003-2004.pdf).

3. VFM Assessment of the P3 used for 18 new schools

Money and time saved by using P3: Quantitative measures of value

This VFM assessment uses net present value as of July 4, 2008, when bids were received. It includes the costs to design, build, partially finance, and maintain the schools for the 32-year life of the contract. It also includes the impact of risk transfer (as discussed later in this section) but excludes costs common to both methods, such as broadband connections, land costs, and furniture and equipment.[4]

The government saved about $97 million[5] in today's dollars (13%) by using this P3 (confirmed by PricewaterhouseCoopers – see Appendix A). The 18 schools are scheduled to be ready two years earlier than with the traditional method.



[4] Capital and renewal costs for both methods were developed by Tech-Cost Consultants Ltd. Inflation and discount rates were provided by the Ministry of Finance and Enterprise. PricewaterhouseCoopers LLP developed the financial model.

[5] Original VFM estimate of $118m was $21m too high because it included furniture and equipment for PSC but not for P3.

Private financing by the contractor costs more than public financing by government, but in the case of ASAP 1, that cost was more than offset by the following factors:

1. **Allocating risks to the party who can best manage them** means that the contractor bore many of the costs that the government would have borne in the traditional approach. For example, the contractor paid for any changes needed during the construction period due to design errors. The contractor also bore any cost increases for labour and material during the construction period. In addition, for the 30-year maintenance and renewal term, the contractor will pay to replace any defective building parts or parts that have reached the end of their useful life. A list of some of the major risks that the P3 contract allocated to the contractor is on pages 7 and 8 of this report.

2. **Using innovative building techniques and materials** will save the government money over the contract term. In the Request for Proposals (RFP) stage, the three proponents presented several innovations to meet stringent, long-term quality requirements set in the technical documents. The contractor incorporated many of these techniques into the final design. For example, each school was designed to meet the Canada Green Building Council LEED™ (Leadership in Energy and Environmental Design) Silver standard for sustainability by using state-of-the-art materials, systems and processes. The contractor used a high-performance roof membrane with a warranty available for the full term of the contract.

   The members of the contractor's design, building, and maintenance team collaborated to develop innovations and efficiencies that reduced costs over the life of the contract.

3. **Achieving economies of scale by designing and building 18 schools** in two large cities on a tight schedule. For example, it costs much less (per boiler) to buy 36 boilers at the same time than two. Similarly, key parts such as structural steel, brick and block, windows, doors, floor finishes, and electrical and mechanical equipment cost far less when bought and installed in bulk. Because the contractor had a guaranteed group of 18 schools, it could secure a supply of most parts early in the construction period, avoiding higher costs for labour, material, equipment and sub-trades later in the construction period.

4. **Developing construction schedules that allow continuous and efficient workflow** between construction sites to minimize downtime between operations and reduce mobilization costs for work crews and equipment. For example, buying over 200 high-performance manufactured classrooms allowed manufacturing plants to schedule production runs well ahead of time. In turn, that allowed for timely delivery and installation of the classrooms.

Qualitative measures of value

1. **Controlled scope**. By bundling 18 schools with standardized designs into one package, the government controlled the scope of the project and managed the risk of any potential scope changes. The government worked closely with each school board to ensure that their program needs were met early in the design process, and that these requirements were clearly expressed to proponents during the RFP phase. This ensured that all school

boards were treated equally, and that they each received schools with consistently high quality.

2. **Earlier opening.** The scheduling advantages explained earlier will let the 18 schools open in September 2010, two years earlier than if the government used the traditional method. Students in these schools will no longer have to take long bus rides to other communities; instead, they can spend more time in play and community based activities before and after school.

3. **30-year maintenance and renewal period.** This gives the government and school boards assurance that schools will be maintained in good condition for 30 years. The P3 contract transfers maintenance of the schools from the school board (government) to the contractor for the term of the contract. This effectively gives the government a 30-year warranty for all 18 schools, and schools with no deferred maintenance at the end of 30 years.

4. **Better workforce management.** The relatively long time to set up a P3 (just over five months) allows proponents to establish labour and equipment supply and to lock in contracts for materials supply. Traditional contracts, typically with a four- to six-week tender period, introduce a lot of risk into the process, as the bidding contractor has only a short time to negotiate scheduling of labour, materials and equipment to arrive onsite at the right time. The P3 results in a single contractor for all 18 schools; for traditional contracts, contractors could be bidding several jobs at the same time. The P3 contractor can offer continued, attractive employment to workers.

Major risks allocated in P3 contract

An important factor in the delivery of P3 projects is an acceptable allocation of risks to the party or parties best able to manage them. In some cases, the contractor is the appropriate party to manage a risk; in others, the government can better manage the risk; in yet a third case, the risk may be best shared between the two parties.

Table 1 (Appendix B) shows a sample of the risk allocation between the government and the contractor in the P3 contract and schedules. This list is not comprehensive. The P3 contract shows all the allocated risks.

Cost overruns: the contractor bears the risk of any construction costs above the bid price in the P3 contract. Maintenance and renewal payments are indexed based on the contract formula, so the contractor pays any increased maintenance costs above the index during the contract.

Schedule certainty: the contractor agreed to have the 18 schools available for use by the school boards by June 30, 2010 or receive reduced payments. The contractor has to manage the construction schedule to meet this date.

Weather: the contractor bears any costs of project delays caused by bad weather.

Scope changes: the government pays for any scope changes that it or a school board want during construction. The government will pay for this work in accordance with the change order process set out in the P3 contract.

During the maintenance and renewal period, the government or school boards may consider changes to schools. For example, changes in local demographics may require a school board to request approval from the government to add or remove high-performance classrooms. The government will pay for this work, as long as the contractor accepts competitive pricing based on a tendering process as specified in the P3 contract.

Interest rates and financing: during the maximum two-month period between notifying a preferred proponent (which becomes the contractor when it signs the P3 contract) and signing the contract, the government shares the risk of any changes in base borrowing rates with the preferred proponent.

The contractor has to arrange for partial financing for the whole term of the contract and is solely responsible for the impact of the financing arrangements. No matter how much rates increase during the contract, the contractor must pay any increased refinancing costs. Conversely, the contractor can benefit from any rate drops.

Permitting: in the project's procurement phase, the government worked with the two cities to ensure that development permits for all 18 schools were in place, with as few conditions as possible. Once the contractor signed the contract, it was responsible to have the cities transfer the development permits to it. The contractor assumed any schedule risks of not being able to obtain the building permits on time.

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4. Project report

Project goals

- **Create 18 schools for K-4, K-6 and K-9 students in high-growth areas of Edmonton and Calgary for the school year starting September 2010**. Many young families are moving into new subdivisions in Edmonton and Calgary. With existing schools closer to the city centres, students must bus to school and many of these schools are overcrowded. The ASAP 1 project aims to put new schools in the areas that need them—quickly. Both Edmonton and Calgary will get nine new schools.

- **Ensure short-term cost certainty** for building the 18 schools and **long-term cost certainty** for maintaining them. Construction rates were increasing between 18 and 25% per year at the time this project was bid. The project shifts the risk of increased costs to the contractor.

- **Use innovative design, project delivery, and funding** to meet the need for schools in Edmonton and Calgary.

- **Ensure standard and consistent schools by using three standard core school designs with flexible student capacity.** The three designs (developed under a separate project) are of a consistent quality for all 18 schools. Flexible student capacity comes from high-performance classrooms that can be added to or subtracted from the core schools, as enrolments change over the life of the schools.

Table 2 (Appendix C) lists the 18 new schools in the project.

The project does not include daily building services (movement of desks, chairs and other furniture, usually done by a custodial team), cleaning, or routine, daily custodial work in schools. These services remain the responsibility of the school boards.

Project outcomes

- **Cost certainty for the life of the schools**—shifting the risk of increasing construction rates and other financial risks to the contractor ensured cost certainty for the design, building, maintenance and renewal of the schools.

- **An innovative, repeatable, transparent, and accountable process to produce and maintain schools**—the same process can now be used for other projects in Alberta.

- **Less time and lower cost to produce schools**—to plan, design, and build from three to six schools is a significant undertaking for each school board. Using the traditional approach, it could take as long as five to six years for all the schools to be ready for students. In contrast, the P3's coordinated, comprehensive approach will produce18 schools ready in only three years, at lower cost.

- **A 30-year "warranty" for each school**—the contractor is responsible for ongoing maintenance and renewal of building parts for the 30-year maintenance phase.

Approaches considered

The government considered two alternative approaches to deliver the 18 schools:

1. ***Traditional Design-Bid-Build*** **approach**, with the usual "pay-as-you-go" financing by the government and delivery by school boards. Private-sector architects and consultants, hired by school boards, design the schools. Stipulated-price construction contracts are awarded through a traditional open-bidding process tendered by school boards to private-sector contractors, likely in six bundles of three projects. The province approves the contracts under the *School Buildings and Tendering Regulation*. Daily operations and maintenance, and infrastructure maintenance and renewal, are funded by provincial grants.

2. ***Design-Build-Finance-Maintain*** **approach** (the basis of the P3), with the winning private-sector proponent (the contractor) forming a consortium or group to handle the project from start to the end of the contract. Then the contractor is responsible for the ongoing maintenance of the schools for a set time (in this project, 30 years), and for having a renewal plan for school components to ensure they meet the performance requirements. School boards still handle daily cleaning and operations of the schools. The government makes monthly payments to the contractor during the 30-year maintenance phase of the contract. Payments start after the schools are ready to use and cover both capital and maintenance and renewal costs. The government can reduce payments based on criteria such as the whether the schools are available for use and whether the buildings meet certain standards.

Selection process

The government's selection process was open, competitive, timely, fair and transparent. A Fairness Auditor, Mr. Richard Innes, CA, prepared a report on the fairness of the process (Appendix D).

A Request for Qualifications was publicly issued on November 1, 2007. Four teams responded and were evaluated on experience, personnel qualifications, past performance and financial capability. The three teams asked to submit proposals were B&B Alberta Schools, New Alberta Schools, and Plenary Education Alberta.[6]

The Request for Proposal (RFP) process ran from February 1, 2008 to July 4, 2008. The "made-in-Alberta" approach to P3s ensures the process is competitive throughout. During the RFP process, the teams made financial and technical submissions to ensure that they met the project's minimum specifications. The government issued a draft form of the contract during the RFP process. The teams provided comments on it. Before receiving financial bids, the government issued the final form of the contract that the successful proponent signed. There were no negotiations on this contract after financial bids were received.
Once the three teams provided RFP submissions, they all submitted financial bids based on the final form of the contract. These bids are summarized in Table 3 (Appendix E). B&B Alberta Schools submitted the lowest price, on a net present value basis, and won the

[6] The companies that make up the teams are listed in Table 5 (Appendix G).

contract. B&B Alberta Schools then created a special purpose company, known as BBPP Alberta Schools Limited, to carry out the work of the contract.

Key terms of P3 contract

What the government must pay: The total cost of the 32-year contract is about $1.157 billion, or in 2008 dollars, about $634 million.

If all 18 schools are ready by June 30, 2010, the government will pay to the contractor:

- $125 million toward the capital cost of the schools;
- monthly amounts in three separate streams (capital, maintenance, and renewal) over the contract term; and
- An early completion bonus based on a daily rate per school, up to $1 million.

Capital payments are fixed, while maintenance and renewal payments are indexed[7].

If any school is not ready by June 30, 2010, the government will pay only that part of the $125 million attributable to completed schools. It will pay the rest as the remaining schools become available. Additionally, the government will make monthly maintenance and renewal payments and 80% of the monthly capital payment only for completed schools, until all 18 schools are completed. The contractor will thus lose capital, maintenance, and renewal payments for every school not complete by the target date, plus 20% of the monthly capital payment for completed schools.

What the contractor must do: The 32-year contract between the government and the contractor has a two-year construction period and a 30-year maintenance period. It requires the contractor to:

- complete the design and construction of the 18 schools in Edmonton and Calgary; described in Table 2 (Appendix C) by June 30, 2010;
- partially finance the construction over the contract term;
- maintain the 18 schools to the standard specified in the contract;
- have a renewal plan for school components to ensure they meet the performance requirements; and
- hand back responsibility for maintenance and renewal of the 18 schools to the school boards in June 2040, in a condition prescribed in the contract.

Payments reduced for non-performance: The government can reduce all monthly payments (capital, maintenance, renewal) if the contractor does not meet performance standards in the contract. For example, if a roof does not meet performance criteria and the contractor does not repair it within the allowed time, the government can reduce monthly payments to the contractor.

[7] Four indices are used to calculate maintenance and renewal payments: AUPE Maintenance Service Worker II published hourly salary; NAICS repair and maintenance hourly rate; Statistics Canada consumer price statistics (excluding food and energy); and Statistics Canada non-residential building construction price index for Edmonton and Calgary.

A detailed description of all the payment adjustments is in Schedule 15 of the P3 contract, and a sample appears in Table 4 (Appendix F). The final form of the P3 contract is at http://www.infrastructure.alberta.ca/3865.htm.

School boards own the schools: The contractor has a license from the government to access the schools for construction, maintenance, and renewal activities. The school boards can use the schools for education purposes and for community and other purposes as defined in long-standing joint use agreements between the cities and the respective school boards that apply to all schools. School boards remain publicly accountable for delivering education programs for all schools in their jurisdictions.

Monitoring during and after construction

During construction, the government is using ACI Architecture as its consultant to review the designs and ensure that construction standards have been met. The contractor has to provide monthly reports on design and construction issues.

In the maintenance and renewal period, the contractor will self-monitor and report on its compliance with the technical requirements. The government will also do its own inspections and testing to ensure the standards continue to be met. In addition, the contractor's lender has a consultant review its performance.

Accounting treatment

The accounting treatment for P3 projects follows generally accepted accounting principles set out by the Public Sector Accounting Board of the Canadian Institute of Chartered Accountants. The obligation is "on-book", so the province records the obligation as the schools are built and records the cost of building the schools as a capital expense because school boards own the schools.

Project schedule

The P3 contract was signed on September 10, 2008 and construction started on some sites by the end of September 2008. The contractor must deliver the 18 schools by June 30, 2010 or face a payment reduction. An independent certifier will certify when the schools are available for use. The 18 schools are due to open to students by September 1, 2010.

The maintenance period starts after the schools are available and continues until June 2040, when the license granted to the contractor to access the schools for maintenance and renewal activities will expire. The contractor must hand back the responsibility for maintenance and renewal of the18 schools to the school boards in the condition specified in the contract. The government and the contractor will assess the schools to ensure they are in the condition specified in the contract when the contract expires. After the contract expires, the school boards will be responsible for operating, maintaining, and renewing the schools.

Appendix A: Commentary by PricewaterhouseCoopers

PRICEWATERHOUSECOOPERS

PricewaterhouseCoopers LLP
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Confidential
April 8, 2010

John Gibson
ASAP Project Office
Alberta Infrastructure and Transportation
1st Floor, 6950- 113th Street
Edmonton, AB
T6H 5V7

Dear Mr. Gibson:

Alberta Schools Alternative Procurement Initiative: revised Value for Money analysis April 8th 2010.

PricewaterhouseCoopers LLP ("PwC") has prepared a Value for Money ("VfM") assessment of procuring the Alberta Schools Alternative Procurement Initiative ("ASAP Initiative") through a Public Private Partnership ("P3") arrangement compared to the traditional procurement arrangements.

At the Financial Close stage of the procurement, our analysis indicates a projected VfM saving of 13% by using the P3 approach with the Preferred Proponent to deliver the ASAP Initiative compared to using the traditional delivery approach.

The VfM assessment is based on the comparison of the total estimated project costs[1] of delivering the ASAP Initiative under:

1) Traditional procurement arrangements, as reflected in the Public Sector Comparator model; and

2) P3 procurement arrangements, based on the profile of payments to the Preferred Proponent as reflected in the Form G1 as on July 4th, 2008.

The VfM analysis has been prepared based on estimated costs and various other assumptions provided by the ASAP Project Team and its advisors as well as the Preferred Proponent bid submission and the Form G1 that was agreed at Financial Close, (collectively the "Information").

[1] Calculated on a net present value basis, applying a base date of July 4th, 2008

PRICEWATERHOUSECOOPERS

We have not audited or attempt to independently verify the accuracy or completeness of the Information.

Please do not hesitate to contact me should you have any queries or wish to discuss further.

Yours truly,

Esther M. Tse
Associate Partner
Infrastructure and Project Finance

NPV Prices ($m's as at July 4, 2008)	Total Cost	$125m Provincial Contribution	Grand Total	Comments
	A	B	C = A + B	
Public Sector Comparator	730.8	-	730.8	Updated as at April 1, 2010 for removal of furniture costs
Financial Close Position				
Preferred Proponent	521.0	113.0	634.0	Values based on July 4, 2008
Comparison of 'Preferred Proponent' to Public Sector Comparator				
Estimated savings:	(209.8)	113.0	(96.8)	
Estimated % saving			13.2%	
Applies discount rate of 5.05% to July 4, 2008				

Appendix B: Sample of risk allocations

Table 1: Sample of Risk Allocations between Government of Alberta and Contractor [8]

	Traditional		P3	
	GOA	Contractor	GOA	Contractor
Construction Risks				
Design interaction with site conditions	•			•
Construction interaction with site conditions		•		•
Site safety		•		•
Construction methodology		•		•
Construction costs	•			•
Unforeseen site conditions	•		•	•
Labour issues		•		•
Material issues		•		•
Design errors	•			•
Schedule issues	•	•		•
Construction quality issues		•		•
Scope changes	•		•	
Delayed site access	•		•	
Material inflation	•	•		•
Wage inflation	•	•		•
Not meeting agreed milestone dates		•		•
Adverse weather conditions	•	•		•
Labour disputes	•			•
Fire during construction		•		•
Vandalism/theft/arson during construction		•		•
Damage and/or injuries to third party		•		•
Damage to work		•		•
Damage and/or loss to utilities		•		•
Defective materials		•		•
Public interface	•	•		•
Workplace health and safety		•		•
Insufficient performance bonding	•			n/a
Subcontractor insolvency		•		•
General Risks				
Land acquisition	•		•	
Life cycle management	•			•
Stakeholders management	•			•
Coordination and approvals through users	•			•
Third party objections	•			•
Patent infringement	•	•		•
GOA supplied data – accuracy	•			•
GOA supplied data – sufficiency	•			•
GOA supplied data – interpretation	•	•		•
Utilities hook up/connections	•			•
Concept approvals – environmental	•		•	

	Traditional		P3	
	GOA	Contractor	GOA	Contractor
Approvals Risks				
Development permits		•	•	•
Building permits		•		•
Occupancy permits		•		•
Environmental permits	•			•
Utilities crossing requirements	•	•		•
Regulatory requirements	•	•		•
Building Code compliance	•			•
Land Use approvals	•		•	
Utilities approvals	•			•
Municipal requirements	•			•
Environmental Risks - Known				
Geotechnical	•			•
Contamination	•			•
Archaeological	•			•
Flood plain analysis	•			•
Environmental Risks - Unknown				
Geotechnical	•		•	
Contamination	•		•	
Archaeological	•		•	
Flood plain analysis	•		•	
Technical Risks				
Core school design	•			•
Modular design and performance	•			•
Structure safety	•	•		•
Design quality issues	•			•
Material behaviour	•			•
Construction process innovation	•			•
Construction performance specification risks	•		•	
Operation performance specification risks	•		•	
Lack of building system integration	•			•
Aggressive schedule	•		•	•
Delayed schedule	•			•
Future IT risk	•		•	
Financial and Economic Risks				
Sourcing of capital – construction	•			•
Allocation of capital – operations	•			•
Cash flow management – construction	•			•
Cash flow management – operations	•			•
Inflation risks prior to financial close	•		•	
Exchange rate risks	n/a			•
Base interest rate changes before Agreement signed	•		•	
Interest rate changes after closure	•			•
Inflation on operations, maintenance and renewal	•		•	•
Inflation on construction	•			•
Insurance	•		•	•

	Traditional		P3	
	GOA	Contractor	GOA	Contractor
Change orders	•		•	
Government withdrawing from P3s	n/a		•	
Demand Risks				
Modular additions above original projections	•		•	
Modular additions (escalation impact)	•			•
Growth in student population over design capacity	•		•	
Changes in school programming	•		•	
Under-utilized school facilities	•		•	
Appropriateness of schools	•		•	
Operations and Maintenance Risks				
Changes in legislation	•		•	•
Damage to property	•		•	•
Increased maintenance costs	•			•
Performance issues	•			•
Change in performance standards	•		•	
Labour issues	•			•
Material issues	•			•
Non-availability of facility or portions thereof	•			•
Vandalism during O&M period	•		•	•
Fire damage	•		•	
Flood and other natural disasters	•		•	
Water, air and/or soil pollution	•			•
Labour disputes	•		•	•
School security issues	•		•	
Unplanned major replacements	•			•
Soft maintenance issues	•		•	
School Board labour relations	•		•	
Consequential damage due to contractor non-performance		•		•
Facility condition risk at 20/25/30 years	•			•
Third party damages risk	•		•	
Liability insurance	•		•	•
Business Risks				
Bankruptcy of contractor	•		•	•
Subcontractor default	•			•

[8] The project DBFM agreement should be consulted for a comprehensive allocation of risks between the parties. The final form of the project DBFM agreement is available at http://www.infrastructure.alberta.ca/3865.htm.

Appendix C: Schools included in the project

Table 2: School jurisdictions and communities served

School Jurisdiction (Board)	Project Community / Grade Structure	End (Full) Capacity of School
Calgary Board of Education	Saddle Ridge / K-4	550
Calgary Board of Education	Evergreen / K-4	550
Calgary Board of Education	Bridlewood / K-6	600
Calgary Board of Education	Cranston / K-4	550
Calgary Board of Education	Royal Oak / K-4	550
Calgary Board of Education	West Springs / K-4	550
Calgary Catholic Schools	Evergreen / K-6	600
Calgary Catholic Schools	Cranston / K-9	840
Calgary Catholic Schools	Saddle Ridge / K-9	840
Edmonton Catholic Schools	Rutherford East / K-9	500
Edmonton Catholic Schools	The Hamptons/ K-9	500
Edmonton Catholic Schools	Terwillegar Heights/ K-6	500
Edmonton Public Schools	Carlton / K-9	850
Edmonton Public Schools	Tamarack / K-9	850
Edmonton Public Schools	Terwillegar Towne / K-9	850
Edmonton Public Schools	Belle Rive / K-9	850
Edmonton Public Schools	Rutherford West/ K-9	850
Edmonton Public Schools	Hollick-Kenyon/ K-9	850
TOTAL NUMBER OF STUDENTS		**12,230**

Appendix D: Commentary by Fairness Auditor

R.B. (Dick) Innes, CA
17708 85th Avenue
Edmonton, Alberta
T5T 0N6

Tel: 780 487 2341
Email: rbinnes@telusplanet .net

Personal and Confidential

October 31, 2008

Diane Dalgleish,
Assistant Deputy Minister, Capital Projects
Alberta Infrastructure
2nd Floor, 6950 – 113th Street
Edmonton, Alberta, Canada
T6H 5V7

Dear Ms Dalgleish;

Re: Fairness Auditor's Report upon completion and Financial Close of the Alberta Schools Alternative Procurement (ASAP I) Project.

This Fairness Report is being provided to you as Chair of the Project Review Committee in accordance with the Fairness Auditor Terms of Reference

In order to ensure that the transaction is being conducted fairly and consistently, the following fairness principles are used as guidelines throughout the transaction process:

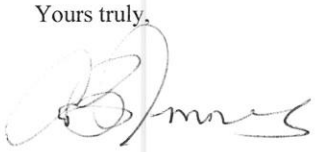
- All Interested Parties, Respondents and Proponents have the same opportunity made available to them to access information.
- The information made available to Interested Parties, Respondents and Proponents is sufficient to ensure that they have the opportunity to fully understand the opportunity.
- All Interested Parties, Respondents and Proponents have reasonable access to the opportunity.
- The criteria established in the invitation documents truly reflect the needs and objectives in respect of the project.
- The evaluation criteria and the evaluation process are established prior to the evaluation of submissions.
- The evaluation criteria, RFQ/RFP, and evaluation processes are internally consistent.
- The pre-established evaluation criteria and evaluation process are followed.
- The evaluation criteria and process are consistently applied to all submissions.

In carrying out my responsibilities as Fairness Auditor within the framework of the fairness principles set out above, I have:

- Reviewed transaction documents including the Request for Qualifications (RFQ), Request for Proposal (RFP), and the Design, Build, Finance, and Manage (DBFM) Agreement, Schedules, and Addenda thereto. I also reviewed the Process Framework, Submission Requirements, and the Evaluation Procedures used throughout the procurement.
- Reviewed Respondent and Proponent questions and answers thereto throughout the process.
- Attended all meetings between the Respondents, Proponents and the Project Team as well as weekly ASAP Team Meetings, DBFM review meetings, Project Review Committee meetings, Liaison Committee meetings, and Evaluation Team meetings,
- Observed and monitored the various selection activities throughout the process including attendance at the Financial Close with the Preferred Proponent.
- Reviewed meeting minutes, email, and reports of the various committees and teams involved in the process.
- Provided advice on fairness matters when required.
- Reported to the ASAP Team and Project Review Committee on a regular basis.

It is my opinion that the ASAP Team has dealt with all Respondents and Proponents in an open and transparent manner throughout the ASAP I process through to Financial Close and has carried out the selection process in an unbiased, fair and consistent manner.

Yours truly,



R.B.(Dick) Innes, CA
Fairness Auditor
ASAP I Project

Appendix E: Summary of bids received

Table 3: Financial bids received from proponents on July 4, 2008

Item	Public Sector Comparator ($million)	P3 Procurement ($million)		
		B & B Alberta Schools	New Alberta Schools	Plenary Education Alberta
Total net present value of design, construction, finance and operations and maintenance	731	634	780	682
Value for money of P3 procurement				
$	Not applicable	97	(49)	49
%	Not applicable	13.27%	(6.70)%	6.70%

Appendix F: Payment adjustments

Table 4: Sample of key payment adjustments included in P3 contract [9]

Issue	Payment Adjustment
Failure to correct deficiencies identified by External Audit within specified time	$5,000 / week for first four weeks; $10,000 / week thereafter
Failure to develop and provide 5 year Maintenance Plan on first day of school year	$1,200 / week
Failure to develop and provide 5 year Renewal Management Plan on first day of school year	$1,200 / week
Failure to register each school with Canada Green Building Council (LEED™ Requirement)	$200 / day / school
Failure to obtain LEED™ Silver Certification within 24 months from school availability	$100,000 / uncertified school
Failure to deliver required construction schedules and submittals to province within time specified	$1,500 / undelivered schedule
Failure to rectify any default with respect to site requirements within time specified	$1,500 / day / default
Failure to rectify any default with respect to maintenance and renewal waste disposal requirements within time specified	$300 / day / default
Failure to provide as-built drawings and updated operations and maintenance manuals to province within time specified	$2,000 / month / undelivered set
School is inaccessible	$5,000 to $20,00 per day or partial day ($30,000 during examination periods)
Failure to make repairs within the repair period or install temporary protection and measures	Emergency failures - $2,000 per day or partial day per school Routine failures - $500 per day or partial day per school

[9] The project DBFM agreement should be consulted for details on all payment adjustments. The final form of the project DBFM agreement is available at http://www.infrastructure.alberta.ca/3865.htm.

Appendix G: Proponent Teams

Table 5: Composition of proponent teams invited to participate in RFP process

Team Component	B & B Alberta Schools [10]	New Alberta Schools	Plenary Education Alberta
Project Lead	Babcock & Brown ULC (75%)	Acciona S.A. (50%)	Plenary Group (Canada) Ltd.
	Gracorp Capital Advisors Ltd./GVest GP Inc. (25%)	Carillion Canada Ltd. (50%)	
Design Build	Graham Design Builders, a JV	Acciona Infraestructuras, S.A.	Stuart Olson Constructors Inc.
	Bird Construction Company, A Limited Partnership	Chandos Construction Ltd.	Dominion Construction Inc.
	Barr Ryder Architects and Interior Designers	Clark Builders	IBI Group Architects, Engineers
	GEC Architecture	Elan Construction Ltd.	Hemisphere Engineering Inc.
	Protostatix Engineering Consultants Inc.	Stantec Architecture Ltd.	Tomecek Roney Little & Associates Ltd.
	MMP Engineering		BPTEC-DNW Engineering Ltd.
	A.D. Williams Engineering Inc.		Golder Associates Ltd.
Operation and Maintenance	Honeywell Limited	Carillion Canada Inc.	Johnson Controls LP
Financing	Babcock & Brown ULC	Carillion Canada, Inc.	Deutsche Bank, AG New York Branch
	Gracorp Capital Advisors Ltd./GVest GP Inc.	Acciona S.A.	
Other Advisors	Davis LLP (lead team counsel)	Blake, Cassels & Graydon LLP (lead team's counsel)	Davies Ward Phillips & Vineberg LLP (lead team counsel)
	Burnet, Duckworth & Palmer LLP (design-build's counsel)	McMillan Binch Mendelsohn LLP (lender's counsel)	McCarthy Tétrault LLP (lender's counsel)
	Enermodal Engineering		
	AON Canada		
	NATIONAL Public Relations		

[10] B&B Alberta Schools was the proponent group that developed and submitted the successful proposal. Once the RFP process was completed, the project leads for B&B Alberta Schools formed a special purpose organization, BBPP Alberta Schools Limited, to carry out the work of the contract.

Tab 78

Government of Alberta

P3 Value for Money Assessment and Project Report

Alberta Schools Alternative Procurement (ASAP) Project Phase II



September 2010

Alberta

8154

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Value for Money Assessment and Project Report on Public Private Partnership (P3) for ASAP II

September 2010

1. **Summary:** Using a P3 for 10 new schools - did it work?

By using a Public Private Partnership (P3) to design, build, finance and maintain 10 schools in Edmonton and the Calgary region, the Government of Alberta saved $105 million (in today's dollars) over 32 years compared to a traditional approach ($253 million instead of $358 million, a 29% savings).[1] These schools will also be delivered up to two years earlier than with the traditional method. The government chose a P3 approach to deliver the Alberta Schools Alternative Procurement Phase 2 project, known as ASAP II. The following assessment shows that using a P3 delivered value for money and that it was the right way to procure the 10 schools.

Following the success of the ASAP I project, the government, on January 30, 2008, announced the building of 14 new schools in the Edmonton and Calgary regions. The project was later split to deliver 10 K-9 schools as a P3 and four high schools as a design-bid-build project. This report addresses the procurement of the 10 K-9 schools only, to be delivered through a P3. Knowledge gained from and the business structures used for ASAP I served as a basis for the procurement of the ASAP II project.

The P3 project will utilize core school designs that provide equitable facilities meeting provincial school standards and guidelines and will support the Alberta curriculum. This standardized approach will provide a high degree of equality for all school boards involved in the project.

The government signed the P3 contract, with a 32-year term, in April 2010 with B2L Partnership (the Contractor) to design, build, finance, and maintain the 10 new schools. The contract requires the schools to be ready for school boards on June 30, 2012 so they can be available for students in September 2012.

The cost savings and earlier completion were achieved due to:

- economies of scale
- allocation of risks to the sector best able to manage them
- fixed cost contract
- construction process efficiencies

This report explains what a P3 is and why it may be used, provides a value for money assessment of the P3 for 10 new schools, and provides a project report.[2]

[1] This savings calculation is based on the amounts in the bids for the ASAP II Request for Proposals

[2] This report was developed by Alberta Infrastructure and Alberta Education following the value for money methodology in the Government of Alberta's *Management Framework: Assessment Process*.

2. Background

What is a P3?

A P3 is a non-traditional way for government to create capital assets (such as roads, schools, and other types of government facilities). In the case of ASAP II, the government entered into one agreement with a contractor, responsible for designing, building, partially financing and maintaining the schools over a 32 year period (2 years of design and construction; 30 years of maintenance).[3]

A P3 can save time, money and reduce risk to the government by having one contractor design, build, finance, and maintain a facility, which is why the abbreviation "DBFM" is sometimes used. For Alberta P3 projects, the public sector owns the facility and provides public services to Albertans, the same as it does with a traditional approach. In this P3, the school boards own the 10 schools and deliver education as they do in their other schools.

What is a traditional approach?

In a traditional approach, the public sector hires an architect to design a school or other facility, then hires a construction contractor to build it. Once the facility is built, the public sector operates and maintains it, typically by awarding numerous individual contracts for repairs and renewal. The government pays for the construction of the facility by making progress payments (for its own infrastructure) or by making capital grants to entities such as school boards, health authorities, and post-secondary institutions. Grant funding is also used to operate and maintain the facility.

What does a Value for Money (VFM) Assessment do?

A VFM assessment measures whether a P3 is the best option for a particular project. In the case of the ASAP II project, it compared the cost of building and maintaining the same schools using the two different methods: traditional and P3. The VFM for a project is the difference between the two costs. The goal of a P3 is to provide value; to do so, the P3 must cost less – measured by net present value – than the traditional method over the life of the contract.

What is net present value?

Net present value is the current value of a future sum of money. It is a standard method to compare the value of money over time (a dollar today is worth more than a dollar tomorrow because of interest and inflation) to assess long-term projects. It is produced by applying an interest rate and an inflation rate (collectively called the "discount rate") to a future sum. The amount and timing of cash flows differ in the two options for producing the schools (traditional and P3) and the calculation of net present value accounts for those differences. The net present value of the cost to produce and maintain a facility using the traditional approach is called the Public Sector Comparator, or PSC.

Nominal payment reflects the total payments made over the life of the asset at face value (unadjusted for interest and inflation).

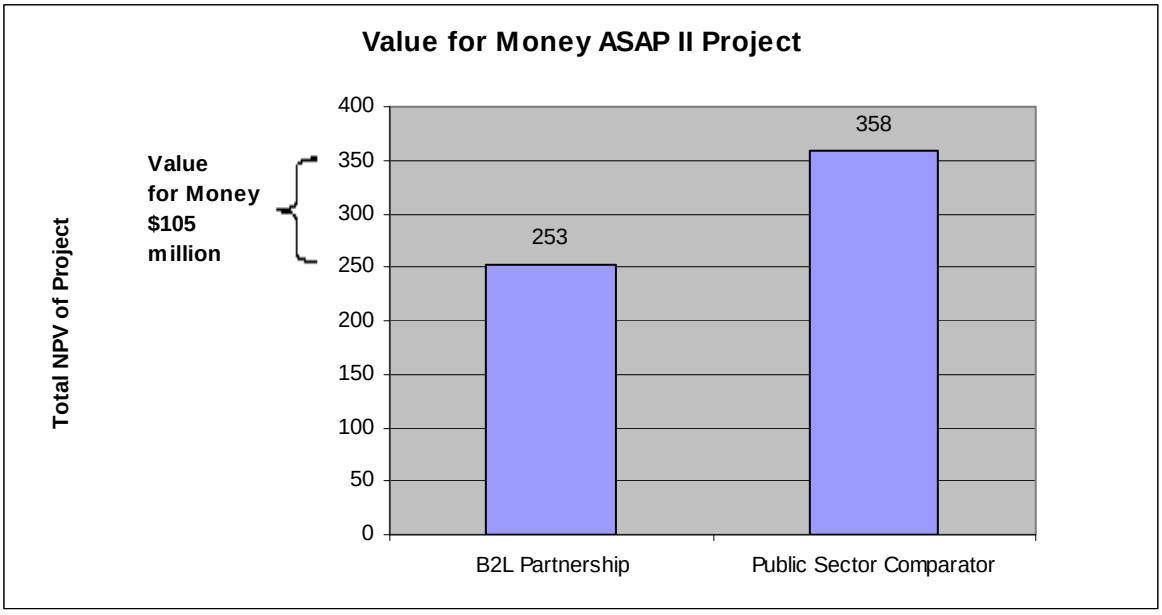
[3] For detailed discussion on P3s, see the Annual Report of the Auditor General of Alberta 2003–2004, at pages 49 to 72 (www.oag.ab.ca/files/oag/ar2003-2004.pdf).

3. VFM Assessment of the P3 used for 10 new schools

Money and time saved by using P3: Quantitative measures of value

This VFM assessment uses net present value as of March 1, 2010, when bids were received. It includes the costs to design, build, partially finance and maintain the schools over the 32-year life of the contract. It also includes the impact of risk transfer (as discussed later in this section) but excludes costs common to both methods, such as furniture and equipment, broadband connections and land costs.[4]

The cost of doing the project through P3 delivery method is tendered at $253 million, saving Alberta taxpayers $105 million (29%) in today's dollars (confirmed by Deloitte & Touche LLP – see Appendix A). The 10 schools are scheduled to be ready about two years earlier than with the traditional method. As a result, the Alberta government entered into the contract to design, build, and finance the 10 new schools and maintain them for a 30-year term. The P3 selection process is based on the net present value of the project or the total value of all aspects of the project over the life of the agreement, expressed in today's dollars.



[4] Capital and renewal costs for both methods were developed by Tech-Cost Consultants Ltd. Inflation and discount rates were provided by the Ministry of Finance and Enterprise. Deloitte & Touche LLP developed the financial model.

Private financing by the contractor costs more than public financing by government but in the case of ASAP II that cost was more than offset by the following factors:

1. **Allocating risks to the party who can best manage them** means that the contractor bore many of the costs that the government would have borne in the traditional approach. For example, the contractor will pay for any changes needed during the construction period due to design errors. The contractor will also bear any cost increases for labor and material during the construction period. In addition, for the 30-year maintenance and renewal term, the contractor will pay to replace any defective building parts or parts that have reached the end of their useful life. A list of some of the major risks that the P3 contract allocated to the contractor is in Table 1 (Appendix B) of this report and discussed on pages 17, 18 and 19.

2. **Using innovative building techniques and materials** will save the government money over the contract term. In the Request for Proposals (RFP) stage, the three proponents presented several innovations to meet stringent, long-term quality requirements set in the technical documents. The contractor incorporated many of these techniques into the final design.

   The members of the contractor's design, building, and maintenance team collaborated to develop innovations and efficiencies that reduced costs over the life of the contract.

3. **Achieving economies of scale by designing and building 10 schools** in different locations on a tight schedule. For example, it costs much less (per boiler) to buy 20 boilers at the same time than two. Similarly, key parts such as structural steel, brick and block, windows, doors, floor finishes, and electrical and mechanical equipment cost far less when bought and installed in bulk. Because the contractor would have a guaranteed group of 10 schools, it could secure a supply of most parts early in the construction period, avoiding higher costs for labor, material, equipment and sub-trades later in the construction period.

4. **Developing construction schedules that allow continuous and efficient workflow** between construction sites to minimize downtime between operations and reduce mobilization costs for work crews and equipment. For example, buying over 100 manufactured high-performance[5] modular classrooms allows manufacturing plants to schedule production runs well ahead of time resulting in timely delivery and installation of the classrooms.

[5] The modular classrooms are based on specificattions that ensure significantly improved heating, ventilation, soundproofing, resistance to mould, ease of serviceability and several other factors that differentiate them from the older portables (see Alberta Educations' *School Capital Manual – September 2009*, page 6)

Qualitative measures of value

1. **Controlled scope.** By bundling 10 schools with standardized designs into one package, the government controlled the scope of the project and managed the risk of any potential scope changes. The government worked closely with each school board to ensure that their program needs were met early in the design process, and that these requirements were clearly expressed to proponents during the RFP phase. This ensured the government's equal treatment of school boards, with each receiving schools of consistently high quality.

2. **Earlier opening.** The scheduling advantages explained earlier will have the 10 schools open in September 2012, about two years earlier than if the government used the traditional method. Students in these schools will no longer have to take long bus rides to other communities; instead, they can spend more time in play and community based activities before and after school.

3. **30-year maintenance and renewal period.** This gives the government and school boards assurance that schools will be maintained in good condition for 30 years. The P3 contract transfers maintenance of the schools from the school board (government) to the contractor for the term of the contract. This effectively gives the government a 30-year warranty for all 10 schools, with no deferred maintenance at the end of 30 years.

4. **Better workforce management.** The relatively long time to set up a P3 (just over six months) allows proponents to establish labor and equipment supply and to negotiate contracts for materials supply. Traditional contracts, typically with a four- to six-week tender period, introduce a lot of risk into the process, as the bidding contractor has only a short time to negotiate scheduling of labor, materials and equipment to arrive onsite at the right time. The P3 results in a single contractor for all 10 schools; for traditional contracts, contractors could be bidding several jobs at the same time. The P3 contractor can offer continued, attractive employment to workers.

Major risks allocated in P3 contract

An important factor in the delivery of P3 projects is an acceptable allocation of risks to the party or parties best able to manage them. In some cases, the contractor is the appropriate party to manage a risk; in others, the government can better manage the risk; in yet a third case, the risk may be best shared between the two parties.

Table 1 (Appendix B) shows a sample of the risk allocation between the government and the contractor in the P3 contract and schedules. This list is not comprehensive. The P3 contract shows all the allocated risks.

Cost overruns: the contractor bears the risk of any construction costs above the bid price in the P3 contract. Maintenance and renewal payments are indexed based on the contract formula, so the contractor pays any increased maintenance costs above the index during the contract.

Schedule certainty: the contractor agreed to have the 10 schools available for use by the school boards by June 30, 2012 or receive reduced payments. The contractor has to manage the construction schedule to meet this date.

Weather: the contractor bears any costs of project delays caused by bad weather.

Scope changes: the government pays for any scope changes that it or a school board wants during construction. The government will pay for this work in accordance with the change order process set out in the P3 contract.

During the maintenance and renewal period, the government or school boards may consider changes to schools. For example, changes in local demographics may require a school board to request approval from the government to add or remove high-performance classrooms. The government will pay for this work, as long as the contractor accepts competitive pricing based on a tendering process as specified in the P3 contract.

Interest rates and financing: during the maximum two-month period between notifying the preferred proponent (which became the contractor when it signed the P3 contract) and signing the contract, the government shared the risk of any changes in base borrowing rates with the preferred proponent.

The contractor had to arrange for partial financing for the whole term of the contract and is solely responsible for the impact of the financing arrangements. No matter how much rates increase during the contract, the contractor must pay any increased refinancing costs. Conversely, the contractor can benefit from any rate drops.

Permitting: during the procurement phase of the project, the government worked with the four municipalities to ensure that development permits for the schools were in place, with as few conditions as possible. Once the contractor signed the contract, it was responsible to have the municipalities transfer the development permits to it. The contractor assumed any schedule risks of not being able to obtain the building permits on time.

4. Project report

Project goals

1. **Deliver ten K-4, K-9 and Grades 5-9 schools in high-growth areas in Edmonton and Calgary regions** and adapt to the particular program needs of the individual boards. The ASAP II project aims to put new schools in the areas that need them—quickly, while also providing flexibility in planning to accommodate jurisdictions' individual learning priorities. Edmonton will receive three new schools, Calgary will receive five, and Langdon and Okotoks will each receive one new school.

2. **Use efficient and environmentally sustainable (LEED Silver) school design** as part of a new approach to construction. Core school designs for K-4, K-9 and Grades 5-9 school configurations will be used to build the 10 new schools in Edmonton, Calgary, Okotoks and Langdon. High-performance modular classrooms can be added or removed from the core building as needed, allowing schools greater flexibility to respond to changes in student enrolment. The designs will also be easily adaptable to different sites across the province.

3. **Equality of facilities** where standard core elementary,–middle and elementary/junior high schools will be designed and constructed for the school boards to be of a consistent standard and configuration across the project bundle. This standardized approach will provide a high degree of equality for all school boards involved in the project.

4. **Ensure short-term cost certainty** for building the 10 schools and **long-term cost certainty** for maintaining them. Construction rates had increased between 18 and 25% and then decreased by 15 – 18% per year in recent years. As the project shifts the risk of increased construction costs to the contractor any increase in construction rates is borne by them. The cost of maintenance and renewal is adjusted according to a prescribed process; any increases above the rate prescribed by the process will be borne by the contractor.

Table 2 (Appendix C) lists the 10 new schools in the project

The school boards remain responsible for daily operations which include daily custodial work, movement of desks and other furniture, and cleaning.

Project outcomes

The following outcomes will be achieved by delivering ASAP II as a P3:

- **Cost certainty over the life of the schools:** shifting the risk of increasing construction rates and other financial risks to the contractor ensured cost certainty for the design, building, maintenance and renewal of the schools.

- **An innovative, repeatable and accountable process for school facility project delivery:** the successful implementation of the P3 process resulted in a project delivery mechanism that leverages innovation and can potentially be repeated in various locations and with different types of infrastructure around the province.

- **Less time and lower cost to produce schools:** to allow the K-4, K-9, and 5-9 middle schools to open in September 2012, enabling full school operations at the beginning of the school year. To plan, design, and build from three to five schools is a significant undertaking for each school board. Using the traditional approach, it could take as long as five years for all the schools to be ready for students. In contrast, the P3's coordinated, comprehensive approach will produce 10 schools ready in only three years, at lower cost.

- **A 30-year "warranty" for each school:** the contractor is responsible for ongoing maintenance and renewal of building parts for the 30-year maintenance phase which is, in effect, a 30-year "warranty" for each school.

Approaches considered

The alternative procurement approaches considered to deliver the 10 schools in this project proposal are shown below:

1. **Traditional Design-Bid-Build approach** with the usual "pay-as-you-go" financing by the government and delivery by school boards. Private-sector architects and consultants, hired by school boards, design the schools. Stipulated-price construction contracts are awarded through a traditional open-bidding process tendered by school boards to private-sector contractors. The province approves the contracts under the *School Buildings and Tendering Regulation*. Daily operations and maintenance, and infrastructure maintenance and renewal, are funded by provincial grants. Although, this approach is most familiar for the government and school boards, it is probable that all schools would not be completed until 2014 and could be subject to "scope creep" and budget overruns.

2. **Design-Build-Finance-Maintain approach**, the basis of the P3, follows the procurement of the 10 K-4, K-9 and Grade 5-9 schools utilizing similar principles and processes to the ASAP-I procurement. The winning private-sector proponent (the contractor) forms a consortium or group to handle the project from start to the end of the contract. Then the contractor is responsible for the ongoing maintenance of the schools for a set time (in this project, 30 years), and for having a renewal plan for school components to ensure they meet the performance requirements. School boards still handle daily cleaning and operations of the schools. The government makes monthly payments to the contractor during the 30-year maintenance phase of the contract. Payments start after the schools are ready to use and cover both capital and maintenance and renewal costs. The government can reduce payments based on criteria such as the whether the schools are available for use and whether the buildings meet certain standards.

Selection process

The government's selection process was open, competitive, timely and transparent. A fairness Auditor, Mr. Richard Innes, CA, oversaw the process to ensure it was fair and provided an independent report by observing and reviewing the process (Appendix D).

A Request for Qualifications was publicly issued on May 1, 2009. Four teams responded and were evaluated on experience, personnel qualifications, past performance and financial capability. The three teams asked to submit proposals were Alberta Public-Private Learning Experience (APPLE) Group, Build II Learn and Plenary Lend Lease Education Alberta.[6]

The Request for Proposal (RFP) process ran from July 2, 2009 to March 1, 2010. The "made-in-Alberta" approach to P3s ensures the process is competitive throughout. During the RFP process, the teams made financial and technical submissions to ensure that they met the project's minimum specifications. The government issued a draft form of the contract during the RFP process. The teams provided comments on it. Before receiving financial bids, the government issued the final form of the contract that the successful proponent signed. There were no negotiations on this contract after financial bids were received.

Once the three teams successfully completed all submissions, they all submited financial bids based on the final form of the contract. These bids are summarized in Table 4 (Appendix F). Build II Learn submitted the lowest price, on a net present value basis, and won the contract. Build II Learn then created a special purpose company, known as B2L Partnership, to carry out the work of the contract.

Key terms of P3 contract

What the government must pay: The total cost of the 32-year contract is about $415 million in nominal dollars, or $253 million in 2010 dollars.

The contractor will be paid about 50% of the construction cost as progress payments. Once all schools are complete, the government will pay the contractor monthly amounts in three separate streams: capital, maintenance and renewal, over the life of the contract.

Capital payments are fixed, while maintenance and renewal payments are indexed.[7]

If any school is not ready by June 30, 2012, the government will pay only that part of the progress payment attributable to completed schools. The rest of the payment will be made upon school availability. Additionally the government will make monthly maintenance and renewal payments and 80% of the monthly capital payment only for completed schools, until all 10 schools are completed. The contractor will thus lose capital, maintenance, and renewal payments for every school not completed by the target date, plus 20% of the monthly capital payment for completed schools.

What the contractor must do: The 32-year contract between the government and the contractor has a two-year construction period and a 30-year maintenance period. It requires the contractor to:

- Complete the design and construction of the 10 schools in the Edmonton and Calgary regions described in Table 2 (Appendix C) by June 30, 2012;

[6] The companies that make up the teams are listed in Table 3 (Appendix E).
[7] Four indices are used to calculate maintenance and renewal payments. AUPE Maintenance Service Worker II published hourly salary; NAICS repair and maintenance hourly rate; Statistics Canada consumer price statistics (excluding food and energy); and Statistics Canada Non-residential building construction price index.

- Partially finance the construction over the term of the contract;
- Maintain the 10 schools to the standards specified in the contract;
- Have a renewal plan for school components to ensure they meet the performance requirements; and
- Hand back responsibilities for maintenance and renewal of the schools to the school boards in June 2042, ensuring facilities are turned over in the condition prescribed in the contract.

Payments reduced for non-performance: The government can reduce all monthly payments (capital, maintenance, renewal) if the contractor does not meet performance specifications in the contract. For example, if a boiler does not perform efficiently and the contractor fails to repair or replaced it within the allowed time, the government can reduce monthly payments to the contractor.

A detailed description of all the payment adjustments is in schedule 15 of the DBFM contract, and a sample appears on Table 5 (Appendix G) of this report. A final form of the DBFM contract is at http://www.education.alberta.ca/department/ipr/p3project/asapii.aspx.

School Boards own the schools: Ownership of the facilities rests with the school boards while the contractor has a license from the government to access the schools for construction, maintenance, and renewal activities. The school boards will be responsible for day-to-day operations of the facilities, including ongoing custodial services, lighting, heating, and all other ongoing traditional operational activities. The school boards can use the schools for education purposes and for community and other purposes as defined in long-standing joint use agreements between the cities and the respective school boards that apply to all schools. The boards can also lease excess space for education related purposes such as day-care and assume the related risks. School boards will remain publicly accountable for delivering education programs for all schools in their jurisdiction.

Monitoring during and after construction

During construction, the government is using Barr Ryder Architects as its consultant to review the designs and ensure that construction standards have been met. The contractor has to provide monthly reports on design and construction issues.

In the maintenance and renewal period, the contractor will self-monitor and report on its compliance with the technical specifications. The government will also perform its own inspections and testing to ensure the standards continue to be met. In addition, the contractor's lender has a consultant review its performance.

Accounting treatment

The accounting treatment for P3 projects follows generally accepted accounting principles set out by the Public Sector Accounting Board of the Canadian Institute of Chartered Accountants. The obligation is "on-book", so the province records the obligation as the asset is built and records the cost of building the asset as a capital expense because school boards own the schools.

Project schedule

The P3 contract was signed on April 15, 2010 and construction is expected to start on some sites by the end of summer 2010. The contractor must deliver the schools by June 30, 2012

or face a payment reduction. An independent certifier will certify when the schools are available for use. The schools are due to open to students by September 2012.

The maintenance period starts after the schools are available and continues until June 2042, when the license granted to the contractor to access the schools for maintenance and renewal activities will expire and all payments cease. The contractor must hand back the responsibility for maintenance and renewal of the schools in the condition specified in the contract. The government and the contractor will assess the schools to ensure they are in the condition specified in the contract when the contract expires. After the contract expires, the schools boards will be responsible for operating, maintaining, and renewing the schools in their jurisdiction.

Appendix A: Commentary by Deloitte & Touche LLP

Amended March 2, 2010

Introduction

Scope of Report

This report presents the comparison of the Financial Offers received from ASAP II Proponents in their SR3 submissions to determine the Preferred Proponent. It also calculates the Value for Money realized by the Preferred Proponent's Financial Offer. The purpose of this report is to provide a concise summary of the bid evaluation process to identify the Preferred Proponent and to facilitate the notification of the Preferred Proponent.

Timing and PSC Updates

The cost estimates that form the basis of the Public Sector Comparator (PSC) were updated by Alberta Infrastructure on January 5, 2010. The financing assumptions were updated by CIBC on January 18, 2010. Using the updated assumptions, the PSC was finalized prior to receipt of the Proponents' SR2B submissions, and was deposited with the Deputy Minister of Justice on January 27, 2010. The PSC expressed as a net present value (NPV) as of January 1, 2010 was $352.98 million.

The PSC was recalculated on February 25, 2010, using the discount rate and inflation rate that was determined by Alberta Finance as the basis for calculating the net present value of the Proponents' Financial Offers. None of the other input assumptions (costs, etc.) were altered. The PSC expressed as an NPV as of January 1, 2010 based on the updated discount rate and inflation rate was $355.83 million.

The Financial Offers from Proponents were received on March 1, 2010.

For purposes of evaluation, the NPV of the PSC was recalculated to a base date of March 1, 2010 to match the date that financial offers were received. None of the other input assumptions (costs, discount rate, inflation rate, etc.) were altered. The PSC expressed as an NPV as of March 1, 2010 is $358.59[1] million. The PSC referred to herein is this recalculated value.

Limitations

This Report was prepared for the exclusive use of Alberta Infrastructure, and is not to be reproduced or used without written permission of Deloitte with the exception of its use with regard to the procurement process for the ASAP II P3 project. No third party is entitled to rely, in any manner or for any purpose, on this Report. Deloitte's services may include advice or recommendations, but all decisions in connection with the implementation of such advice and recommendations shall be the responsibility of, and be made by, Alberta Infrastructure.

Deloitte's scope of work related to the PSC was limited to the review and updating of a PSC spreadsheet model provided by Alberta Infrastructure. The PSC's financial assumptions and cost estimates are those of Alberta Infrastructure. Deloitte's scope of work related to the VfM was limited to development of a spreadsheet to calculate and compare the net present value of the financial offers using Alberta Infrastructure's methodology.

This Report relies on certain information provided by Alberta Infrastructure and the Project's Proponents, and Deloitte has not performed an independent review of this information. It does not constitute an audit conducted in accordance with generally accepted auditing standards, an examination or compilation of, or the performance of agreed upon procedures with respect to prospective financial information, an examination of or any other form of assurance with respect to internal controls, or other attestation or review services in accordance with standards or rules established by the CICA or other regulatory body.

[1] The previous version of this report dated March, 1, 2010 which was in draft form and under review stated the recalculated PSC as $360.79 million. The value of $358.59 million in this report is based on final review of the draft report and underlying calculations.

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Method

The Financial Offers consist of the following payments:

- Monthly payment stream over the operating period July 1, 2012 to June 30, 2042 inclusive), consisting of:
  - Capital Payments (identical monthly payments stated in nominal dollars)
  - Maintenance Payments (monthly payments for Maintenance, stated in 2010 dollars)
  - Renewal Payments (monthly payments with timing as needed for Renewal, stated in 2010 dollars)
- Total Provincial Funding, calculated by multiplying the amount of one full month's Capital Payment by 137.

The total cost of the Financial Offers on a net present value basis was determined by calculating the sum of the net present values (as at the SR3 submission date of March 1, 2010) of:

- the Capital Payments;
- the Maintenance Payments, after first adjusting each payment for inflation using a fixed estimated inflation rate of 2.45% per annum determined by Alberta Finance;
- the Renewal Payments, after first adjusting each payment for inflation using the fixed estimated inflation rate of 2.45% per annum determined by Alberta Finance; and
- the Provincial Funding, after first distributing the amount into a number of separate progress payments using a pre-determined schedule of payment dates and payment amounts (with each amount defined as a percentage of Provincial Funding). The schedule of payment dates and amounts is taken from the Shadow Bid, which has monthly payments of an average of 0.71% of Provincial Funding commencing in July 31, 2012[2].

The discount rate used to calculate net present values is 4.9% per annum, determined by Alberta Finance based on the Province's borrowing costs.

Process and results

To determine the Proponent that provided the Financial Offer with the lowest total cost on a net present value basis, the Proponent's Form G1 cashflows (Columns B, D, and E) were value-copied into the bid comparison spreadsheet that was developed in advance.

The payment cashflows as copied into the bid comparison spreadsheet were compared to and spot-checked against each Proponent's Form G1 (paper version) to confirm agreement between the Proponent's electronic and paper financial offers and the accuracy of the value-copy process. The sum of each cashflow in the bid comparison spreadsheet was also compared to the sum of the cashflow in the Proponent's Form G1 spreadsheet to again ensure the accuracy of the value-copy process. These comparisons confirm that the NPVs of each bid have been calculated according to the payments indicated on the paper version of each Proponent's Form G1.

The bid comparison spreadsheet calculates the NPV of the cashflows to the Proponents as of March 1, 2010, which is the basis for determination of the Preferred Proponent. The results are as follows:

Net Present Values for Offer Comparison *(NPVs to 01-Mar-2010)*	PSC	APPLE	Build II Learn	Plenary
Total Cost on Net Present Value Basis	$358,591,853.55	$273,460,772.90	$253,241,536.77	$296,454,547.45
		Rank: 2	Rank: 1	Rank: 3

The result as indicated in the above table is that B2L has the lowest NPV, and absent any SR3 submission compliance concerns, B2L would be the Preferred Proponent.

Calculation of final value for money

Overview

Value for Money (VfM) is determined by comparing the Preferred Proponent's Financial Offer to the PSC and is defined by Alberta Infrastructure and Transportation's P3 Management Framework as follows:

> *... net present value comparison of the comparable costs and risks of the proposed P3 project with the conventional project delivery over the same life cycle*

The cost of conventional project delivery for the Project is established as the PSC. The cost of P3 project delivery is estimated at several points in the project development process with a Shadow Bid, allowing VfM to be estimated and refined as project information improves. The final VfM analysis replaces the Shadow Bid's estimated cost with the cost of the Preferred Proponent's Financial Offer (i.e. the actual bid rather than the Shadow Bid).

Calculation

The VfM compares the cost of the Preferred Proponent's Financial Offer to the cost of the PSC. The VfM is therefore as follows:

	NPV (in millions)
Public Sector Comparator	$358.59 million
Preferred Proponent's Financial Offer	$253.24 million
Difference	$105.35 million

The VfM is therefore $105.35 million, or 29.38% of the PSC.

Appendix B: Sample of risk allocations

Table 1: Sample of Risk Allocations between Government of Alberta and Contractor [8]

	Traditional		P3	
	GoA	**Contractor**	**GoA**	**Contractor**
Construction Risks				
Design interaction with site conditions	•			•
Construction interaction with site conditions		•		•
Site safety		•		•
Construction methodology		•		•
Construction costs	•			•
Unforeseen site conditions	•		•	•
Labour issues		•		•
Material issues		•		•
Design errors	•			•
Schedule issues	•	•		•
Construction quality issues		•		•
Scope changes	•		•	
Delayed site access	•		•	
Material inflation	•	•		•
Not meeting agreed milestone dates		•		•
Adverse weather conditions	•	•		•
Labour disputes	•			•
Fire during construction		•		•
Vandalism/theft/arson during construction		•		•
Damage and/or injuries to third party		•		•
Damage and/or loss to utilities		•		•
Public interface	•	•		•
Workplace health and safety		•		•
Insufficient performance bonding	•			n/a
Subcontractor insolvency		•		•
General risks				
Land acquisition	•		•	
Life cycle management	•			•
Stakeholders management	•			•
Coordination and approvals through users	•			•
Third party objections	•			•
Patent infringement	•	•		•
GOA supplied data – accuracy	•			•
GOA supplied data – sufficiency	•			•

[8] The project agreement should be consulted for a comprehensive allocation of risks between the parties. The final form of the project agreement is available at http://www.education.alberta.ca/department/ipr/p3project/asapii.aspx.

GOA supplied data – interpretation	•	•		•
Utilities hook up/connections	•			•
Concept approvals – environmental	•		•	
Approvals Risks				
Development permits		•	•	•
Building permits		•		•
Occupancy permits		•		•
Environmental permits	•			•
Utilities crossing requirements	•	•		•
Regulatory requirements	•	•		•
Building Code compliance	•			•
Land Use approvals	•		•	
Utilities approvals	•			•
Municipal requirements	•			•
Environmental Risks - Known				
Geotechnical	•			•
Contamination	•			•
Archaeological	•			•
Flood plain analysis	•			•
Environmental Risks - Unknown				
Geotechnical	•		•	
Contamination	•		•	
Archaeological	•		•	
Flood plain analysis	•		•	
Technical Risks				
Core school design	•			•
Modular design and performance	•			•
Structure safety	•	•		•
Design quality issues	•			•
Material behaviour	•			•
Construction process innovation	•			•
Construction performance specification risks	•		•	
Operation performance specification risks	•		•	
Lack of building system integration	•			•
Aggressive schedule	•		•	•
Delayed schedule	•			•
Financial and Economic Risks				
Sourcing of capital – construction	•			•
Allocation of capital – operations	•			•
Cash flow management – construction	•			•

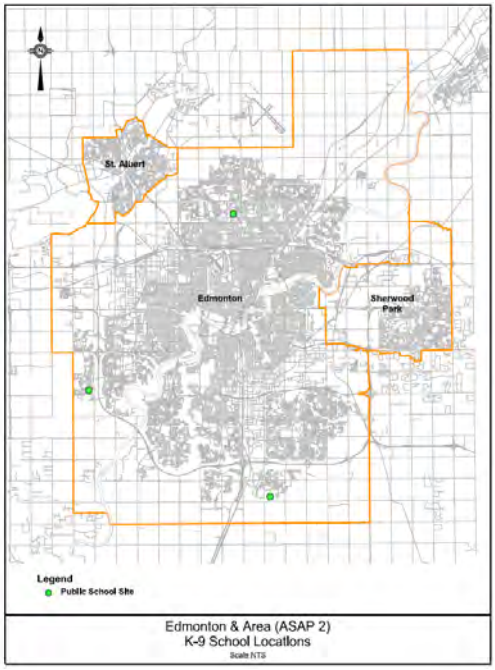
Cash flow management – operations	•			•
Inflation risks prior to financial close	•		•	
Base interest rate changes before Agreement signed	•		•	
Interest rate changes after closure	•			•
Inflation on operations, maintenance and renewal	•		•	•
Inflation on construction	•			•
Insurance	•		•	•
Change orders	•		•	
Government withdrawing from P3s	N/A		•	
Demand Risks				
Modular additions above original projections	•		•	
Modular additions (escalation impact)	•			•
Growth in student population over design capacity	•		•	
Changes in school programming	•		•	
Under-utilized school facilities	•		•	
Appropriateness of schools	•		•	
Operations and Maintenance Risks				
Changes in legislation	•		•	•
Damage to property	•		•	•
Increased maintenance costs	•			•
Performance issues	•			•
Change in performance standards	•		•	
Labour issues	•			•
Material issues	•			•
Non-availability of facility or portions thereof	•			•
Vandalism during O&M period	•		•	•
Fire damage	•		•	
Flood and other natural disasters	•		•	
Water, air and/or soil pollution	•			•
School security issues	•		•	
Unplanned major replacements	•			•
School Board labour relations	•		•	
Consequential damage due to contractor non-performance		•		•
Facility condition risk at 20/25/30 years	•			•
Third party damages risk	•		•	
Liability insurance	•		•	•
Business Risks				
Bankruptcy of contractor	•		•	•
Subcontractor default	•			•

Appendix C: Schools included in the project

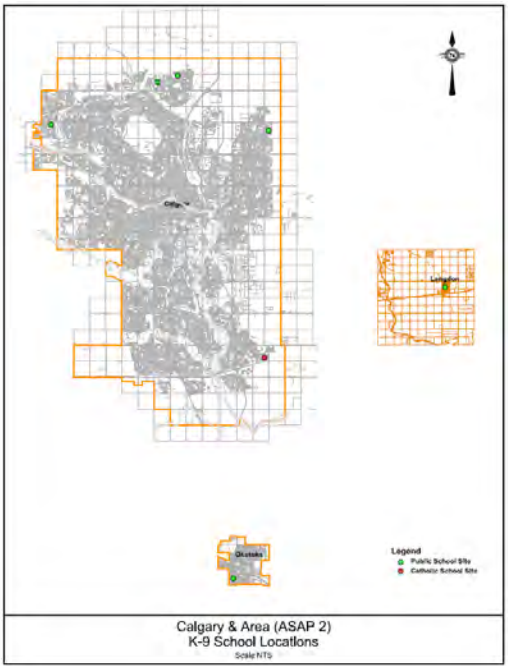
Table 2: School jurisdictions and communities served

School Jurisdiction (Board)	Project Community / Grade Structure	End (Full) Capacity of School
Calgary Board of Education No. 19	Coventry Middle School / 5-9	900
Calgary Board of Education No. 19	Tuscany Middle School / 5-9	900
Calgary Board of Education No. 19	Taradale Middle School / 5-9	900
Calgary Board of Education No. 19	Panorama Middle School / 5-9	900
Calgary Roman Catholic Separate School District No. 1	Copperfield Elementary School / K-9	900
Edmonton School District No. 7	Ellerslie Elementary School / K-9	850
Edmonton School District No. 7	Griesbach School / K-9	600
Edmonton School District No. 7	The Hamptons School / K-9	850
Foothills School Division No. 38	Okotoks School / K-9	700
Rocky View School Division No. 41	Langdon School / K-4	450
TOTAL NUMBER OF STUDENTS		7,950

Edmonton and Area School Sites



Calgary Area School Sites



Appendix D: Commentary by Fairness Auditor

June 24, 2010

Barry Day
Deputy Minister
Alberta Infrastructure
3rd Floor, 6950 – 113th Street
Edmonton, Alberta, Canada
T6H 5V7

Dear Sir

Re: Fairness Auditor's Report upon completion and Financial Close of the second Alberta Schools Alternative Procurement (ASAP II) Project.

This Fairness Report is being provided in accordance with the Fairness Auditor Terms of Reference

In order to ensure that the transaction is being conducted fairly and consistently, the following fairness principles were used as guidelines throughout the transaction process:

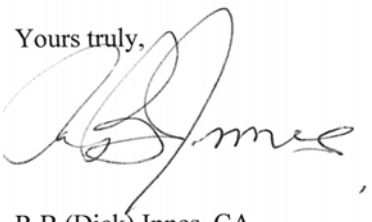
- All Interested Parties, Respondents and Proponents have the same opportunity made available to them to access information.
- The information made available to Interested Parties, Respondents and Proponents is sufficient to ensure that they have the opportunity to fully understand the opportunity.
- All Interested Parties, Respondents and Proponents have reasonable access to the opportunity.
- The criteria established in the invitation documents truly reflect the needs and objectives in respect of the project.
- The evaluation criteria and the evaluation process are established prior to the evaluation of submissions.
- The evaluation criteria, RFQ/RFP, and evaluation processes are internally consistent.
- The pre-established evaluation criteria and evaluation process are followed.
- The evaluation criteria and process are consistently applied to all submissions.

In carrying out my responsibilities as Fairness Auditor within the framework of the fairness principles set out above, I have:

- Reviewed transaction documents including the Request for Qualifications (RFQ), Request for Proposal (RFP), and the Design, Build, Finance, and Manage (DBFM) Agreement, Schedules, and Addenda thereto. I also reviewed the Process Framework, Submission Requirements, the Evaluation Procedures used throughout the procurement as well as information provided on the Sharepoint site.
- Reviewed Respondent and Proponent clarifications, questions and answers thereto throughout the process.
- Attended all meetings between the Respondents, Proponents and the Project Team as well as weekly ASAP Team Meetings, DBFM review meetings, Project Review Committee meetings, Deputy Minister meetings, Evaluation Team meetings, and Selection Committee meetings.
- Observed and monitored the various selection activities throughout the process including attendance at the Financial Close with the Preferred Proponent.
- Reviewed meeting minutes and reports of the various committees and teams involved in the process.
- Provided advice on fairness matters when required.
- Reported to the ASAP Team and Project Review Committee on a regular basis.

It is my opinion that the ASAP II Team has dealt with all Respondents and Proponents in an open and transparent manner throughout the ASAP II process through to Financial Close and has carried out the selection process in an unbiased, fair and consistent manner.

Yours truly,



R.B.(Dick) Innes, CA
Fairness Auditor
ASAP II Project

Appendix E: Proponent Teams

Table 3: Composition of proponent teams invited to participate in RFP process

Team Component	Build II Learn	Alberta Public-Private Learning Experience (APPLE) Group	Plenary Lend Lease Education Alberta
Project Lead	HOCHTEIF PPP Solutions North America Inc.	Bilfinger Berger Project Investments Inc.	Plenary Group (Canada) Ltd.
	Gracorp Capital Advisors Ltd.		Lend Lease Americas Inc.
Design Build	Graham Design Build Services, a JV	Stuart Olson Constructors Inc.	Lend Lease Americas Inc.
	Bird Construction Company, A Limited Partnership	Dominion Construction Company Inc.	Lear Construction Management Ltd.
	GEC Architecture	IBI Group Architects Engineers	Krawford Construction Inc.
	Gibbs Gage Architects	MechWave Engineering Ltd.	Jen-Col Construction Ltd.
	Terrain Group	Read Jones Christofferson Ltd.	Delnor Construction Ltd.
	BSEI Municipal Consulting Engineers Inc.	Stebnicki + Partners Consulting Electrical Engineers	Group2 Architecture Engineering Ltd.
	TRL & Associates		ACI Architecture Inc./Zeidler Partnership Architects Joint Venture
	Wiebe Forest Engineering		BPTEC-DNW Engineering Ltd.
	FFA Consultants		Kellam Berg Engineering and Surveys Ltd.
			Hidi Rae Consulting Engineers Inc.
			Al-Terra Engineering Ltd.
			Hukalo Oberg Engineering Ltd.
			KSJ Engineering Ltd.
			Thurber Engineering Ltd.
Operation and Maintenance	Honeywell Limited	Ainsworth Inc.	Johnson Controls LP
Financing	HOCHTEIF PPP Solutions North America Inc.	Bilfinger Berger Project Investments Inc.	Plenary Group (Canada) Ltd.
	Gracorp Capital Advisors Ltd.		Lend Lease Americas Inc.
	Investec North America Limited		

Appendix F: Summary of bids received

Table 4: Financial bids received from proponents on March 1, 2010

Item	Public Sector Comparator ($million)	P3 Procurement ($million)		
		Build II Learn[9]	**Alberta Public-Private Learning Experience (APPLE)**	**Plenary Lend Lease Education Alberta**
Total net present value of design, construction, finance and operations and maintenance	358	253	273	296
Value for money of P3 procurement $ %	 Not applicable Not applicable	 105 29.4%	 85 23.7%	 62 17.3%

[9] Build II Learn was the proponent group that developed and submitted the successful proposal. Once the RFP process was completed, the project leads for Build II Learn formed a special purpose company, B2L Partnership to carry out the work of the contract.

Appendix G: Payment adjustments

Table 5: Sample of key payment adjustments included in P3 contract [10]

Issue	Payment Adjustment
Failure to correct a deficiency or deficiencies identified by an External Audit within the specified time	$5,000/week for the first four weeks and $10,000/week thereafter
Failure by the Contractor to develop and provide the Province with an annually updated 5-year Maintenance Plan on or before the first day of each School Year	$1,200/week
Failure to provide the Province with an updated Emergency Response Plan by October 1 of every year for each School following School Availability of a School	$1,200/week
Failure to register each school with Canada Green Building Council for LEED™ Silver Certification within the time stipulated	$200/day/school
Failure to deliver to the Province any of the schedules indicated regarding construction schedules and submittals	$1,500/day
Failure to rectify any default of its obligations under M&R waste disposal requirements	$300/day/default
Failure to provide an updated “as-built” drawings and updated Operation and Maintenance Manuals to the Province within the time stipulated	$2,000/month/undelivered set
Failure to comply with any requirement referenced in Security Clearance and School Access Protocol	$4,000/incident
Failure to make repairs to exterior doors or windows within the repair period or install temporary protection and measures	Emergency failures - $2,000/day or partial day/school Routine failures - $500/day or partial day/school
Failure to make repairs within the repair period or install temporary protection and measures to the fire prevention equipment and Fire Alarm system	Emergency failures - $4,000/day or partial day/school Routine failures - $1,000/day or partial day/school
Failure to provide access to a School Building	$5,000 to $20,00/day or partial day ($30,000 during examination periods)

[10] The project agreement should be consulted for details on all payment adjustments. The final form of the project agreement and schedules is available at http://www.education.alberta.ca/department/ipr/p3project/asapii.aspx.

Tab 79

Government of Alberta

P3 Value for Money Assessment and Project Report

Alberta Schools Alternative Procurement (ASAP) Project Phase III



March 2013

Alberta

8180

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Value for Money Assessment and Project Report on Public Private Partnership (P3) for 12 New Schools

March 2013

1. Summary: Using a P3 for 12 new schools - did it work?

By using a Public Private Partnership (P3) to design, build, finance and maintain 12 schools in Airdrie, Chestermere, Brooks, Cochrane, Penhold, Beaumont, Medicine Hat and Red Deer, the Alberta government saved $43 million over 32 years (in today's dollars) compared to a traditional design-bid-build approach ($289 million instead of $332 million, a 13% savings)[1]. It will also deliver the schools at a guaranteed fixed date earlier than it could have achieved with the traditional procurement approach. The following assessment shows that using a P3 Model delivered value for money and that it was the correct choice to procure these 12 new schools.

On May 18, 2011, Treasury Board agreed to provide the Ministry of Education with a $550 million budget to address the highest priority school projects and directed that the schools be delivered using a combination of procurement methods, including a public-private partnership (P3), subject to a value for money assessment. The value for money assessment confirmed the P3 model could add value so the procurement commenced on October 14, 2011.

The P3 schools are predominantly built based on a standard core design to allow for future expansion if needed. The 12 schools were identified by their respective school boards as high priority projects essential to meet demand for educational programming in areas of the communities experiencing high enrolment growth.

The government signed the P3 contract, with a 32-year term, in September 2012 with ABC Schools Partnership (the contractor). The contract requires the schools to be ready for school boards by June 2014 so they can be available for students in September 2014.

The cost savings and earlier completion were due to:

- life-cycle optimization
- economies of scale
- construction efficiencies
- building innovations
- risks shifted from government to the contractor
- fixed cost contract

This report explains what a P3 is and why it may be used and provides a value for money assessment of the P3 for 12 new schools

[1] This savings calculation is based on the amounts in the bids for the ASAP 3 Request for Proposals.

2. Background

What is a P3?

A P3 is a non-traditional way for government to create capital assets such as roads, schools, and other types of government facilities. In the case of Alberta Schools Alternative Procurement III (ASAP III), the government entered into one agreement with a contractor responsible for designing, building, partially financing, and maintaining the schools over a 32-year period (2 years design and construction; 30 years maintenance). [2]

A P3 can save time, money and reduce risk to the government by having one contractor design, build, finance, and maintain a facility. For Alberta P3 projects, the public sector owns the facility and provides public services to Albertans, the same as it does with a traditional approach. In this P3, the school boards own the 12 schools and deliver education as they do in their other schools.

What is a traditional approach?

In a traditional approach, the public sector hires an architect to design a school or some other facility, and then hires a construction contractor to build it. Once the facility is built, the public sector operates it and maintains it, typically by awarding numerous individual contracts for repairs and renewal. The government pays for the construction of the facility by making progress payments (for its own infrastructure) or by making capital grants to entities such as school boards, health authorities, and post-secondary institutions. Provincial grant funding is also used to operate and maintain the facility.

What does a Value for Money (VFM) assessment do?

A VFM assessment measures whether a P3 is the best option for a particular project. In the case of ASAP III, it compared the estimated costs of building and maintaining the same schools using the two different methods: traditional and P3. The VFM for a project is the difference between these two costs. The goal of a P3 is to provide value: to do so, the P3 must cost less – measured by net present value – than the traditional method over the life of the contract.

What is net present value?

Net present value is the current value of a future sum of money. It is a standard method to compare the value of money over time (a dollar today is worth more than a dollar tomorrow because of interest and inflation) to assess long-term projects. It is produced by applying an interest rate and an inflation rate (collectively called the “discount rate”) to a future sum. The amount and timing of cash flows differ in the two options for producing the schools (traditional and P3) and the calculation of net present value accounts for those differences. The net present value of the cost to produce and maintain a facility using the traditional approach is called the Public Sector Comparator, or PSC.

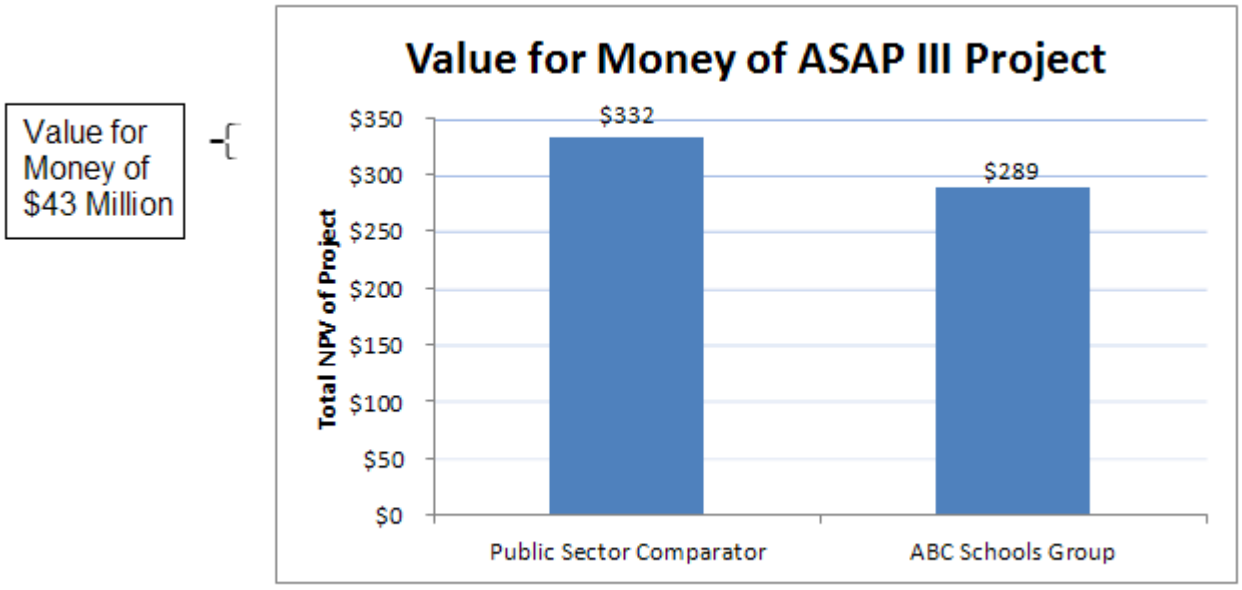
[2] For detailed discussion on P3s, see the Annual Report of the Auditor General of Alberta 2003–2004, at pages 49 to 72 (www.oag.ab.ca/files/oag/ar2003-2004.pdf).

3. VFM Assessment of the P3 used for 12 new schools

Money and time saved by using P3: Quantitative measures of value

This VFM assessment uses net present value as of July 11, 2012, when bids were received. It includes the costs to design, build, partially finance, and maintain the schools for the 32-year agreement term. It also includes the impact of risk transfer (as discussed later in this section) but excludes costs common to both methods, such as broadband connections, land costs, and furniture and equipment.

The low bid received for this project was $289 million and the PSC was estimated at $332 million (both in 2012 dollars). The VFM is therefore $43 million or 13% of the PSC. A Value for Money Analysis prepared by the financial advisor, PWC, retained for this project is attached in Appendix A. The 12 schools are scheduled to be ready earlier than with the traditional method.



Private financing by the contractor costs more than public financing by government, but in the case of ASAP III, that cost was more than offset by the following factors:

1. **Allocating risks to the party who can best manage them** means that the contractor bore many of the costs that the government would have borne in the traditional approach. For example, the contractor pays for any changes needed during the construction period due to design errors. The contractor also bears any cost increases for labour and material during the construction period. In addition, for the 30-year maintenance and renewal term, the contractor will pay to replace any defective building parts or parts that have reached the end of their useful life. A list of some of the major risks that the P3 contract allocated to the contractor is in Appendix B attached to this report.

2. **Using innovative building techniques and materials** will save the government money over the contract term. In the Request for Proposals (RFP) stage, the three proponents presented several innovations to meet stringent, long-term quality requirements set out in the technical documents. The contractor will incorporate many of their innovative techniques into the final design.

3. **Achieving economies of scale by designing and building 12 schools** in various parts of Alberta on a tight schedule. For example, it costs much less (per boiler) to buy 24 boilers at the same time than two. Similarly, key parts such as structural steel, brick and block, windows, doors, floor finishes, and electrical and mechanical equipment cost far less when bought and installed in bulk. Because the contractor had a guaranteed group of 12 schools, it could secure a supply of most parts early in the construction period, avoiding higher costs for labour, material, equipment and sub-trades later in the construction period.

4. **Developing construction schedules that allow continuous and efficient workflow** between construction sites to minimize downtime between operations and reduce mobilization costs for work crews and equipment. For example, buying over 50 modular classrooms allows manufacturing plants to schedule production runs well ahead of time. In turn, that allows for timely delivery and installation of the classrooms.

Qualitative measures of value

1. **Controlled scope**. By bundling 12 schools into one package, the government controlled the scope of the project and managed the risk of any potential scope changes. The government worked closely with each school board to ensure that their program needs were met early in the design process, and that these requirements were clearly expressed to proponents during the RFP phase. This ensures that all school boards are treated equally, and that they each receive schools with consistently high quality.

2. **Earlier opening.** The scheduling advantages explained earlier will let the 12 schools open in September 2014, earlier than if the government used the traditional method. Students in these schools will no longer have to take long bus rides to other communities; instead, they can spend more time in play and community based activities before and after school.

3. **30-year maintenance and renewal period.** This gives the government and school boards assurance that schools will be maintained in good condition for 30 years. The P3 contract transfers maintenance of the schools from the school board (government) to the contractor for the term of the contract. This effectively gives the government a 30-year warranty for all 12 schools and schools with no deferred maintenance at the end of 30 years.

4. **Better workforce management.** The relatively long time to set up a P3 allows proponents time to establish labour and equipment supply and to lock in contracts for materials supply. Traditional contracts, typically with a four- to six-week tender period, introduce additional risk into the process, as the bidding contractor has only a short

time to negotiate scheduling of labour, materials and equipment to arrive onsite at the right time. The P3 results in a single contractor for all 12 schools; for traditional contracts, contractors could be bidding several jobs at the same time. The P3 contractor can offer continued, attractive employment to workers.

Major risks allocated in P3 contract

An important factor in the delivery of P3 projects is an acceptable allocation of risks to the party or parties best able to manage them. In some cases, the contractor is the appropriate party to manage a risk; in others, the government can better manage the risk; in yet a third case, the risk may be best shared between the two parties.

Table 1 (Appendix B) shows a sample of the risk allocation between the government and the contractor in the P3 contract and schedules. This list is not comprehensive. The P3 contract identifies all the allocated risks.

Cost overruns: the contractor bears the risk of any construction costs above the bid price in the P3 contract. Maintenance and renewal payments are indexed based on the contract formula, so the contractor pays any increased maintenance costs above the index during the contract.

Schedule certainty: the contractor agrees to have the 12 schools available for use by the school boards by June 30, 2014 or receive reduced payments. The contractor will manage the construction schedule to meet this date.

Weather: the contractor bears any costs of project delays caused by bad weather.

Scope changes: the government pays for any scope changes that it or a school board want during construction. The government will pay for this work in accordance with the change order process set out in the P3 contract.

During the maintenance and renewal period, the government or school boards may consider changes to schools. For example, changes in local demographics may require a school board to request approval from the government to add or remove modular classrooms. The government may pay for this work, as long as the contractor accepts competitive pricing based on a tendering process as specified in the P3 contract. Other changes requested by school boards may be the responsibility of the school board.

Interest rates and financing: during the period between notifying a preferred proponent (which becomes the contractor when it signs the P3 contract) and signing the contract, the government shares the risk of any changes in base borrowing rates with the preferred proponent.

The contractor has to arrange for partial financing for the whole term of the contract and is solely responsible for the impact of the financing arrangements. No matter how much rates increase during the contract, the contractor must pay any increased refinancing costs. Conversely, the contractor can benefit from any rate drops.

Permitting: in the project's procurement phase, the government worked with the various applicable municipalities to ensure that development permits for all 12 schools were in place, with as few conditions as possible. Once the contractor signed the contract, it was responsible to have the municipalities transfer the development permits to it. The contractor assumed any schedule risks of not being able to obtain the building permits on time.

4. Project Report

Government of Alberta Goals

Goal 1 Under "Investing in Communities and Families" – Honour Alberta Communities - Our Communities are safe, prosperous, welcoming, culturally diverse and desirable places to live or destinations to visit. New schools provided by ASAP III help to enhance communities and their desirability as places to live and visit.

Goal 4 Under "Securing Alberta's Economic Future" – Invest in Learning- Build a knowledge-inspired economy by offering a sustainable education system that meets the needs of our province and Albertans throughout their lives. ASAP III is a significant step toward better offering a sustainable education system that meets the needs of Alberta.

Alberta Education Ministry Goals

Develop a long-term strategy to provide the educational infrastructure needed to support the success of all Alberta students. (Goal 2: Strategic Priority 2.4). The ASAP III project supports Alberta students by providing new schools in areas where they are needed.

Project goals

- **Build 12 schools for students in the K-12 education system, in high-growth areas of Alberta for completion by June 30, 2014**. The ASAP III project aims to put new schools in the areas that need them.

- **Ensure short-term cost certainty** for building the 12 schools and **long-term cost certainty** for maintaining them. The project shifts the risk of increased costs to the contractor.

- **Use innovative design, project delivery, and funding** to meet the need for schools in various regions across Alberta.

- **Ensure standard and consistent schools by modifying core school designs with flexible student capacity.** The designs are of a consistent quality for all 12 schools. Flexible student capacity comes from modular classrooms that can be added to or subtracted from the core schools, as enrolments change over the life of the schools.

Table 2 (Appendix C) lists the 12 new schools in the project.

The contract does not include daily building services (movement of desks, chairs and other furniture), cleaning, or routine, daily custodial work in schools. These services remain the responsibility of the school boards.

Project outcomes

- **Construction of schools in some of the fastest growing communities.** Across Alberta, many areas have experienced significant growth in population.. One of the main outcomes of this project is to build schools in these communities to address the needs of increasing school-aged populations.

- **Continued support for improving high school completion rates.** This project supports the goal of Alberta Education to improve high school completion rates. Improved high school completion is a key component of Alberta Education's Accountability Framework. Students are considered high school completers if they have received a high school diploma or equivalent, or have enrolled in an Alberta post-secondary institution or apprenticeship program within the tracking period. Provision of new schools in communities where students live is considered a positive outcome towards this Ministry's goal.

- **Enhanced Partnership Opportunities.** This project provides enhanced opportunities for partnership contributions to the design, use and funding of the schools under ASAP III, resulting in increased gymnasium space for both students and the community, links to recreational facilities and multiplex facilities to enhance community relationships between the school and community and sharing of facilities with post-secondary and child care facilities.

Approaches considered

The government considered two approaches to deliver the 12 schools:

1. ***Traditional Design-Bid-Build* approach**, with the usual "pay-as-you-go" financing by the government and delivery by school boards. Private-sector architects and consultants, hired by school boards, design the schools. Stipulated-price construction contracts are awarded through a traditional open-bidding process tendered by school boards to private-sector contractors, likely in 12 individual projects. The province approves the contracts under the *School Buildings and Tendering Regulation*. Daily operations and maintenance, and infrastructure maintenance and renewal, are funded by provincial grants.

2. ***Design-Build-Finance-Maintain* approach** (the basis of the P3), with the winning private-sector proponent (the contractor) forming a consortium or group to handle the project from start to the end of the contract. Once construction is complete, the contractor is responsible for the ongoing maintenance of the schools for a set period of time (in this project, 30 years), and for having a renewal plan for school components to ensure they

meet the performance requirements. School boards still handle daily cleaning and operations of the schools. The government makes monthly payments to the contractor during the 30-year maintenance phase of the contract. Payments start after the schools have reached total availability in June 2014 and cover the three capital, maintenance and renewal costs. The government can reduce payments based on performance criteria such as whether the schools are available for use and whether the buildings meet certain standards.

Selection process

The government's selection process was open, competitive, timely, fair and transparent. A Fairness Auditor, Mr. Richard Innes, an independent CA, was appointed Fairness Auditor for this project and prepared a report on the fairness of the process (Appendix D).

A Request for Qualifications was publicly issued on October 14, 2011. Five teams responded and were evaluated on experience, personnel qualifications, past performance and financial capability. The three best qualified proponents selected to submit proposals were ABC Schools Group, Alberta Consortium for Education, and Build to Learn[3] (Appendix E).

The Request for Proposal (RFP) process ran from December 1, 2011 to July 11, 2012. The "made-in-Alberta" approach to P3s ensures the process is competitive throughout. During the RFP process, the proponents made financial and technical submissions to ensure that they met the project's minimum specifications. The government issued a draft form of the contract during the RFP process. The proponents provided comments on it. Before receiving financial bids, the government issued the final form of the contract that the successful proponent signed. No negotiations on this contract were allowed after financial bids were received.

Once the three proponents provided RFP submissions, they all submitted financial bids based on the final form of the contract. These bids are summarized in Table 3 (Appendix F). ABC Schools Group submitted the lowest price, on a net present value basis, and won the contract. ABC Schools Group then created a special purpose company, known as ABC Schools Partnership, to carry out the work of the contract.

Key terms of P3 contract

What the government must pay: The total cost of the 32-year contract is $289 million in 2012 dollars.

The government will pay to the contractor approximately $100 million toward the capital cost of the schools over the course of construction. Once the schools are ready by June 30, 2014, monthly amounts in three separate streams (capital, maintenance, and renewal) will be paid over the contract term.

Capital payments are fixed, while maintenance and renewal payments are indexed[7].

[7] Four indices are used to calculate maintenance and renewal payments: AUPE Maintenance Service Worker II published hourly salary; NAICS repair and maintenance hourly rate; Statistics Canada consumer price statistics (excluding food and energy); and Statistics Canada non-residential building construction price index for Edmonton and Calgary.

If any of the 12 schools is not ready by June 30, 2014, the government will pay only that part of the remaining progress payment attributable to completed schools. The rest of the payment will be made upon total school availability. Additionally, the government will make monthly maintenance and renewal payments and 80% of the monthly capital payment only for completed schools, until all 12 schools are completed. The contractor will thus lose capital, maintenance, and renewal payments for every school not complete by the target date, plus 20% of the monthly capital payment for completed schools.

What the contractor must do: The 32-year contract between the government and the contractor has a two-year construction period and a 30-year maintenance period. It requires the contractor to:

- complete the design and construction of the 12 schools across Alberta; described in Table 2 (Appendix C) by June 30, 2014;
- partially finance the construction over the contract term;
- maintain the 12 schools to the standard specified in the contract;
- have a renewal plan for school components to ensure they meet the performance requirements; and
- hand back responsibility for maintenance and renewal of the 12 schools to the school boards in June 2044, in a condition as prescribed in the contract.

Payments reduced for non-performance: The government can reduce all monthly payments (capital, maintenance, renewal) if the contractor does not meet performance standards in the contract. For example, if a roof does not meet performance criteria and the contractor does not repair it within the allowed time, the government can reduce monthly payments to the contractor.

A detailed description of all the payment adjustments is in Schedule 15 of the P3 contract, and a sample appears in Table 5 (Appendix G).

School boards own the schools: The contractor has a license from the government to access the schools for construction, maintenance, and renewal activities. The school boards can use the schools for education purposes and for community and other purposes as defined between the municipalities and the respective school boards. School boards remain publicly accountable for delivering education programs for all schools in their jurisdictions.

Monitoring during and after construction

During construction, the government is using ACI Architecture Ltd. and Quinn Young Architects Ltd. as its consultants to review the designs and ensure that construction standards have been met. The contractor has to provide monthly reports on design and construction issues.

In the maintenance and renewal period, the contractor will self-monitor and report on its compliance with the technical requirements. The government will also do its own inspections and testing to check reports and ensure the standards continue to be met. In addition, the contractor's lender will also have a consultant review its performance.

Accounting treatment

The accounting treatment for P3 projects follows generally accepted accounting principles set out by the Public Sector Accounting Board of the Canadian Institute of Chartered Accountants. The obligation is “on-book”, so the province records the amount owing for the private financing over the construction period and also records the cost of building the schools on its consolidated balance sheet as a capital asset.

Project schedule

The P3 contract was signed on September 13, 2012 and construction started on some sites by the end of September 2012. The contractor must deliver the 12 schools by June 30, 2014 or payment reductions will be imposed. An independent certifier will certify when the schools are available for use. The 12 schools are anticipated to open by the school boards to students in September 2014.

The maintenance period starts after the schools are available and continues until June 2044, when the license granted to the contractor to access the schools for maintenance and renewal activities will expire. The contractor must hand back the responsibility for maintenance and renewal of the 12 schools to the school boards in the condition specified in the contract. The government and the contractor will assess the schools, starting three years before contract expiry, to ensure they are in the condition specified in the contract. After the contract expires, the school boards will assume responsibility for operating, maintaining, and renewing the schools, using traditional grant funding.

ASAP III – SR3 Financial Offers

Comparison of Financial Offers and Calculation of Final Value for Money

July 2012



Contents

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2. Comparison of Financial Offers 1
3. NPV Summary of Financial Offers 3
4. Calculation of final Value for Money 3

Note to Readers

This report has been prepared solely for Alberta Infrastructure. This report should not be shown to any other party beyond Alberta Infrastructure without the prior written consent of PricewaterhouseCoopers LLP ("PwC"). PwC accepts no liability of any kind and disclaims all responsibility for the consequences of any person other than Alberta Infrastructure acting or refraining to act in reliance on the report or for any decision made or not made based on the report.

The information included in this report contains confidential and competitive information, the release of which would be harmful to Alberta Infrastructure and PwC. The information/data shall not be duplicated, used or disclosed in whole or in part for any other purposes other than to approve the project or to enter into procurement and for internal use by Alberta Infrastructure if such approval is received. Any other duplication, use or disclosure in whole or in part of this information without the express written permission of PwC is prohibited.

Our work was based primarily on information supplied by Alberta Infrastructure and its consultants. It was carried out on the basis that such information is accurate and complete. Information was not subject to checking or verification procedures, except to the extent expressly stated to form part of the scope of our work. We did not examine, compile or apply agreed upon procedures to such information in accordance with standards established by the CICA, and we express no assurance of any kind on such information. The financial analysis presented herein is based on information provided by Alberta Infrastructure and its external advisors and is based upon assumed sites and scope for the project.

Actual results may vary from those presented, and the variations may be material. The outputs of our analysis are provided only for planning purposes. No assurances are provided that the results indicated in the various analyses discussed in this report will be borne in practice. These forecasts may change based on additional analysis and data.

It should be noted that the cost assumptions used in this report are of a preliminary nature and not the result of a detailed costing exercise and actual Project costs may be different from the estimates used for this report.

We make no representation regarding the sufficiency of our work either for the purposes for which this report has been requested or for any other purpose. Had we been requested to perform additional work, additional matters might have come to our attention that would have been reported to Alberta Infrastructure.

1. Introduction

Scope of Report

This report presents the comparison of the Financial Offers received from ASAP III Proponents in the SR3 submissions. The purpose of this report is to summarize the bid evaluation process and to identify the Preferred Proponent. It also calculates the Value for Money (VfM) for the Proponents' Financial Offers.

Value for Money is assessed by comparing the Preferred Proponent's Financial Offer with the Public Sector Comparator (PSC) and is defined by Alberta Infrastructure and Transportation's P3 Management Framework as follows:

... net present value comparison of the comparable costs and risks of the proposed P3 project with the conventional project delivery over the same life cycle.

The PSC is the estimated cost of traditional project delivery.

Timing and PSC Updates

The cost estimates that form the basis of the Public Sector Comparator (PSC) were updated in June 2012 by Alberta Infrastructure and its consultants. The PSC at the SR2b submission was $348.08 million, based on a discount rate of 3.70% and a base date of July 1, 2012.

Between the SR2b and SR3 submissions, the Airdrie GSPD K-12 School was removed from the project scope. The PSC was recalculated on July 6, 2012 and the revised PSC value, excluding the Airdrie School, was $329.28 million.

On July 9, 2012, Alberta Finance issued an updated discount rate of 3.60% based upon the Province of Alberta's borrowing costs. This resulted in a final PSC value of $331.64 million. No other changes were made to the PSC.

The Financial Offers from Proponents were received on July 11, 2012 and compared against the final PSC value of $331.64 million.

2. Comparison of Financial Offers

Method

The Financial Offers consist of the following payments:

- Monthly payment stream over the operating period (July 1, 2014 to June 30, 2044 inclusive), consisting of:
  - Capital Payments (identical monthly payments stated in nominal dollars)
  - Maintenance Payments (monthly payments for Maintenance, stated in 2012 dollars)
  - Renewal Payments (monthly payments with timing as needed for Renewal, stated in 2012 dollars)
- Total Provincial Funding, calculated by multiplying the amount of one full month's Capital Payment by 187.

The total cost of the Financial Offers on a net present value basis was determined by calculating the sum of the net present values (discounted at 3.60% to July 1, 2012) of:

- the Capital Payments;
- the Maintenance Payments, after first adjusting each payment for inflation using a fixed estimated inflation rate of 2.00% per annum determined by Alberta Finance;
- the Renewal Payments, after first adjusting each payment for inflation using the fixed estimated inflation rate of 2.00% per annum determined by Alberta Finance; and
- the Provincial Funding.

Process and results

To determine the Proponent that provided the Financial Offer with the lowest total cost on a NPV basis, the Proponents' Form G1 cashflows (Columns B and C) and the Provincial Funding were copied into a bid evaluation spreadsheet which was developed prior to bid submission. The following steps were taken:

- the Capital Payments (Column B) were expressed in nominal dollars and no changes were made to those cashflows.
- the Maintenance and Renewal Payments (Column C) were expressed in real 2012 dollars. These values were inflated based on a 2.00% annual indexation factor with the first increase commencing April 1, 2014.
- the Provincial Funding was calculated based upon one full month's capital payment multiplied by 187. The Provincial Funding profile used in the models was copied for the evaluation spreadsheet. The formula governing the Provincial Funding prohibits payment of the Provincial Funding until 30% of the construction has been completed. This was verified in each of the Proponents' models.

Spot checking

The Proponents' Form G1 paper version was spot checked with the form G1 in their respective models for accuracy.

The following steps were taken:

- Totals for each of the columns were verified;
- The first and final payment of each column was verified; and
- Totals for random dates were verified.

No errors were found.

3. NPV Summary of Financial Offers

The bid comparison spreadsheet calculates the NPV of the cashflows to the Proponents as of July 1, 2012, which is the basis for determination of the Preferred Proponent. The results are as follows:

	Public Sector Comparator (PSC)	ABC Schools Group (ABC)	Alberta Consortium for Education (ACE)	Build to Learn 3 (B2L[3])
NPV ($ millions)	$331.64	$288.78[1]	$294.19	$294.58

4. Calculation of final Value for Money

The VfM compares the cost of the Preferred Proponent's Financial Offer with the cost of the PSC. The VfM for the ASAP III project is as follows:

	NPV ($ millions)
Public Sector Comparator	$331.64
Preferred Proponent's Financial Offer	$288.78[1]
Difference	$42.86

The VfM is therefore $42.86M or 12.9% of the PSC.

[1] Adjusted to remove one additional year of indexation assumed by the proponent. This adjustment has no overall impact on the ranking of the proponent financial offers.

Appendix B: Sample of Risk Allocations

Table 1: Sample of Risk Allocations between Government of Alberta and Contractor

	Traditional		P3	
	GOA	**Contractor**	**GOA**	**Proponent**
Construction Risks				
Design interaction with site conditions	•			•
Construction interaction with site conditions	•	•		•
Site safety		•		•
Construction methodology		•		•
Construction costs	•			•
Unforeseen site conditions	•			•
Labour issues		•		•
Material issues		•		•
Design errors	•			•
Schedule issues	•	•		•
Construction quality issues		•		•
Scope changes	•		•	
Delayed site access	•		•	
Material inflation	•	•		•
Wage inflation	•	•		•
Not meeting agreed milestone dates		•		•
Adverse weather conditions	•	•		•
Labour disputes	•			•
Fire during construction		•		•
Vandalism/theft/arson during construction		•		•
Damage and/or injuries to third party		•		•
Damage to work		•		•
Damage and/or loss to utilities		•		•
Defective materials		•		•
Public interface	•	•		•
Workplace health and safety		•		•
Insufficient performance bonding	•			n/a
Subcontractor insolvency		•		•
General Risks				
Land acquisition	•		•	
Life cycle management	•			•
Stakeholders management	•		•	
Coordination and approvals through users	•		•	
Third party objections	•			•
Patent infringement	•	•		•
GOA supplied data – accuracy	•			•
GOA supplied data – sufficiency	•			•
GOA supplied data – interpretation	•	•		•
Utilities hook up/connections	•			•
Approval Risks				
Concept approvals – environmental	•		•	
Development permits	•		•	•
Building permits		•		•

Table 1: Sample of Risk Allocations between Government of Alberta and Contractor (continued)

	Tradtional		P3	
	GOA	**Contractor**	**GOA**	**Proponent**
Occupancy permits		•		•
Environmental permits	•			•
Utilities crossing requirements	•	•		•
Regulatory requirements	•	•		•
Building Code compliance	•			•
Land Use approvals	•		•	
Utilities approvals	•			•
Municipal requirements	•			•
Environmental Risks - Known				
Geotechnical (known)		•		•
Contamination (known)		•		•
Archaeological (known)		•		•
Environmental Risks - Unknown				
Geotechnical (unknown)	•			•
Contamination (unknown)	•		•	
Archaeological (unknown)	•		•	
Technical Risks				
Core school design	•			•
Modular design and performance	•			•
Structure safety	•			•
Design quality issues	•			•
Material behaviour	•	•		•
Construction process innovation		•		•
Construction performance specification risks	•		•	
Operation performance specification risks	•		•	
Lack of building system integration		•		•
Aggressive schedule	•	•		•
Delayed schedule		•		•
Future IT risk	•		•	
Financial and Economic Risks				
Sourcing of capital – construction	•		•	•
Allocation of capital – operations	•			•
Cash flow management – construction	•			•
Cash flow management – operations	•			•
Inflation risks prior to financial close	•		•	
Exchange rate risks	n/a			•
Interest rate changes before Agreement	•		•	
Interest rate changes after closure	•			•
Inflation on operations, maintenance and renewal	•		•	•
Inflation on construction	•			•
Change orders	•		•	
Government withdrawing from P3s	n/a		•	
Demand Risks				
Modular additions above original projections	•		•	
Modular additions (escalation impact)	•			•
Growth in student population over design capacity	•		•	
Changes in school programming	•		•	
Under-utilized school facilities	•		•	
Appropriateness of schools	•		•	
Operations and Maintenance Risks				
Changes in legislation	•		•	
Damage to property beyond insurance coverage	•			•
Increased maintenance costs	•			•

Table 1: Sample of Risk Allocations between Government of Alberta and Contractor (continued)

	Tradtional		P3	
	GOA	**Contractor**	**GOA**	**Proponent**
Performance issues	•			•
Change in performance standards	•		•	
Maintenance Labour issues	•			•
Maintenance Material issues	•			•
Non-availability of facility or portions thereof	•			•
Vandalism during O&M period (Glass and Grafitti)	•		•	•
Other Vandalism during O&M	•			•
Fire damage during O&M	•		•	
Flood and other natural disasters during O&M	•		•	
Water, air and/or soil pollution	•			•
Labour disputes during O&M	•			•
School security issues	•		•	
Unplanned major replacements	•			•
School Board labour relations	•		•	
Consequential damage due to contractor non-performance		•		•
Facility condition risk at 20/25/30 years	•			•
Third party damages risk	•			•
Business Risks				
Subcontractor default		•		•

Appendix C: Schools included in the project

Table 2: School jurisdictions and communities served

School Board	Municipality	Approximate Address	Grade Structure	Approximate Initial Capacity of School
Rocky View School Division No. 41	City of Airdrie	186 Sagewood Boulevard SW	6-8	900
Rocky View School Division No. 41	City of Airdrie	2654 Chinook Winds Drive SW	9-12	1,000
Black Gold Regional Division No. 18	Town of Beaumont	Dansereau Meadows (Phase 9, SDA-11-01)	K-9	700
St. Thomas Aquinas Roman Catholic	Town of Beaumont	Dansereau Meadows (Phase 9, SDA-11-01)	K-9	400
Grasslands Regional Division No. 6	City of Brooks	Upland Boulevard	K-6	450
Red Deer Public School District No. 104	City of Red Deer	300 Timothy Drive.	K-5	500
Greater North Central Francophone Education Region No. 2	City of Red Deer	48 Avenue and 34 Street	K-12	250
Red Deer Catholic Regional Division No. 39	City of Red Deer	60 Clearview Drive	K-5	300
Rocky View School Division No. 41	Town of Chestermere	325 Kinniburgh Boulevard	K-9	500
Medicine Hat School District No. 76	City of Medicine Hat	751 Strachan Road SE	K-9	600
Chinook's Edge School Division No. 73	Town of Penhold	1 Waskasoo Avenue	7-12	500
Greater Southern Separate Catholic Francophone Education Region No. 4	Town of Cochrane	Quigley Drive and West Terrance Crescent	K-9	200



Existing Schools

- Modernization Project

New or Replacement Schools

- Design-Build Project
- Design-Bid-Build Project
- Design-Build-Finance-Maintain (P3) Project

APPENDIX D

R.B. (Dick) Innes, CA

Private and Confidential

October 16, 2012

Ray Gilmour Deputy
Minister Alberta
Infrastructure
3rd Floor, 6950 – 113th Street
Edmonton, Alberta, Canada
T6H 5V7

Dear Sir;

Re: Fairness Report upon completion and Financial Close of the third Alberta Schools Alternative Procurement Project DBFM (ASAP III DBFM).

This Fairness Report is being provided in accordance with the Fairness Auditor Scope of Work.

"The following definition of fairness will be used throughout the transaction process.

- Alberta Infrastructure, in its execution of the procurement, adhered to the process set out by the Alberta Infrastructure in the applicable RFQ and RFP.
- The evaluation criteria and evaluation procedures of Alberta Infrastructure were defined and applied in accordance with the RFQ and RFP, where applicable;
- The procurement process and outcome were not influenced by any biases.
- All Respondents and Proponents were treated consistently throughout the procurement process, and in accordance with the RFQ and RFP, as applicable."

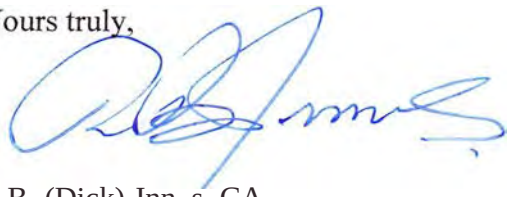
I have provided a draft copy of this Report to John Gibson, Program Director and Fred Demott, Project Director for comment and their input has been considered in completion of this Report.

In carrying out my responsibilities as Fairness Auditor I have done the following:

- Reviewed transaction documents including the Request for Qualifications (RFQ), Request for Proposal (RFP), and the Design, Build, Finance, and Maintain (DBFM) Agreement, Schedules, and Addenda thereto. I also reviewed the Process Framework, Submission Requirements, and the Evaluation Procedures used throughout the procurement as well as information provided on the Sharepoint site.
- Reviewed Respondent and Proponent clarifications, questions and answers thereto throughout the process.
- Attended all meetings between the Respondents, Proponents and the Project Team as well as weekly ASAP Team Meetings, School Board Liaison Committee meetings, document review meetings, Project Review Committee meetings, Evaluation Team meetings, and Selection Committee meetings.
- Canvassed all Respondents and Proponents individually at the end of every meeting and confirmed they were satisfied with the fairness of the procurement process.
- Observed and monitored the various selection activities throughout the process including attendance at the Financial Close with the Preferred Proponent.
- Reviewed meeting minutes and reports of the various committees and teams involved in the process.
- Provided advice on fairness matters when required.
- Reported to the ASAP Project Team and the Deputy Minister, Alberta Infrastructure as required.

It is my opinion that the ASAP Project Team has been diligent in executing the ASAP III DBFM procurement on a fair basis as defined above and that all Respondents and Proponents have been dealt with consistently, fairly, and in an unbiased manner.

Yours truly,



R.B. (Dick) Inn s, CA
Fairness Auditor
ASAP III DBFM

CC: Diane Dalgleish ADM, John Gibson, Fred Demott

APPENDIX E: List of Respondents for the Alberta Schools Alternative Procurement III

Table 3

Consortium	List of Companies
Build to Learn[3]	Gracorp Capital Advisors Ltd. Bird Capital Bird Construction Inc. Graham Construction Barr Ryder Architects Honeywell Scotia Capital
ABC Schools	Hochtief PPP Solutions North America Inc. Concert Infrastructure Ltd. Clark Builders Turner Construction Company Concert Construction company Stantec Ainsworth Inc. Investec North America Ltd. CIBC World Markets Inc.
Alberta Consortium for Education	EllisDon Inc. Ellisdon Construction Services Inc. Fengate Capital Management Inc. Balfour Beatty Capital Canada Balfour Beatty Communities S2 Architecture ONPA Architects Halsall Hemisphere Engineering O2 Planning + Design Charter Builder GDI National Bank Financial Markets

Appendix F: NPV Summary of Financial Offers

The bid comparison spreadsheet calculates the NPV of the cash flows to the Proponents as of July 1, 2012, which is the basis for determination of the Preferred Proponent. The results are as follows:

Table 4

	Public Sector Comparator (PSC)	ABC Schools Group (ABC)	Alberta Consortium for Education (ACE)	Build to Learn 3 ($B2L^3$)
NPV ($ millions)	$331.64	288.78	294.19	294.58
Value for Money ($ millions)	-	42.86	37.45	37.07
Value for Money (%)	-	12.9%	11.3%	11.2%

The above table shows that all three Proponents' Financial Offers were below the PSC with ABC having the lowest NPV of the three Proponents.

Appendix G: Payment adjustments

Table 4: Sample of key payment adjustments included in P3 contract [9]

Issue	Payment Adjustment
Failure to correct deficiencies identified by External Audit within specified time	$5,000 / week for first four weeks; $10,000 / week thereafter
Failure to develop and provide 5 year Maintenance Plan on first day of school year	$1,200 / week
Failure to develop and provide 5 year Renewal Management Plan on first day of school year	$1,200 / week
Failure to register each school with Canada Green Building Council (LEED™ Requirement)	$200 / day / school
Failure to obtain LEED™ Silver Certification within 24 months from school availability	$100,000 / uncertified school
Failure to deliver required construction schedules and submittals to province within time specified	$1,500 / undelivered schedule
Failure to rectify any default with respect to site requirements within time specified	$1,500 / day / default
Failure to rectify any default with respect to maintenance and renewal waste disposal requirements within time specified	$300 / day / default
Failure to provide as-built drawings and updated operations and maintenance manuals to province within time specified	$2,000 / month / undelivered set
School is inaccessible	$5,000 to $20,000 per day or partial day ($30,000 during examination periods)
Failure to make repairs within the repair period or install temporary protection and measures	Emergency failures - $2,000 per day or partial day per school Routine failures - $500 per day or partial day per school

[9] The project DBFM agreement should be consulted for details on all payment adjustments. The final form of the project DBFM agreement is available at http://www.infrastructure.alberta.ca/3869.htm

Tab 80

Government of Alberta

P3 Value for Money Assessment and Project Report

Southeast Stoney Trail (SEST) Ring Road Project

Calgary, Alberta



September 2010

Alberta

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Value for Money Assessment and Project Report on Public Private Partnership (P3) for SEST

September 2010

1. Summary: Using a P3 for Southeast Stoney Trail - did it work?

By using a Public Private Partnership (P3) to design, build, finance and operate Southeast Stoney Trail (SEST), the Alberta government saved $1.063 billion over 34 years (in today's dollars) compared to a traditional approach ($769 million instead of $1.832 billion, a 58% savings). It will also deliver SEST two years earlier than with traditional methods. The following assessment shows that using a P3 delivered value for money and that it was the right way to procure SEST.

The government signed the P3 contract, with a 34-year term in March 2010, with Chinook Roads Partnership (the contractor) for the design, construction, partial financing, operation and maintenance of SEST. The contract requires the road to be ready for public use by October 1, 2013, which is two years earlier than could be achieved with traditional methods. The cost savings and earlier completion can be attributed to:

- economies of scale,
- construction efficiencies,
- construction innovations,
- risks shifted from government to the contractor, and
- fixed-cost contract.

The Government of Alberta uses P3s to deliver needed infrastructure to Albertans. The P3 procurement approach is used to provide benefits that can include an extended warranty, fixed pricing and earlier delivery of infrastructure compared to procuring the asset using a traditional approach. The government also requires P3 projects to deliver value for money. This report provides information to show that the Southeast Stoney Trail (SEST) indeed delivered value for money through P3 procurement.[1]

The Calgary Southeast Stoney Trail ring road segment along with the recently completed Northeast Stoney Trail will provide a complete eastern bypass around the city, alleviating congestion along Deerfoot Trail through Calgary.

This report explains what a P3 is and why it may be used, provides a value for money assessment of the P3 and provides a project report.

[1] This report was developed by Alberta Transportation following the value for money methodology in the Government of Alberta's *Management Framework: Assessment Process*.

2. Background

What is a P3?

A P3 is a different, non-traditional way for government to create capital assets such as roads, schools, and other types of government facilities. In the case of SEST, the government entered into one agreement with a contractor responsible for designing, building, partially financing, operating and maintaining the road over a 34-year period (four years design and construction; 30 years operations and maintenance). [2]

A P3 can save time and money and reduce risk to the government by having one contractor design, build, finance, operate and maintain a road. For Alberta P3 projects, the public sector owns the facility and provides public services to Albertans, the same as it does with a traditional design-bid-build approach.

What is a traditional approach?

In a traditional approach, the public sector hires an engineering firm to design a road, bridge, or other related facilities, and then hires a construction contractor through a public tender process to build them. Once the infrastructure is built, the public sector operates and maintains it typically by awarding numerous individual contracts for routine repairs and rehabilitation. The government pays for the construction of the infrastructure by making progress payments (for its own infrastructure) or by making capital grants to entities such as school boards, health authorities, and post-secondary institutions. Government funding is also used to operate and maintain the facility.

What does a Value for Money (VFM) assessment do?

A VFM assessment measures whether a P3 is the best option for a particular project. In the case of SEST, the estimated costs of the traditional and P3 options were compared. The VFM for a project is the difference between the two costs. The goal of a P3 is to provide value; to do so, the P3 must cost less – measured by net present value – than the traditional method over the life of the contract.

What is net present value?

Net present value is the current value of a future sum of money. It is a standard method to compare the value of money over time (a dollar today is worth more than a dollar tomorrow because of interest and inflation) to assess long-term projects. It is produced by applying an interest rate and an inflation rate (collectively called the “discount rate”) to a future sum. The amount and timing of cash flows differ in the two options for producing the road (traditional and P3) and the calculation of net present value accounts for those differences. The net present value of the cost to produce and maintain a facility using the traditional approach is called the Public Sector Comparator, or PSC.

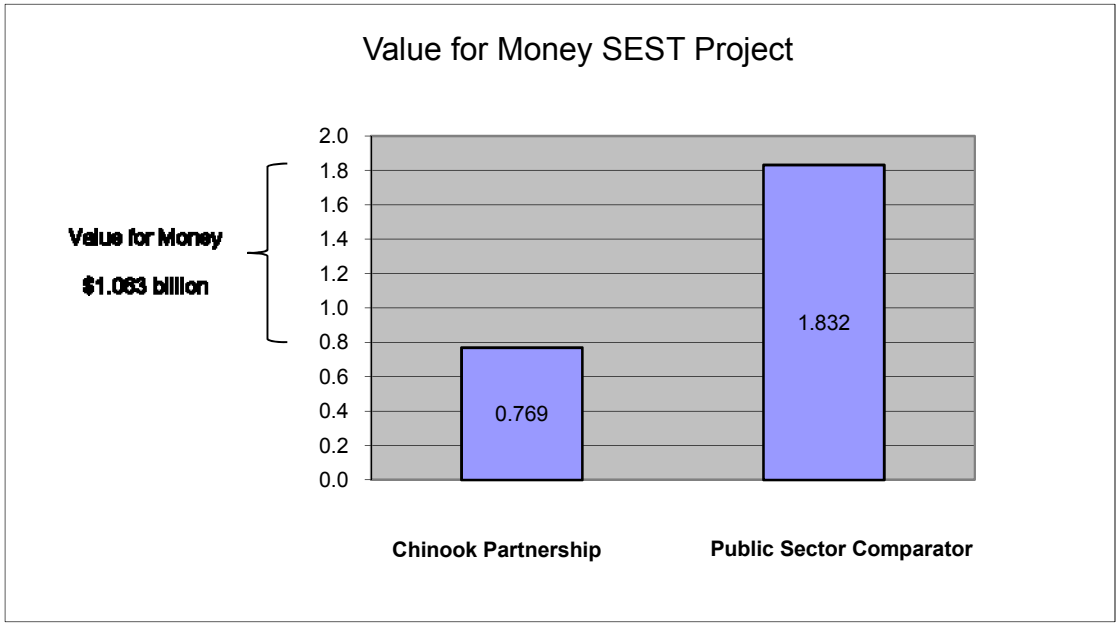
[2] For detailed discussion on P3s, see the Annual Report of the Auditor General of Alberta 2003–2004, at pages 49 to 72 (www.oag.ab.ca/files/oag/ar2003-2004.pdf).

3. VFM Assessment of the P3 used for SEST

Money and time saved by using P3: Quantitative measures of value

This VFM assessment uses net present value as of January 27, 2010, when bids were received. It includes the costs to design, build, partially finance, operate and maintain the road over the 34-year agreement term. It also includes the impact of risk transfer (as discussed later in this section) but excludes costs common to both methods, such as land. [3]

The low bid received for this project was $769 million and the PSC was estimated at $1.832 billion (both in 2010 dollars). The VFM is therefore $1.063 billion or 58% of the PSC. A Value for Money Analysis prepared by the financial advisor, Deloitte & Touche LLP, retained for this project is attached in Appendix A.



Private financing by the contractor costs more than public financing by government, but in the case of SEST, that cost was more than offset by the following factors:

1. **Earlier Completion** – Completing the project two years earlier than could be achieved using traditional delivery can equate to savings on cost escalation. Market forces continually drive up costs related to labour, equipment, fuel, construction materials, etc. Earlier completion reduces the exposure to this phenomenon. Earlier completion also provides savings to the road users in travel time and fuel costs over the 2 years of earlier completion.

[3] Capital and rehabilitation costs for both methods were developed by CH2M HILL Canada Ltd. Inflation and discount rates were provided by the Ministry of Finance and Enterprise. Deloitte & Touch LLP developed the financial model.

2. **Economies of Scale** – Given the 365 lane kilometers of road construction and 27 bridge structures, the contractor is able to secure large volume long term contracts for material such as asphalt, concrete, and steel which are significantly discounted relative to the smaller quantities secured in traditional contracts.

3. **Risk Allocation** – Allocating risks to the party best able to manage them means the contractor bears many of the costs that the government would have borne in the traditional approach. For example, the contractor will pay for any changes needed during the construction period due to design changes and errors. The contractor will also bear any cost increases for labour and material during the construction period. In addition, for the 30-year operation and maintenance term, the contractor will pay to rehabilitate or replace any defective component of the infrastructure. A list of some of the major risks that the P3 contract allocated to the contractor is on pages 6 and 7 of this report.

Qualitative measures of value

1. **Long Term Warranty** – The P3 effectively gives the government a 30-year warranty by transferring responsibility for operation and maintenance of the road to the contractor for the term of the contract. The 30-year operation and maintenance period gives the government assurance that the road will be maintained in good condition with no deferred maintenance at the end of 30 years.

2. **Life Cycle View** – By linking the design, construction, operation and maintenance obligations into a single contract ensures that there is a high degree of discipline in achieving a quality product. For example, any compromise in quality would result in a more substantive maintenance obligation for the P3 contractor. Therefore the combination of design, construction, and operation and maintenance of the infrastructure is highly optimized to suit the infrastructure's entire life cycle.

Major risks allocated in P3 contract

An important factor in the delivery of P3 projects is an acceptable allocation of risks to the party or parties best able to manage them. In some cases, the contractor is the appropriate party to manage a risk; in others, the government can better manage the risk; in yet a third case, the risk may be best shared between the two parties.

Table 1 (Appendix B) shows a sample of the risk allocation between the government and the contractor in the P3 contract and schedules. This list is not comprehensive. The P3 contract referenced in Appendix B shows all the allocated risks.

Schedule certainty – The contractor agrees to have the road available for traffic by October 1, 2013 or receive reduced payments. The contractor has to manage the construction schedule to meet this date.

Weather – The contractor bears any costs of project delays caused by bad weather.

Scope changes – The government pays for any scope changes that it requests during construction. The government will pay for this work in accordance with the change order process set out in the P3 contract. During the operation and maintenance period the

government may consider changes to road. For example, continued residential growth in the area may require the government to add another interchange or more freeway lanes. The government will pay for this work as long as the contractor provides competitive pricing based on a tendering process as specified in the P3 contract.

Interest rates and financing – During the maximum two month period between notifying a preferred proponent (which becomes the contractor when it signs the P3 contract) and signing the contract, the government shares the risk of any changes in base borrowing rates with the preferred proponent. The contractor has to arrange for partial financing for the whole term of the contract and is solely responsible for the impact of the financing arrangements. No matter how much rates increase during the contract, the contractor must pay any increased refinancing costs. Conversely, the contractor can benefit from any rate drops.

4. Project report

Project goals

The SEST project assists in meeting a number of Alberta Transportation and Government of Alberta (GoA) goals and strategic priorities, referenced in Alberta Transportation's Business Plan 2010-13 [4], as follows:

1. **Government of Alberta Strategic Business Plan Goal 1: "Alberta will have a prosperous economy"** – SEST will contribute to growth in the Gross Domestic Product, provide job opportunities, enhance movement of goods, and strengthen tourism.

2. **Alberta Transportation Strategic Priority 2: "Develop the provincial transportation system to support Alberta's regional and provincial economic development**" – SEST is a major addition to the City of Calgary road network and a major connector of the north-south trade corridor. Connectivity with the regional highway network will be improved with new interchanges at Highway 1A (17 Avenue SE), Highway 22X (Marquis of Lorne), and Highway 2 (Deerfoot Trail). With the completion of SEST, a high standard north-south bypass of Calgary will be provided thus alleviating traffic congestion on Deerfoot Trail.

3. **Alberta Transportation Strategic Priority 5 "Continue to implement a provincial Traffic Safety Plan to reduce the number of collisions, injuries and fatalities on Alberta roads"** – SEST will reduce traffic, especially truck traffic, on key arterial roads within the city. The free-flow SEST mainline will permit a safer and more efficient route for both local commuters and through-traffic.

Appendix C provides a drawing showing the project route and lists the associated interchanges and crossings.

Project outcomes

The following outcomes will be achieved by delivering SEST as a P3:

- **Cost certainty for the life of the road** – Shifting the risk of increasing construction costs and other financial risks to the contractor ensured cost certainty for the design, construction, operation and maintenance of the new road.

- **An innovative, repeatable, transparent, and accountable process to produce and maintain roads** – The same process can be used for other projects in Alberta.

- **Less time and lower cost to build**– To plan, design, and build this amount of infrastructure using the traditional approach would take at least six years before being available to the travelling public. In contrast, the P3's coordinated and comprehensive approach will produce SEST in only four years and at a lower cost.

[4] Transportation Business Plan 2008-11:
http://www.finance.alberta.ca/publications/budget/budget2010/transportation.pdf

- **A 30-year warranty** – The contractor is responsible for ongoing operation, maintenance and rehabilitation for the 30-year operation and maintenance phase.

Approaches considered

The government considered two alternative approaches to deliver SEST:

1. **Traditional Design-Bid-Build approach**, with the usual pay-as-you-go financing by the government and delivery by Alberta Transportation. Private-sector engineering consultants hired by Alberta Transportation design the roads and bridges. Construction contracts are awarded through a traditional open-bidding process tendered by Alberta Transportation to private sector contractors, typically in work packages of unique tasks (such as grading, paving, bridge construction, lighting, etc.) and/or of geographically distinct sections. A project of this size under a traditional procurement would involve up to 20 separate construction contracts. Upon construction completion, operations, maintenance and infrastructure rehabilitation responsibility is tendered through a traditional open-bidding process to private sector contractors specializing in this type of work.

2. **Design-Build-Finance-Operate-Maintain approach (the basis of the P3)**, with the winning private-sector proponent (the contractor) forming a consortium or group to handle the project from start to end of the contract. The contractor is responsible for the ongoing operation and maintenance of the road for a set time (in this project, 30 years), and for having a rehabilitation plan to ensure performance requirements are met. The government makes monthly payments to the contractor during the 30-year maintenance phase of the contract. Payments start after the road is ready to use and cover capital, operations, maintenance and rehabilitation costs. The government can reduce payments based on criteria such as whether the roadway remains available for use and whether the performance of the infrastructure meets certain standards.

Selection process

The government's selection process was open, competitive, timely, fair and transparent. A Fairness Auditor, Mr. Gary Campbell, QC, prepared a report on the fairness of the process (Appendix D).

A Request for Qualifications was publicly issued on March 11, 2009. Five teams responded and were evaluated on experience, personnel qualifications, past performance and financial capability. The three teams asked to submit proposals were Southeast Calgary Connector Group, SEConnect, and Chinook Partnership as shown in Appendix E.[5]

The Request for Proposal (RFP) process ran from May 19, 2009 to January 27, 2010. The made-in-Alberta approach to P3s ensures the process is competitive throughout. During the RFP process, the teams made financial and technical submissions to ensure that they met the project's minimum specifications. The government issued a draft form of the contract during the RFP process. The teams provided comments on it. Before receiving financial bids, the government issued the final form of the contract that the successful proponent would sign.

[5] The companies that make up the teams are listed in Table 2 (Appendix E).

Once the three teams provided RFP submissions, they all submitted financial bids based on the final form of the contract. There were no negotiations on this contract after financial bids were received. These bids are summarized in Table 3 (Appendix F). Chinook Partnership submitted the lowest price, on a net present value basis, and won the contract. Chinook Partnership then created a special purpose company, known as Chinook Roads Partnership, to carry out the work of the contract.

Key terms of P3 contract

What the government must pay: The sum of the payments for the 34-year contract is approximately $1.226 billion or in 2010 dollars, about $769 million.

The Alberta government will pay $232 million for construction costs during the construction phase while the federal government is providing $100 million through the Major Infrastructure Component of the Building Canada Plan for a total of $332 million. Once the road opens to traffic, the Alberta government will make monthly payments over the remaining 30 years of the contract. Of this monthly payment, capital payments are fixed, while operation, maintenance and rehabilitation payments are indexed.[6] This is the same index that is used for Alberta Transportation's traditionally delivered provincial highway maintenance contracts.

If the contractor fails to achieve traffic availability by the October 1, 2013 target date, the contractor will incur severe penalties, achieved by reduction in the overall capital payments payable by the government. The penalty is loss of the full amount of the monthly capital payment that would otherwise become due, except that during December 2013 through May 2014 the penalty is one-third of the capital payment.

What the contractor must do: The 34-year contract between the government and the contractor has a four-year construction period and a 30-year operation, maintenance, and rehabilitation period. It requires the contractor to:

- complete the design and construction of the SEST as described in Appendix C by October 1, 2013;
- partially finance the construction over the contract term;
- operate, maintain, and rehabilitate the road to the performance standards specified in the contract;
- operate and maintain (but not rehabilitate) a portion of existing highway infrastructure already constructed by Alberta Transportation. The existing infrastructure includes a specific segment of Highway 2 (Deerfoot Trail) between SEST (currently Highway 22X) and the Highway 2A junction, which is adjacent to SEST; and
- hand back the roadway to Alberta Transportation in September 2043 in a condition as prescribed in the contract.

[6] Four indices are used to calculate operation and maintenance payments: Manpower, Consumer Goods, Construction, and Diesel Fuel. Additional detail can be found in Schedule 10 of the P3 Agreement.

Payments reduced for non-performance:

The government can reduce all monthly payments (capital, operation and maintenance, and rehabilitation) if the contractor does not meet performance standards in the contract. For example, if pavement does not meet performance criteria and the contractor does not repair it within the allowed time, the government can reduce monthly payments to the contractor.

A detailed description of all the payment adjustments is in Schedule 15 of the P3 contract, and a sample appears in Table 4 (Appendix G). The final form of the P3 contract is at http://www.transportation.alberta.ca/eastgp.htm.

The Government owns the road

The contractor has a licence from the government for the term of the P3 agreement, subject to the paramount obligation to keep the road open for the free use by the public (except for specifically permitted lane closures due to accidents, emergencies, repair work, etc.). Tolls are expressly prohibited, as are commercial signage and any other commercial use of the road.

Monitoring during and after construction

During construction, the government is using CH2M HILL Canada Ltd. as its consultant to review the designs and ensure that construction standards have been met. The contractor has to provide monthly reports on design and construction issues. In the operation, maintenance, and rehabilitation period, the contractor will self-monitor and report on its compliance with the technical requirements. The government will also do its own inspections and testing to ensure the standards continue to be met. In addition, the contractor's lender has a consultant review the contractor's performance.

Accounting treatment

The accounting treatment for P3 projects follows generally accepted accounting principles set out by the Public Sector Accounting Board of the Canadian Institute of Chartered Accountants. The obligation is "on-book", so the province records the obligation as the asset is built and records the cost of building the asset as a capital asset.

Project schedule

The P3 contract was signed on March 30, 2010 and construction started in earnest on June 7, 2010. The contractor must deliver SEST by October 1, 2013 or face a payment reduction. An independent certifier will certify when SEST is available for use.

The operation, maintenance, and rehabilitation period starts after the road is made available to traffic and continues until September 2043, when the license granted to the contractor to access the road for operation, maintenance, and rehabilitation activities will expire. The contractor then must hand back the road in the condition specified in the contract. The government and the contractor will assess SEST to ensure it is in the condition specified in the contract when the contract expires. After the contract expires, the Alberta government will be responsible for operating, maintaining, and rehabilitating the road.

Appendix A: Commentary by Deloitte & Touche LLP

Deloitte.

Southeast Stoney Trail P3

Comparison of Financial Offers and Calculation of Final Value for Money

Confidential

January 28, 2010

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Comparison of Financial Offers 2
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Introduction

Scope of Report

This report presents the comparison of the Financial Offers received from SEST Proponents in their SR3 submissions to determine the Preferred Proponent. It also calculates the Value for Money realized by the Preferred Proponent's Financial Offer. The purpose of this report is to provide a concise summary of the bid evaluation process to identify the Preferred Proponent and to facilitate the notification of the Preferred Proponent.

Timing

The assumptions and cost estimates that form the basis of the Public Sector Comparator (PSC) were updated by Alberta Transportation ("TRANS") on November 18, 2009. The debt rate only was further updated on January 8, 2010. The PSC was finalized prior to receipt of the Proponents' proposals, and was deposited with the Deputy Minister of Justice on January 8, 2010.

The PSC was recalculated on January 25, 2010, using the discount rate and inflation rate that were determined by Alberta Finance as the basis for calculating the net present value of the Proponents' Financial Offers. None of the other input assumptions (costs, etc.) were altered. The PSC referred to herein is this recalculated value.

The Financial Offers from Proponents were received on January 27, 2010.

Limitations

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Deloitte's scope of work related to the PSC was limited to the review and updating of a PSC spreadsheet model provided by TRANS. The PSC's financial assumptions and cost estimates are those of TRANS. Deloitte's scope of work related to the VfM was limited to development of a spreadsheet to calculate and compare the net present value of the financial offers using TRANS' methodology.

This Report relies on certain information provided by TRANS and the Project's Proponents, and Deloitte has not performed an independent review of this information. It does not constitute an audit conducted in accordance with generally accepted auditing standards, an examination or compilation of, or the performance of agreed upon procedures with respect to prospective financial information, an examination of or any other form of assurance with respect to internal controls, or other attestation or review services in accordance with standards or rules established by the CICA or other regulatory body.

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Comparison of Financial Offers

Method

The Financial Offers consist of the following payments:

- Monthly payment stream over the operating period (October 2013 to September 2043 inclusive), consisting of:
  - Capital Payments (identical monthly payments stated in nominal dollars)
  - O&M Payments (monthly payments for O&M, stated in 2010 dollars)
  - Major Rehabilitation Payments (monthly payments with timing as needed for Major Rehabilitation, stated in 2010 dollars)
- Total Provincial Funding, calculated by multiplying the amount of one full month's Capital Payment by 257.

The total cost of the Financial Offers on a net present value basis was determined by calculating the sum of the net present values (as at the SR3 submission date of January 27, 2010) of:

- the Capital Payments;
- the O&M Payments, after first adjusting each payment for inflation using a fixed estimated inflation rate of 2.40% per annum determined by Alberta Finance;
- the Major Rehabilitation Payments, after first adjusting each payment for inflation using the fixed estimated inflation rate of 2.40% per annum determined by Alberta Finance; and
- the Provincial Funding, after first distributing the amount into a number of separate progress payments using a pre-determined schedule of payment dates and payment amounts (with each amount defined as a percentage of Provincial Funding). The schedule of payment dates and amounts is taken from the Shadow Bid, which has monthly payments of Provincial Funding commencing in January 2011[1].

The discount rate used to calculate net present values is 4.95% per annum, determined by Alberta Finance based on the Province's borrowing costs.

Process and results

To determine the Proponent that provided the Financial Offer with the lowest total cost on a net present value basis, the Proponent's Form G1 cashflows (Columns B, D, and E) were value-copied into the bid comparison spreadsheet that was developed in advance.

The payment cashflows as copied into the bid comparison spreadsheet were compared to and spot-checked against each Proponent's Form G1 (paper version) to confirm agreement between the Proponent's electronic and paper financial offers and the accuracy of the value-copy process. The sum of each cashflow in the bid comparison spreadsheet was also compared to the sum of the cashflow in the Proponent's Form G1 spreadsheet to again ensure the accuracy of the value-copy process. These comparisons confirm that the NPVs of each bid have been calculated according to the payments indicated on the paper version of each Proponent's Form G1.

---

[1] Since actual progress payments will be made according to the Contractor's verified progress in the field, which cannot be known in advance, an assumed schedule is required in order to evaluate the bids. The same schedule is used for all three because Proponents do not bid an enforceable construction schedule. The Preferred Proponent's schedule of Progress Payments as evidence in its financial model may be used for calculating the book value and for budgeting purposes.

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The bid comparison spreadsheet calculates the NPV of the cashflows to the Proponents as of January 27, 2010, which is the basis for determination of the Preferred Proponent. The results are as follows:

Determination of Preferred Proponent

Net Present Values for Offer Comparison *(NPVs to 27-Jan-2010)*	PSC	CP	SEC	SCC
Total Cost on Net Present Value Basis	**$1,831,577,325.74**	**$769,149,796.85**	**$1,133,940,752.10**	**$1,162,648,393.53**

CP=Chinook Partnership, SEC=SEConnect, SCC=Southeast Calgary Connector Group

The result as indicated in the above table is that Chinook Partnership (CP) has the lowest NPV, and absent any SR3 submission compliance concerns, Chinook Partnership would be the Preferred Proponent.

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Calculation of final value for money

Overview

Value for Money (VfM) is determined by comparing the Preferred Proponent's Financial Offer to the PSC and is defined by Alberta Infrastructure and Transportation's P3 Management Framework as follows:

> *... net present value comparison of the comparable costs and risks of the proposed P3 project with the conventional project delivery over the same life cycle*

The cost of conventional project delivery for the Project is established as the PSC. The cost of P3 project delivery is estimated at several points in the project development process with a Shadow Bid, allowing VfM to be estimated and refined as project information improves. The final VfM analysis replaces the Shadow Bid's estimated cost with the cost of the Preferred Proponent's Financial Offer (i.e. the actual bid rather than the Shadow Bid).

Calculation

The VfM compares the cost of the Preferred Proponent's Financial Offer to the cost of the PSC. The VfM is therefore as follows:

	NPV (in millions)
Public Sector Comparator	$ 1,832
Preferred Proponent's Financial Offer	$ 769
Difference	$ 1,063

The VfM is therefore $ 1,063 million, or 58% of the PSC.

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Appendix B: Sample of risk allocations

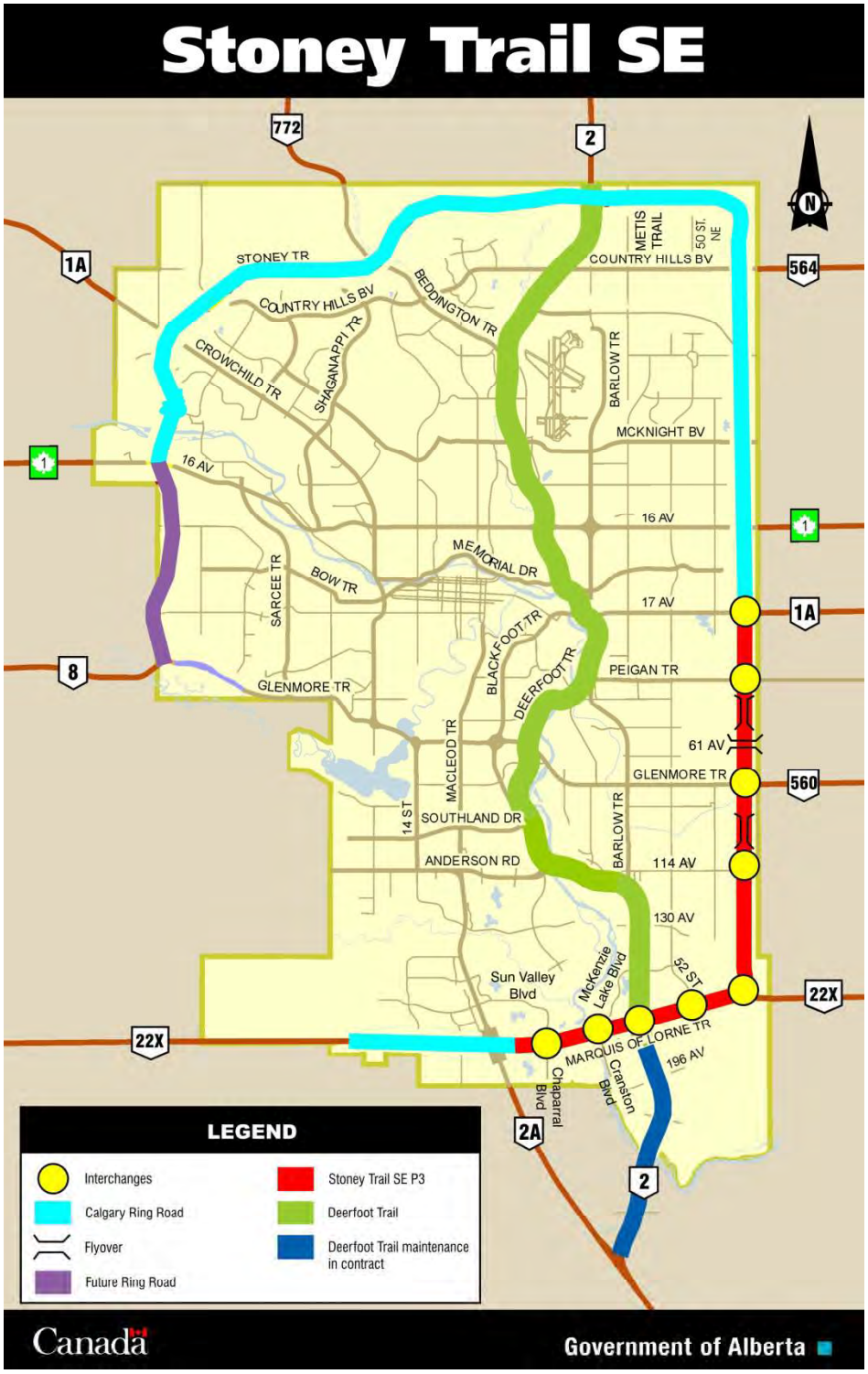
Table 1: Sample of Risk Allocations between Government of Alberta and Contractor [7]

	Traditional		P3	
	GoA	Contractor	GoA	Contractor
DEVELOPMENT, DESIGN AND CONSTRUCTION RISKS				
Concept approvals – environmental – Alberta Environmental Referral	●		●	
Concept approvals – environmental – Federal CEAA (assumes CSIF funding)	●		●	
Bridge crossing and/or watercourse alteration				
Environmental permits	●			●
Environmental				
Environmental Contamination (known)	●			●
Environmental Contamination (unknown)	●		●	
Archaeological				
Archaeological finds (known)	●			●
Archaeological finds (unknown)	●		●	
Land acquisition	●		●	●
Delays by outside agencies (utilities and permitting)	●		●	●
Delays by the Province	●		●	
Minimum insurance and bonding requirements	●		●	
Adequacy of insurance and bonding requirements	●			●
Confirmation of insurance and bonding		●		●
Sub-contractor insolvency		●		●
Design error	●			●
Changes in standards	●		●	
Alberta Transportation supplied data – accuracy		●		●
Alberta Transportation supplied data – sufficiency	●			●
Alberta Transportation supplied data – interpretation		●		●
Traffic volume and vehicle mix	●			●
Patent infringement	●	●		●
Weather	●			●
Labour disputes	●			●
Fire		●		●
Vandalism		●		●
Damage to works		●		●
Traffic accidents		●		●

[7] The project agreement should be consulted for a comprehensive allocation of risks between the parties. The final form of the project agreement is available at http://www.transportation.alberta.ca/eastgp.htm

	Traditional		P3	
	GoA	Contractor	GoA	Contractor
Damage/injury to third parties		●		●
Damage/loss to utilities		●		●
Defective materials		●		●
Water/air/soil pollution – unknown pre-existing	●		●	
Water/air/soil pollution – known pre-existing or arising from work	●	●		●
Quality assurance/quality control	●	●		●
Quality audits	N /A	N/A	●	
Public interface	●	●		●
Workplace Health and Safety		●		●
Utilities	●	●	●	●
FACILITY EXPANSION RISK				
Traffic congestion due to signalization	●			●
Traffic growth	●			●
Future interchanges or additional lanes	●		●	
OPERATION AND MAINTENANCE RISKS				
Changes in standards and legislation	●		●	
Weather	●			●
Labour disputes	●			●
Traffic – volume and vehicle mix	●			●
Traffic – deterioration	●			●
Actual maintenance costs higher than anticipated	●			●
Damage/injury to third parties		●		●
Damage to works	●		●	
Water/air/soil pollution		●		●
Vandalism	●		●	
Condition after 30 years	●	N/A		●
Performance	●			●
FINANCING RISKS				
Interest rates – before Agreement closure	●		●	
Interest rates – after closure	●			●
Inflation on Construction Agreement		●		●
Inflation on operation, maintenance, rehab.	●		●	●

Appendix C: Project Scope



Roadway
25 km of six-lane divided highway

Bridges
27 total bridge structures

Interchanges
17 Avenue SE
Peigan Trail SE
Glenmore Trail SE
114 Avenue SE
Highway 22X
52 Street SE
Deerfoot Trail SE
McKenzie Lake Blvd/Cranston Blvd
Sun Valley Blvd/Chaparral Blvd

Flyovers
61 Avenue SE
Canadian Pacific Rail
Canadian National Rail

Maintenance
Contract includes maintenance of Stoney Trail SE and 12 km of Deerfoot Trail between Stoney Trail SE (currently Highway 22X) and Highway 2A junction.

Appendix D: Commentary by Fairness Auditor

GGC CONSULTANTS INC.
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Office of the President

Direct Line: 780.429.9794
E-Mail: ggc1936@aol.com

Personal & Confidential

January 28, 2010

Mr. Tom Loo, P. Eng.
Executive Director, Major Capital Projects
Alberta Transportation
3rd Floor, Twin Atria Building
4999 – 98th Avenue
Edmonton AB T6B 2X3

Dear Tom:

Re: Fairness Auditor's Report on the Completion of the RFP Evaluation and Recommendation of the Preferred Proponent for Calgary's South East Stoney Trail Ring Road ("SEST").

This Report is being provided to the Executive Director/Project Steering Committee of the above-noted, as stipulated in the Alberta Infrastructure and Transportation Terms of Reference for the Fairness Auditor.

Further to our Letter of Opinion dated May 19, 2009, the Fairness Auditor has familiarized himself with the appropriate documentation in this matter, including the ***Request for Qualification***, ***Instructions to Proponents***, ***Transaction Process Framework***, terms of the ***Request for Proposal, Agreement to Design, Build, Finance and Operate North West Anthony Henday Drive Ring Road*** **("*DBFO Agreement*"),** and the appropriate minutes and memoranda pertaining to this process.

In order to ensure that the transaction was conducted fairly and consistently, the following fairness principles were used as guidelines throughout the transaction process:

1. The Proponents in this matter were given the same opportunity for the availability to access information.

2. The information made available to the Proponents was sufficient to ensure that they had the opportunity to fully understand the opportunity.

3. All the Proponents had reasonable access to the opportunity.

4. The criteria established in the invitation documents truly reflect the needs and objectives of the project.

5. The evaluation criteria and the evaluation process were established prior to the evaluation of submissions.

6. The evaluation criteria, and evaluation processes were internally consistent.

7. The pre-established criteria and evaluation process were followed.

8. The evaluation criteria and process were consistently applied to all submissions.

The Fairness Auditor attended several Evaluation Committee Meetings, and in addition reviewed the evaluation criteria used by that group.

The Fairness Auditor attended the Selection Committee Meetings, Working Committee Meetings, and was present for interviews between the Selection Committee/Working Committee and the RFP Proponents. It was observed that the interface with each group was open, unbiased, transparent, consistent in approach, and ultimately a fair process in my opinion. In addition, at every meeting with any of the RFP Proponents, the Fairness Auditor asked the Proponent whether there were any fairness issues and the response in every case was that there were no fairness issues.

As the Fairness Auditor in this procurement, I hereby certify that, in my opinion, the selection process in this matter conducted by Alberta Transportation, to the completion of its recommendation of the Preferred Proponent, was open, consistent in approach, and fair.

Yours truly,

GGC CONSULTANTS INC.

PER:

GARY G. CAMPBELL, Q.C.

GGC/wd

4270455.2

Appendix E: Proponent Teams

Table 2: Composition of proponent teams invited to participate in RFP process

Team Component	Southeast Calgary Connector Group (SCC Group)	SEConnect (SEC)	Chinook Partnership (CP) [8]
Project Lead	Bilfinger Berger Project Investments Inc.	HOCHTIEF PPP Solutions North America Inc.	SNC-Lavalin Inc.
		Macquarie Capital Group Ltd.	Acciona S.A.
Design-Build	Kiewit Management Co.	Flatiron Constructors Canada Ltd.	SNC-Lavalin Constructors (Pacific) Inc.
	Parsons Overseas Company of Canada Ltd.	Graham Building Services	Acciona Infraestructuras S.A.
	McElhanney Engineering Services Ltd.	Ledcor CMI Ltd.	Stantec Consulting Ltd.
	Delcan Corporation Ltd.	Carmacks Enterprises Ltd.	Golder Associates Ltd.
	Applied Research Associates Inc.	AECOM	
	Brybil Projects Ltd.	Dillon Consulting Ltd.	
	Urban Systems	EBA Engineering Consultants Ltd.	
	Terracon Consultants	Spencer Environmental Management Services Ltd.	
	DMD & Associates Ltd.	Patching Associates Acoustical Engineering Ltd.	
	Opus International Consultants	CTMS Engineering Inc.	
	Patching Associates Acoustical Engineering Ltd.		
	Conestoga-Rovers & Associates		
	ARUP Canada Inc.		

[8] Chinook Partnership was the proponent group that developed and submitted the successful proposal. Once the RFP process was completed, the project leads for Chinook Partnership formed a special purpose organization, Chinook Roads Partnership to carry out the work of the contract.

Team Component	Southeast Calgary Connector Group (SCC Group)	SEConnect (SEC)	Chinook Partnership (CP) [8]
	Halcrow Group Ltd.		
	Thurber Engineering Ltd.		
Operation and Maintenance	Volker Steven Contracting Ltd.	Carmacks Maintenance Services Ltd.	SNC-Lavalin ProFac Inc.
			Acciona S.A.
Financing	Bilfinger Berger Project Investments Inc.	Hochtief PPP Solutions North America Inc.	SNC-Lavalin Capital Inc.
	Scotia Capital	Macquarie Capital Group Ltd.	Royal Bank of Scotland
			BNP Paribas
Other Advisors	Davis LLP	CIT Group Securities (Canada) Inc.	
	Wylie Crump Ltd.		
	Jardine Lloyd Thompson Ltd.		
	Stikeman Elliot LLP		
	PKF (UK) LLP		

Appendix F: Summary of bids received

Table 3: Financial bids received from proponents on January 27, 2010

Item	PSC ($ million)	P3 Procurement ($ million)		
		Chinook Partnership	SE Connect	Southeast Calgary Connector Group
Total net present value of design, construction, finance and operations and maintenance	1,832	769	1,134	1,163
Value for money of P3 procurement				
$	Not applicable	1,063	698	669
%	Not applicable	58%	38%	37%

Appendix G: Payment adjustments

Table 4: Sample of key payment adjustments included in P3 contract [9]

Issue	Payment Adjustment
If an external audit has not been completed within the specified time:	$2,400/week or any partial week, for the first four weeks and $6,000/week or any partial week, thereafter
If any deficiencies identified by the Environmental Management System external auditor have not been corrected within the specified time:	$6,000/week or any partial week, for the first four weeks and $12,000/week or any partial week, thereafter
If the contractor fails to undertake roadway inspections:	• $2,500 for the first occurrence; • $5,000 for the second occurrence; • $10,000 for the third occurrence; and • $20,000 for the fourth occurrence and each occurrence thereafter.
If during the Operating Period, the roadway superelevation and cross-slope rates are measured and are found not to be maintained within ±1.0% of the design rates:	• $3,600/week or any partial week, for the first four weeks the deficiency is not remedied; then • $11,000/week or any partial week, thereafter.
If localized pavement repairs (e.g. for spalling, roughness, cracking, or potholes), permanent or otherwise, are not completed within the stipulated time period:	$600/localized repair for each seven day period or any partial week, until the deficiency is corrected.

[9] The project agreement should be consulted for details on all payment adjustments. The final form of the project agreement is available at http://www.transportation.alberta.ca/eastgp.htm

Issue	Payment Adjustment
If lamps or components of the roadway lighting system are not adjusted, maintained, repaired/replaced within the stipulated time:	• Lamp repair/replacement, $120/lamp/day or any partial day, that the lamp remains in need of repair/replacement; and • Repair or adjustment of any pole, base or other lighting system component, $120/component/day or any partial day, that the component needs adjustment.
If grass is in excess of the specified maximum height:	$120/hectare or any partial hectare/month or any partial month,
If the contractor fails to commence work within 60 days of identification of a structural or operational deficiency on bridges:	$1,200/day or any partial day, per deficiency shall be assessed until the contractor commences and diligently pursues completion of the work.
If the contractor is non-compliant with respect to snow clearing and ice control:	• $12,000 for each occurrence of non-compliance during a Storm Event (to a maximum of $72,000 total for the Infrastructure); • $24,000 for each occurrence of non-compliance during a subsequent Storm Event in any consecutive 12 month period (to a maximum of $145,000 total for the Infrastructure); and • The third occurrence of any non-compliance within a consecutive 12 month period but in a separate third Storm Event shall be a potential Termination Event for the purposes of and having the consequences set out in section 16.8(k) of the DBFO Agreement.

Tab 81

P3 Value for Money Assessment and Project Report

Northeast Anthony Henday Drive (NEAHD) Ring Road Project

Edmonton, Alberta



November 2012

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Appendix A: Commentary by Deloitte & Touche LLP

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Value for Money Assessment and Project Report on Public Private Partnership (P3) for NEAHD

October 2012

1. Summary: Using a P3 for Northeast Anthony Henday Drive - did it work?

By using a Public Private Partnership (P3) to design, build, finance and operate Northeast Anthony Henday Drive (NEAHD), the Alberta government will save an estimated $371 million (in 2012 dollars) over 34.5 years when compared to a traditional design-bid-build procurement approach ($1.809 billion instead of $2.180 billion, a 17% savings). It will also deliver NEAHD three years earlier than it could have achieved with traditional procurement methods. The following assessment shows that using a P3 delivered value for money and that it was the right way to procure NEAHD.

The government signed the P3 contract, with a 34.5-year term in May 2012, with Capital City Link General Partnership (the contractor) for the design, construction, partial financing, operation and maintenance of NEAHD. The contract requires the road to be ready for public use by October 1, 2016. The cost savings and earlier completion can be attributed to:

- life-cycle optimization,
- economies of scale,
- construction efficiencies,
- construction innovations,
- risks shifted from government to the contractor, and
- fixed-price contract.

The Government of Alberta uses P3s, when deemed appropriate, to deliver needed infrastructure to Albertans. The P3 procurement approach is used to provide benefits that can include an extended warranty, fixed pricing and earlier delivery of infrastructure compared to procuring the asset using a traditional approach. The government also requires P3 projects to deliver value for money. This report provides information to show that the Northeast Anthony Henday Drive (NEAHD) indeed delivered value for money through P3 procurement.[1]

The Northeast Anthony Henday Drive is the final segment of the ring road in Edmonton. It will provide an alternate route for bypass traffic along the north and east edges of the city, thereby alleviating congestion along Yellowhead Trail through Edmonton.

This report explains what a P3 is and why it may be used, provides a value for money assessment of the P3 and provides a project summary.

[1] This report was developed by Alberta Transportation following the value for money methodology in the Government of Alberta's *Public-Private Partnership Framework and Guideline* which can be viewed at. http://www.finance.alberta.ca/business/alternative-capital-financing/documents-resources.html

2. Background

What is a P3?

A P3 is a different, non-traditional way for government to create capital assets such as roads, schools, and other types of government facilities. In the case of NEAHD, the government entered into one agreement with a contractor responsible for designing, building, partially financing, operating and maintaining the road over a 34.5-year period (four and a half years design and construction; 30 years operations and maintenance). [2]

A P3 can save time and money and reduce risk to the government by having one contractor design, build, finance, operate and maintain a road. For Alberta P3 projects, the public sector owns the facility and provides public services to Albertans, the same as it does with a traditional design-bid-build approach.

What is a traditional approach?

In a traditional approach, the public sector hires an engineering firm to design a road, bridge, or other related facilities, and then hires a construction contractor through a public tender process to build them. Once the infrastructure is built, the public sector operates and maintains it typically by awarding numerous individual contracts for routine repairs and rehabilitation. The government pays for the construction of the infrastructure by making progress payments (for its own infrastructure) or by making capital grants to entities such as school boards, health authorities, and post-secondary institutions. Government funding is also used to operate and maintain the facility.

What does a Value for Money (VFM) assessment do?

A VFM assessment measures whether a P3 is the best option for a particular project. In the case of NEAHD, the estimated costs of the traditional and P3 options were compared. The VFM for a project is the difference between these two costs. The goal of a P3 is to provide value; to do so, the P3 must cost less – measured by net present value – than the traditional method over the life of the contract.

What is net present value?

Net present value is the current value of a future sum of money. It is a standard method to compare the value of money over time (a dollar today is worth more than a dollar tomorrow because of interest and inflation) to assess long-term projects. It is produced by applying an interest rate and an inflation rate (collectively called the “discount rate”) to a future sum. The amount and timing of cash flows differ in the two options for producing the road (traditional and P3) and the calculation of net present value accounts for those differences. The net present value of the cost to produce and maintain a facility using the traditional approach is called the Public Sector Comparator, or PSC.

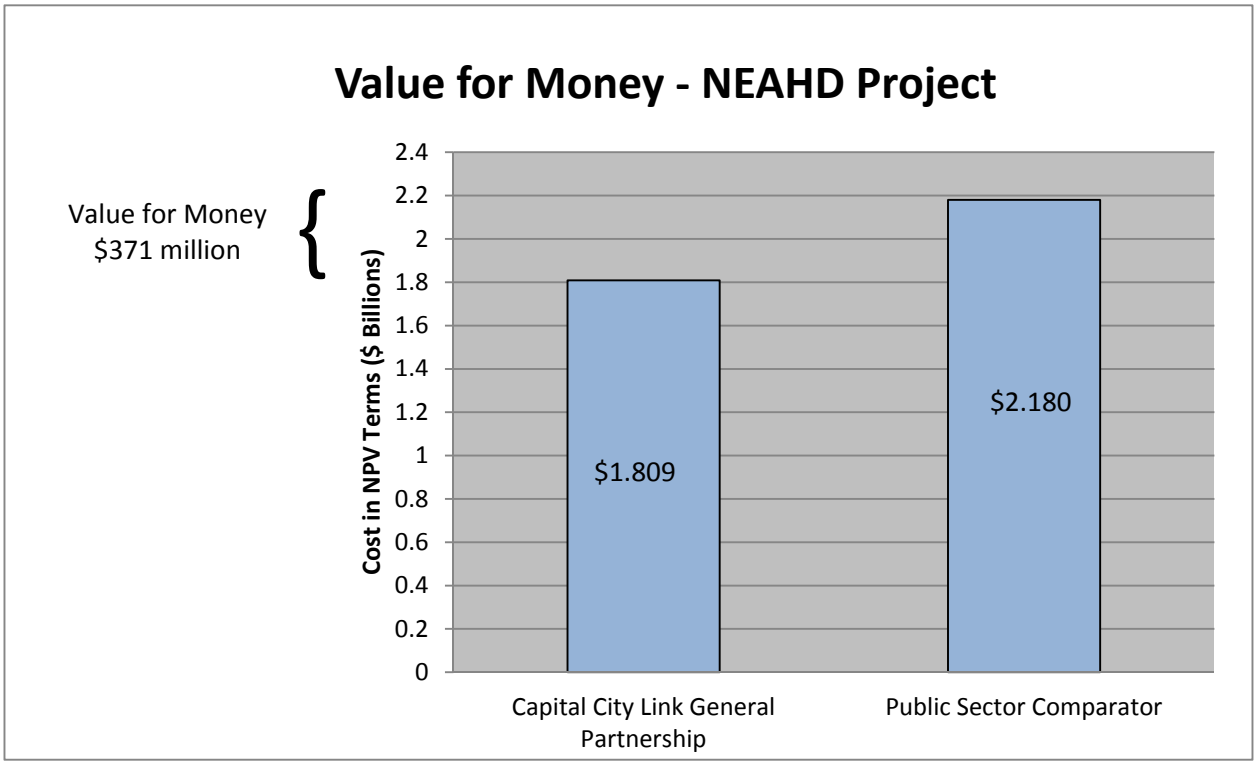
[2] For detailed discussion on P3s, see the Annual Report of the Auditor General of Alberta 2003–2004, on pages 49 to 72 (www.oag.ab.ca/files/oag/ar2003-2004.pdf).

3. VFM Assessment of the P3 used for NEAHD

Money and time saved by using P3: Quantitative measures of value

This VFM assessment uses net present value as of March 14, 2012, when bids were received. It includes the costs to design, build, partially finance, operate and maintain the road over the 34.5-year agreement term. It also includes the impact of risk transfer (as discussed later in this section) but excludes costs common to both methods, such as land. [3]

The low bid received for this project was $1.809 billion and the PSC was estimated at $2.180 billion (both in 2012 dollars). The VFM is therefore $371 million or 17% of the PSC. A value for money analysis prepared by the financial advisor, Deloitte & Touche LLP, retained for this project is attached in Appendix A.



[3] Capital and rehabilitation costs for both methods were developed by ISL Engineering Ltd. Inflation and discount rates were provided by the Ministry of Finance and Enterprise. Deloitte & Touch LLP developed the financial model.

Private financing by the contractor costs more than public financing by government, but in the case of NEAHD, that cost was more than offset by the following factors:

1. **Life-Cycle Optimization** – Having one contract that includes design, construction and a 30-year maintenance period encourages the contractor to consider different construction and maintenance solutions that would optimize the life-cycle of the infrastructure and reduce costs over the life of the project.

2. **Earlier Completion** – Completing the project three years earlier than could be achieved using traditional delivery can equate to savings on cost escalation. Market forces continually drive up costs related to labour, equipment, fuel, construction materials, etc. Earlier completion reduces the exposure to this phenomenon. Earlier completion also provides savings to the road users in travel time and fuel costs over the three years of earlier completion.

3. **Economies of Scale** – Given the 355 lane kilometers of road construction and 47 bridge structures, the contractor is able to secure large volume long term contracts for material such as asphalt, concrete, and steel which are significantly discounted relative to the smaller quantities secured in traditional contracts.

4. **Construction Efficiencies** – As with many large projects, the contractor is able to apply standardized design approaches and construction methodologies to numerous elements within the project scope. The project can be completed using fewer person-hours by capitalizing on the streamlining of processes.

5. **Construction Innovation** - A P3 contract requires the contractor to perform both the design and construction processes. The contractor can use its knowledge and experience to develop innovative solutions in either design or construction that accelerate the completion of the project and reduce costs.

6. **Risk Allocation** – Allocating risks to the party best able to manage them means the contractor bears many of the costs that the government would have borne in the traditional approach and can manage them at a lower cost than government. For example, the contractor will pay for any changes needed during the construction period due to design changes and errors. The contractor will also bear any cost increases for labour and material during the construction period. In addition, for the 30-year operation and maintenance term, the contractor will pay to rehabilitate or replace any defective component of the infrastructure. A list of some of the major risks that the P3 contract allocated to the contractor is on pages 6 and 7 of this report.

7. **Fixed-Price Contract** – By entering into a fixed-price contract for the project, the contractor bears the risk for increases to project costs during construction. The government is protected from any anomalies in construction pricing and can effectively budget for the price of the project. As well, the operations and maintenance costs for the 30-year maintenance period are fixed with an index factor applied to adjust for inflation. The contractor's payments over the 30 years cannot be modified if the price of various maintenance materials or equipment increases.

Qualitative measures of value

1. **Long Term Warranty** – The P3 effectively gives the government a 30-year warranty by transferring responsibility for operation and maintenance of the road to the contractor for the term of the contract. The 30-year operation and maintenance period gives the government assurance that the road will be maintained in good condition with no deferred maintenance at the end of 30 years.

2. **Life Cycle View** – By linking the design, construction, operation and maintenance obligations into a single contract ensures that there is a high degree of discipline in achieving a quality product. For example, any compromise in quality would result in a more substantive maintenance obligation for the P3 contractor. Therefore the combination of design, construction, and operation and maintenance of the infrastructure is highly optimized to suit the infrastructure's entire life cycle.

Major risks allocated in P3 contract

An important factor in the delivery of P3 projects is an acceptable allocation of risks to the party or parties best able to manage them. In some cases, the contractor is the appropriate party to manage a risk; in others, the government can better manage the risk; in yet a third case, the risk may be best shared between the two parties.

Table 1 (Appendix B) shows a sample of the risk allocation between the government and the contractor in the P3 contract and schedules. This list is not comprehensive. The P3 contract referenced in Appendix B shows all the allocated risks.

Schedule certainty – The contractor agrees to have the road available for traffic by October 1, 2016 or receive reduced payments. The contractor has to manage the construction schedule to meet this date.

Weather – The contractor bears any costs of project delays caused by bad weather.

Scope changes – The government pays for any scope changes that it requests during construction. The government will pay for this work in accordance with the change order process set out in the P3 contract. During the operation and maintenance period the government may consider changes to the road. For example, continued residential growth in the area may require the government to add another interchange or more freeway lanes. The government will pay for this work as long as the contractor provides competitive pricing based on a tendering process as specified in the P3 contract.

Interest rates and financing – During the maximum two month period between notifying a preferred proponent (which becomes the contractor when it signs the P3 contract) and signing the contract, the government shares the risk of any changes in base borrowing rates with the preferred proponent. The contractor has to arrange for partial financing for the whole term of the contract and is solely responsible for the impact of the financing arrangements. No matter how much rates increase during the contract, the contractor must pay any increased refinancing costs. Conversely, the contractor can benefit from any rate drops.

4. Project report

Project goals

The NEAHD project assists in meeting a number of Government of Alberta (GoA) goals and strategic priorities[4] and Alberta Transportation Priority Initiatives (referenced in Alberta Transportation's Business Plan 2012-15[5]), as follows:

1. **Government of Alberta Strategic Plan Goal 5: "Preserve the Province's Finances"** – the delivery of NEAHD will be done in a fiscally responsible manner, will support growth in the Gross Domestic Product, provide job opportunities, and enhance movement of goods and people.

2. **Alberta Transportation Goal 1: "Alberta's provincial highway network connects communities and supports economic and social growth"** – NEAHD is a major addition to the City of Edmonton road network and a major connector of the north-south movement of goods. Connectivity with the regional highway network will be improved with new highway-to-highway interchanges at Highway 16 and Highway 15 (Manning Drive). With the completion of NEAHD, a high standard north-south bypass of Edmonton will be provided and will facilitate the movement of goods and people to northern Alberta, including Fort McMurray.

Appendix C provides a drawing showing the project route and lists the associated interchanges and crossings.

Project outcomes

The following outcomes will be achieved by delivering NEAHD as a P3:

- **Cost certainty for the life of the road** – Shifting the risk of increasing construction costs and other financial risks to the contractor ensured cost certainty for the design, construction, operation and maintenance of the new road.

- **An innovative, repeatable, transparent, and accountable process to produce and maintain roads** – The same process can be used for other projects in Alberta.

- **Less time and lower cost to build**– To plan, design, and build this amount of infrastructure using the traditional approach would take at least seven and a half years before being available to the travelling public. In contrast, the P3's coordinated and comprehensive approach will produce NEAHD in only four and a half years and at a lower cost.

- **A 30-year warranty** – The contractor is responsible for ongoing operation, maintenance and rehabilitation for the 30-year operation and maintenance phase.

[4] GOA Government Strategic Plan 2012:
http://www.finance.alberta.ca/publications/budget/budget2012/goa-business-plan.pdf

[5] Transportation Business Plan 2012-15:
http://www.finance.alberta.ca/publications/budget/budget2012/transportation.pdf

Approaches considered

The government considered two alternative approaches to deliver NEAHD:

1. **Traditional Design-Bid-Build approach**, with the usual pay-as-you-go financing by the government and delivery by Alberta Transportation. Private-sector engineering consultants hired by Alberta Transportation design the roads and bridges. Construction contracts are awarded through a traditional open-bidding process tendered by Alberta Transportation to private sector contractors, typically in work packages of unique tasks (such as grading, paving, bridge construction, lighting, etc.) and/or of geographically distinct sections. A project of this size under a traditional procurement would involve up to 30 separate construction contracts. Upon construction completion, operations, maintenance and infrastructure rehabilitation responsibility is tendered through an ongoing traditional open-bidding process to private sector contractors specializing in this type of work.

2. **Design-Build-Finance-Operate-Maintain approach (the basis of the P3)**, with the winning private-sector proponent (the contractor) forming a consortium or group to handle the project from start to end of the contract. The contractor is responsible for the ongoing operation and maintenance of the road for a set time (in this project, 30 years), and for having a rehabilitation plan to ensure performance requirements are met. The government makes monthly payments to the contractor during the 30-year maintenance phase of the contract. Payments start after the road is ready to use and cover capital, operations, maintenance and rehabilitation costs. The government can reduce payments based on criteria such as whether the roadway remains available for use and whether the performance of the infrastructure meets certain standards.

Selection process

The government's selection process was open, competitive, timely, fair and transparent. The Fairness Auditor, GGC Consultants Inc., as represented by Mr. Gary Campbell, QC, prepared a report on the fairness of the process (Appendix D).

A Request for Qualifications was publicly issued on March 2, 2011. Five teams responded and were evaluated on experience, personnel qualifications, past performance and financial capability. The three teams asked to submit proposals were Alberta Roads Consortium, Capital City Link Group, and Edmonton Connect Partners, as shown in Appendix E.[6]

The Request for Proposal (RFP) process ran from May 13, 2011 to March 14, 2012. The made-in-Alberta approach to P3s ensures the process is competitive throughout. During the RFP process, the teams made financial and technical submissions to ensure that they met the project's minimum specifications. The government issued a draft form of the contract during the RFP process and the teams provided comments on it. Before receiving financial bids, the government issued the final form of the contract that the successful proponent would sign.

Once the three teams provided RFP submissions, they all submitted financial bids based on the final form of the contract. There were no negotiations on this contract after financial bids

[6] The companies that make up the teams are listed in Table 2 (Appendix E).

were received. These bids are summarized in Table 3 (Appendix F). Capital City Link Group submitted the lowest price, on a net present value basis, and won the contract. Capital City Link Group then created a special purpose company, known as Capital City Link General Partnership, to carry out the work of the contract.

Key terms of P3 contract

What the government must pay: The sum of the payments for the 34.5-year contract is approximately $1.809 billion in 2012 dollars.

During the construction phase the Alberta government will pay $924.9 million for construction costs while P3 Canada will provide up to $36.8 million through the PPP Canada Fund. This funding covers only part of the overall construction (capital) cost. Once the road opens to traffic, the Alberta government will make monthly payments over the remaining 30 years of the contract. Of these monthly payments, the portion representing the remaining capital amount is fixed, while operation, maintenance and rehabilitation payments are indexed.[7] This is the same index that is used for Alberta Transportation's traditionally delivered provincial highway maintenance contracts.

If the contractor fails to achieve traffic availability by the October 1, 2016 target date, the contractor will incur severe penalties, achieved by reduction in the overall capital payments payable by the government. The penalty is loss of the full amount of the monthly capital payments or a portion thereof that the government would otherwise have paid the contractor, except that during December 2016 through May 2017 the penalty is one-third of the capital payment.

What the contractor must do: The 34.5-year contract between the government and the contractor has a four and a half year construction period and a 30-year operation, maintenance, and rehabilitation period. It requires the contractor to:

- complete the design and construction of the NEAHD as described in Appendix C by October 1, 2016;
- partially finance the construction over the contract term;
- operate, maintain, and rehabilitate the road to the performance standards specified in the contract;
- operate and maintain (but not rehabilitate) a portion of existing bridge infrastructure already constructed by Alberta Transportation. The existing infrastructure includes two bridges at Whitemud Drive, two bridges carrying Sherwood Park Freeway over the Canadian National Railway and one bridge carrying 34 Street over Sherwood Park Freeway; and
- hand back the roadway to Alberta Transportation in September 2046 in a condition as prescribed in the contract.

Payments reduced for non-performance:

The government can reduce all monthly payments (capital, operation and maintenance, and rehabilitation) if the contractor does not meet performance standards in the contract. For

[7] Four indices are used to calculate operation and maintenance payments: Manpower, Consumer Goods, Construction, and Diesel Fuel. Additional detail can be found in Schedule 10 of the P3 Agreement.

example, if pavement does not meet performance criteria and the contractor does not repair it within the allowed time, the government can reduce monthly payments to the contractor.

A detailed description of all the payment adjustments is in Schedule 15 of the P3 contract, and a sample appears in Table 4 (Appendix G). The final form of the P3 contract is at http://www.transportation.alberta.ca/3787.htm.

The Government owns the road

The contractor has a licence from the government for the term of the P3 agreement, subject to the paramount obligation to keep the road open for the free use by the public (except for specifically permitted lane closures due to accidents, emergencies, repair work, etc.). Tolls are expressly prohibited, as are commercial signage and any other commercial use of the road.

Monitoring during and after construction

During construction, the government is using ISL Engineering Ltd. as its consultant to review the designs and ensure that construction standards have been met. The contractor has to provide monthly reports on design and construction issues. In the operation, maintenance, and rehabilitation period, the contractor will self-monitor and report on its compliance with the technical requirements. The government will also do its own inspections and testing to ensure the standards continue to be met. In addition, the contractor's lender has a consultant review the contractor's performance.

Accounting treatment

The accounting treatment for P3 projects follows generally accepted accounting principles set out by the Public Sector Accounting Board of the Canadian Institute of Chartered Accountants. The obligation is "on-book", so the province records the amount owing for the private financing over the construction period and also records the cost of building the asset on its balance sheet as a capital asset.

Project schedule

The P3 contract was signed on May 8, 2012 and construction started in earnest in June 2012. The contractor must deliver NEAHD by October 1, 2016 or face a payment reduction. An independent certifier will certify when NEAHD is available for use.

The operation, maintenance, and rehabilitation period starts after the road is made available to traffic and continues until September 2046, when the license granted to the contractor to access the road for operation, maintenance, and rehabilitation activities will expire. The contractor then must hand back the road in the condition specified in the contract. The government and the contractor will assess NEAHD to ensure it is in the condition specified in the contract when the contract expires. After the contract expires, the Alberta government will be responsible for operating, maintaining, and rehabilitating the road.

Appendix A: Commentary by Deloitte & Touche LLP

Deloitte.

Northeast Anthony Henday Drive P3

Comparison of Financial Offers and Calculation of Final Value for Money

Confidential

March 14, 2012

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Introduction

Scope of Report

This report presents the comparison of the Financial Offers received from NEAHD Proponents in their SR3 submissions to determine the Preferred Proponent. It also calculates the Value for Money ("VfM") realized by the Preferred Proponent's Financial Offer. The purpose of this report is to provide a concise summary of the bid evaluation process to identify the Preferred Proponent and to facilitate the notification of the Preferred Proponent.

Timing

The PSC was finalized prior to receipt of the Proponents' proposals, and was deposited with the Deputy Minister of Justice on February 14, 2012. The finalized PSC comprises assumptions and cost estimates last updated by Alberta Transportation ("AT") on September 8, 2011. The discount rate, inflation rate and P3 debt financing rate were further updated on February 9, 2012 using information from Alberta Finance and Enterprise.

The PSC was recalculated on March 14, 2012, using the discount rate and inflation rate that were determined by Alberta Finance and Enterprise as the basis for calculating the net present value of the Proponents' Financial Offers. None of the other input assumptions (costs, etc.) were altered. The PSC referred to herein is this recalculated value.

The Financial Offers from Proponents were received on March 14, 2012.

Limitations

This report was prepared for the exclusive use of AT, and is not to be reproduced or used without written permission of Deloitte with the exception of its use with regard to the procurement process for the Northeast Anthony Henday Drive P3 project. No third party is entitled to rely, in any manner or for any purpose, on this Report. Deloitte's services may include advice or recommendations, but all decisions in connection with the implementation of such advice and recommendations shall be the responsibility of, and be made by, AT.

Deloitte's scope of work related to the PSC was limited to the review and updating of a PSC spreadsheet model provided by AT. The PSC's financial assumptions and cost estimates are those of AT. Deloitte's scope of work related to the VfM was limited to development of a spreadsheet to calculate and compare the net present value of the financial offers using AT's methodology.

This report relies on certain information provided by AT and the Project's Proponents, and Deloitte has not performed an independent review of this information. It does not constitute an audit conducted in accordance with generally accepted auditing standards, an examination or compilation of, or the performance of agreed upon procedures with respect to prospective financial information, an examination of or any other form of assurance with respect to internal controls, or other attestation or review services in accordance with standards or rules established by the CICA or other regulatory body.

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Comparison of Financial Offers

Method

The Financial Offers consist of the following payments:

- Monthly payment stream over the operating period (October 2016 to September 2046 inclusive), consisting of:
  - Capital Payments (identical monthly payments stated in nominal dollars)
  - O&M Payments (monthly payments for O&M, stated in 2012 dollars)
  - Major Rehabilitation Payments (monthly payments with timing as needed for Major Rehabilitation, stated in 2012 dollars)
- Total Provincial Funding, calculated by multiplying the amount of one full month's Capital Payment by 266.

The total cost of the Financial Offers on a net present value basis was determined by calculating the sum of the net present values (as at the SR3 submission date of March 14, 2012) of:

- the Capital Payments;
- the O&M Payments, after first adjusting each payment for inflation using a fixed estimated inflation rate of 2.15% per annum determined by Alberta Finance and Enterprise;
- the Major Rehabilitation Payments, after first adjusting each payment for inflation using the fixed estimated inflation rate of 2.15% per annum determined by Alberta Finance and Enterprise; and
- the Provincial Funding, after first distributing the amount into a number of separate progress payments using a pre-determined schedule of payment dates and payment amounts (with each amount defined as a percentage of Provincial Funding). The schedule of payment dates and amounts is taken from the Shadow Bid, which has monthly payments averaging 2.8% of Provincial Funding commencing in January 2014[1].

The discount rate used to calculate net present values is 3.75% per annum, determined by Alberta Finance and Enterprise based on the Province's borrowing costs.

Proponents were advised of the discount rate and inflation rate to be used on March 12, 2012.

Process and results

To determine the Proponent that provided the Financial Offer with the lowest total cost on a net present value basis, the Proponent's Form G1 cashflows (Columns B, D, and E) were value-copied into the bid comparison spreadsheet that was developed in advance.

The payment cashflows as copied into the bid comparison spreadsheet were compared to and spot-checked against each Proponent's Form G1 (paper version) to confirm agreement between the Proponent's electronic and paper financial offers and the accuracy of the value-copy process. The sum of each cashflow in the bid comparison spreadsheet was also compared to the sum of the cashflow in the Proponent's Form G1 spreadsheet to again ensure the accuracy of the value-copy process. These comparisons confirm that the NPVs of each bid have been calculated according to the payments indicated on the paper version of each Proponent's Form G1.

[1] Since actual progress payments will be made according to the Contractor's verified progress in the field, which cannot be known in advance, an assumed schedule is required to evaluate the bids. The same schedule is used for all three because Proponents do not bid an enforceable construction schedule. The Preferred Proponent's schedule of Progress Payments as evidenced in its financial model may be used for calculating the book value and for budgeting purposes.

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The bid comparison spreadsheet calculates the NPV of the cashflows to the Proponents as of March 14, 2012, which is the basis for determination of the Preferred Proponent. The results are as follows:

	Public Sector Comparator	Cashflows to Proponents		
		ARC	ECP	CCLG
Total Cost on a Net Present Value Basis (NPVs to 14-Mar 2012, in millions)	$2,179.97	$2,033.93	$2,218.51	$1,808.87

ARC=Alberta Roads Consortium, CCLG=Capital City Link Group, ECP=Edmonton Connect Partners

The result as indicated in the above table is that Capital City Link Group has the lowest NPV, and absent any SR3 submission compliance concerns, Capital City Link Group would be the Preferred Proponent.

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Calculation of final value for money

Overview

VfM is determined by comparing the Preferred Proponent's Financial Offer to the PSC and is defined by Alberta's Public-Private Partnership Framework and Guideline as:

> *…a net present value comparison of the comparable costs and risks of the proposed P3 project with the Public Sector Comparator (PSC).*

The cost of traditional project delivery for the Project is established as the PSC. The cost of P3 project delivery is estimated at several points in the project development process with a Shadow Bid, allowing VfM to be estimated and refined as project information improves. The final VfM analysis replaces the Shadow Bid's estimated cost with the cost of the Preferred Proponent's Financial Offer (i.e. the actual bid rather than the Shadow Bid).

Calculation

The VfM compares the cost of the Preferred Proponent's Financial Offer to the cost of the PSC. The VfM is therefore as follows:

	NPV (in millions)
Public Sector Comparator	$ 2,179.97
Preferred Proponent's Financial Offer	$ 1,808.87
Difference	$ 371.1

The VfM is therefore $ 371.1 million, or 17% of the PSC.

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Appendix B: Sample of Risk Allocations

Table 1: Sample of Risk Allocations between Government of Alberta and Contractor [8]

	Traditional		P3	
	GoA	Contractor	GoA	Contractor
DEVELOPMENT, DESIGN AND CONSTRUCTION RISKS				
Concept approvals – environmental – Alberta Environmental Referral	●		●	
Concept approvals – environmental – Federal CEAA (assumes CSIF funding)	●		●	
Bridge crossing and/or watercourse alteration				
Environmental permits	●			●
Environmental				
Environmental Contamination (known)	●			●
Environmental Contamination (unknown)	●		●	
Archaeological				
Archaeological finds (known)	●			●
Archaeological finds (unknown)	●		●	
Land acquisition	●		●	●
Delays by outside agencies (utilities and permitting)	●		●	●
Delays by the Province	●		●	
Minimum insurance and bonding requirements	●		●	
Adequacy of insurance and bonding requirements	●			●
Confirmation of insurance and bonding		●		●
Sub-contractor insolvency		●		●
Design error	●			●
Changes in standards	●		●	
Alberta Transportation supplied data – accuracy		●		●
Alberta Transportation supplied data – sufficiency	●			●
Alberta Transportation supplied data – interpretation		●		●
Traffic volume and vehicle mix	●			●
Patent infringement	●	●		●
Weather	●			●
Labour disputes	●			●
Fire		●		●
Vandalism		●		●
Damage to works		●		●
Traffic accidents		●		●
Damage/injury to third parties		●		●
Damage/loss to utilities		●		●

[8] The project agreement should be consulted for a comprehensive allocation of risks between the parties. The final form of the project agreement is available at http://www.transportation.alberta.ca/3787.htm.

	Traditional		P3	
	GoA	**Contractor**	**GoA**	**Contractor**
Defective materials		●		●
Water/air/soil pollution – unknown pre-existing	●		●	
Water/air/soil pollution – known pre-existing or arising from work	●	●		●
Quality assurance/quality control	●	●		●
Quality audits	N /A	N/A	●	
Public interface	●	●		●
Workplace Health and Safety		●		●
Utilities	●	●	●	●
FACILITY EXPANSION RISK				
Traffic congestion due to signalization	●			●
Traffic growth	●			●
Future interchanges or additional lanes	●		●	
OPERATION AND MAINTENANCE RISKS				
Changes in standards and legislation	●		●	
Weather	●			●
Labour disputes	●			●
Traffic – volume and vehicle mix	●			●
Traffic – deterioration	●			●
Actual maintenance costs higher than anticipated	●			●
Damage/injury to third parties		●		●
Damage to works	●		●	
Water/air/soil pollution		●		●
Vandalism	●		●	
Condition after 30 years	●	N/A		●
Performance	●			●
FINANCING RISKS				
Interest rates – before Agreement closure	●		●	
Interest rates – after closure	●			●
Inflation on Construction Agreement		●		●
Inflation on operation, maintenance, rehab.	●		●	●

Appendix C: Project Scope

NEAHD Location and Features



Project Feature:

- 27 kilometres of six- and eight-lane divided roadway (9 kilometres of new highway construction and 18 kilometres of highway reconstruction)
- nine interchanges
- two road flyovers
- eight railway crossings (flyovers)
- two bridges across the North Saskatchewan River
- 47 total bridge structures

Interchanges locations:

- Manning Drive (partly completed with the Northwest Anthony Henday Drive project)
- 153 Avenue
- 130 Avenue
- Highway 16 (Yellowhead Trail)
- Broadmoor Boulevard at Highway 16
- Sherwood Drive at Highway 16
- Baseline Road
- Sherwood Park Freeway/Wye Road
- 17 Street at Sherwood Park Freeway

Flyover locations:

- Various CNR/CPR Rail Crossings
- Victoria Trail Flyover
- Petroleum Way Flyover

Appendix D: Commentary by Fairness Auditor

GGC CONSULTANTS INC.
2700, 10155 – 102 Street
Edmonton, AB
T5J 4G8

March 14, 2012

Tom Loo, P.Eng.
Executive Director
Major Capital Projects Branch
Alberta Transportation
2nd Floor, Twin Atria Building
4999 – 98 Avenue
Edmonton, AB, T6B 2X3

Dear Sir:

Re: Fairness Auditor's Report on Completion of the RFP Evaluation and Recommendation of the Preferred Proponent for North East Anthony Henday Drive ("NEAHD")

This Report is being provided to the Executive Director, Major Capital Projects Branch and Project Steering Committee of the above-noted, as stipulated in the Alberta Infrastructure and Transportation Terms of Reference for the Fairness Auditor.

Further to our Letter of Opinion dated May 10, 2011, the Fairness Auditor has familiarized himself with the appropriate documentation in this matter, including the **Request for Qualification, Instructions to Proponents, Transaction Process Framework,** terms of the **Request for Proposal, Agreement to Design, Build, Finance and Operate North East Anthony Henday Drive ("NEAHD"),** and the appropriate minutes and memoranda pertaining to this process.

In order to ensure that the transaction was conducted fairly and consistently, the following fairness principles were used as guidelines throughout the transaction process:

1. The Proponents in this matter were given the same opportunity for the availability to access information.

2. The information made available to the Proponents was sufficient to ensure that they had the opportunity to fully understand the opportunity.

3. All the Proponents had reasonable access to the opportunity.

4. The criteria established in the invitation documents truly reflect the needs and objectives of the project.

5. The evaluation criteria and the evaluation process were established prior to the evaluation of submissions.

6. The evaluation criteria, and evaluation processes were internally consistent.

7. The pre-established criteria and evaluation process were followed.

8. The evaluation criteria and process were consistently applied to all submissions.

The Fairness Auditor attended several Evaluation Committee Meetings, and in addition reviewed the evaluation criteria used by that group.

The Fairness Auditor attended the Selection Committee Meetings and Working Committee Meetings, and was present for interviews between the Selection Committee/Working Committee and the RFP Proponents. It was observed that the interface with each group was open, unbiased, transparent, consistent in approach, and ultimately a fair process in my opinion. In addition, at every meeting with any of the RFP Proponents, the Fairness Auditor asked the Proponent whether there were any fairness issues and the response in every case was that there were no fairness issues.

As the Fairness Auditor in this procurement, I hereby certify that, in my opinion, the selection process in this matter conducted by Alberta Transportation, to the completion of its recommendation of the Preferred Proponent, was open, consistent in approach and fair.

Yours very truly,

GGC CONSULTANTS INC.

Per:
GARY G. CAMPBELL, Q.C.

GGC/wd

Appendix E: Proponent Teams

Table 2: Composition of proponent teams invited to participate in RFP process

Team Component	Capital City Link Group[9] (CCLG)	Alberta Roads Consortium (ARC)	Edmonton Connect Partners (ECP)
Project Lead	HOCHTIEF PPP Solutions North America Inc. (Contact) **(LEAD)**	Macquarie Capital Group Limited (Contact) **(LEAD)**	SNC-Lavalin Capital, a division of SNC-Lavalin Inc. (Contact) **(LEAD)**
	ACS Infrastructure Canada Inc. **(LEAD)**		John Laing Investments Limited
	MNII Canada I, LLC **(LEAD)**		
	Davis LLP		
	McMillan LLP		
Design-Build	Flatiron Constructors Canada Limited **(LEAD)**	Kiewit Management Co. **(LEAD)**	SNC-Lavalin Constructors (Pacific) Inc. **(LEAD)**
	Dragados Canada, Inc.	Parsons Canada Ltd.	Graham Building Service, a JV of Graham Building Services LP and Jardeg Construction Services Ltd. **(LEAD)**
	Aecon Construction Management Inc.	McElhanney Engineering Services Ltd.	SNC-Lavalin Inc.
	Lafarge Canada Inc.	Delcan Corporation	CH2M HILL Canada Limited
	Sureway Construction Management Ltd.	Brybil Projects Ltd.	**exp** Services Inc. (formerly Trow Associates Inc.)

[9] Capital City Link Group was the proponent group that developed and submitted the successful proposal. Once the RFP process was completed, the project leads for Capital City Link Group formed a special purpose organization, Capital City Link General Partnership to carry out the work of the contract.

Team Component	Capital City Link Group[9] (CCLG)	Alberta Roads Consortium (ARC)	Edmonton Connect Partners (ECP)
	AECOM Canada Ltd.	Terracon Consultants Inc.	International Bridge Technologies, Inc.
	Stantec Consulting Ltd.	DMD & Associates Ltd.	Hatch Mott MacDonald Ltd.
	MMM Group Limited	Opus International Consultants (Canada) Ltd.	
	Buckland & Taylor Ltd.	George L. Crawford & Associates Inc.	
	AMEC Earth and Environmental, a division of AMEC Americas Limited	Northwest Hydraulic Consultants Ltd.	
	EBA Engineering Consultants Ltd.		
	Spencer Environmental Management Services Ltd.		
Operation and Maintenance	Volker Stevin Contracting Ltd. **(LEAD)**	Alberta Highway Services Ltd. **(LEAD)**	SNC-Lavalin Operations and Maintenance Inc. **(LEAD)**
			Carmacks Maintenance Services Ltd.
Financing	ACS Infrastructure Canada Inc. **(LEAD)**	Macquarie Capital Group Limited **(LEAD)**	SNC-Lavalin Capital, a division of SNC-Lavalin Inc. **(LEAD)**
	HOCHTIEF PPP Solutions North America Inc.		John Laing Investments Limited
	MNII Canada I, LLC		Scotia Capital Inc.
	National Bank Financial Inc.		
Other Advisors		Blake, Cassels & Graydon LLP	
		Davies Ward Phillips & Vineberg LLP	
		Cook Advisory Services Inc.	

Appendix F: Summary of bids received

Table 3: Financial bids received from proponents on March 14, 2012

Item	PSC	P3 Procurement		
		Capital City Link Group	Alberta Roads Consortium	Edmonton Connect Partners
Total net present value of design, construction, finance and operations and maintenance	$2,180 million	$1,809 million	$2,034 million	$2,219 million
Value for money of P3 procurement		$371 million 17%	$146 million 7%	-$39 million -2%

Appendix G: Payment adjustments

Table 4: Sample of key payment adjustments included in P3 contract [10]

Issue	Payment Adjustment
If an external audit has not been completed within the specified time:	$2,400/week or any partial week, for the first four weeks and $6,000/week or any partial week, thereafter
If any deficiencies identified by the Environmental Management System external auditor have not been corrected within the specified time:	$6,000/week or any partial week, for the first four weeks and $12,000/week or any partial week, thereafter
If the contractor fails to undertake roadway inspections:	• $2,500 for the first occurrence; • $5,000 for the second occurrence; • $10,000 for the third occurrence; and • $20,000 for the fourth occurrence and each occurrence thereafter.
If during the Operating Period, the roadway superelevation and cross-slope rates are measured and are found not to be maintained within ±1.0% of the design rates:	• $3,600/week or any partial week, for the first four weeks the deficiency is not remedied; then • $11,000/week or any partial week, thereafter.
If localized pavement repairs (e.g. for spalling, roughness, cracking, or potholes), permanent or otherwise, are not completed within the stipulated time period:	$600/localized repair for each seven day period or any partial week, until the deficiency is corrected.

[10] The project agreement should be consulted for details on all payment adjustments. The final form of the project agreement is available at http://www.transportation.alberta.ca/3787.htm.

Issue	Payment Adjustment
If lamps or components of the roadway lighting system are not adjusted, maintained, repaired/replaced within the stipulated time:	• Lamp repair/replacement, $120/lamp/day or any partial day, that the lamp remains in need of repair/replacement; and • Repair or adjustment of any pole, base or other lighting system component, $120/component/day or any partial day, that the component needs adjustment.
If grass is in excess of the specified maximum height:	$120/hectare or any partial hectare/month or any partial month,
If the contractor fails to commence work within 60 days of identification of a structural or operational deficiency on bridges:	$1,200/day or any partial day, per deficiency shall be assessed until the contractor commences and diligently pursues completion of the work.
If the contractor is non-compliant with respect to snow clearing and ice control:	• $12,000 for each occurrence of non-compliance during a Storm Event (to a maximum of $72,000 total for the Infrastructure); • $24,000 for each occurrence of non-compliance during a subsequent Storm Event in any consecutive 12 month period (to a maximum of $145,000 total for the Infrastructure); and • The third occurrence of any non-compliance within a consecutive 12 month period but in a separate third Storm Event shall be a potential Termination Event for the purposes of and having the consequences set out in section 16.8(k) of the DBFO Agreement.

Tab 82

Order No. 69/19

FINAL ORDER WITH RESPECT TO MANITOBA HYDRO'S 2019/20 GENERAL RATE APPLICATION

May 28, 2019

BEFORE: Robert Gabor, Q.C., Chair
Marilyn Kapitany, B.Sc., (Hon), M.Sc., Vice-Chair
Hugh Grant, Ph.D., Member
Shawn McCutcheon, Member
Larry Ring, Q.C., Member

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9.0 IT IS THEREFORE ORDERED THAT: 46

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1.0 Summary of Board Findings

By this Order, the Public Utilities Board ("Board") approves new rates for Manitoba Hydro (or the "Utility") for the 2019/20 fiscal year. The Board finds that it is just and reasonable to approve a 2.5% rate increase for most customer classes, effective June 1, 2019. The Board finds that Manitoba Hydro does not require an increase to its revenues in 2019/20 fiscal year. All revenues from the 2.5% rate increase are to be placed in a deferral account for major capital projects currently under construction. The deferral account will partially mitigate future rate increases required when new major capital projects are in-service, consistent with the principles of rate stability and predictability. This increase will contribute additional revenues to Manitoba Hydro in 2019/20 and in future years.

The evidence in this proceeding demonstrates that Manitoba Hydro does not require a rate increase for its operations in 2019/20. Manitoba Hydro's initial General Rate Application ("GRA") for a rate increase of 3.5% for all customer classes, to be effective April 1, 2019, was filed on November 30, 2018 . It was based on the position that, without any rate increase, Manitoba Hydro was projecting a net loss of $28 million in the 2019/20 fiscal year (which runs from April 1, 2019 to March 31, 2020). Manitoba Hydro filed supplemental information on February 14, 2019, which showed a $92 million improvement in its financial forecast for 2019/20 with an updated projection of $64 million in positive net income in 2019/20 without any rate increase. With its requested 3.5% increase effective June 1, 2019, net income is projected to be $115 million in 2019/20.

A rate increase at the level of 2.5% with all revenues directed to a major capital project deferral account is just and reasonable. The Board will determine how the deferral account will be brought into Manitoba Hydro's operating revenues at a future GRA. The deferral account will help to offset higher rate increases when new capital projects enter into service in the next few years.

The Board anticipates the bill impact of the 2.5% rate increase to be a $2.34 increase in the monthly bill of a residential customer without electric space heat using 1,000 kilowatt-

hours per month, and a $4.47 increase in the monthly bill for a residential customer with electric space heat using 2,000 kilowatt-hours per month.

The Board finds that it is just and reasonable to differentiate the June 1, 2019 rate increase to the General Service Small Non-Demand class such that a 2.5% increase to the class revenue target is reduced by an amount that will gradually move this class's Revenue to Cost Coverage ratio into the zone of reasonableness of 95-105% over a period of nine years.

A majority of the Board further finds that it is just and reasonable to approve no rate increase for the First Nations On-Reserve Residential and Diesel Zone Residential customer classes effective June 1, 2019.

The Board directs Manitoba Hydro to provide a compliance filing to the Board pursuant to the directives in this Order. The compliance filing shall be provided in a timely fashion to allow the Board no less than two business days to review and approve consumer rates effective June 1, 2019.

2.0 Background and Procedural History

Background

Under Manitoba law, the Board must set electricity rates for Manitoba Hydro's customers that are just and reasonable and in the public interest. In so doing, as confirmed by the Manitoba Court of Appeal, the Board balances the interests of Manitoba Hydro's ratepayers and the financial health of Manitoba Hydro. Together and in the broadest interpretation these interests represent the general public interest.

Pursuant to subsection 25(1) of *The Crown Corporations Governance and Accountability Act*, CCSM c C336, the prices charged by Manitoba Hydro with respect to the provision of power ("rates for services") are reviewed by the Board. No changes in rates for services can be made and no new rates for services can be introduced without the approval of the Board. Manitoba Hydro is required to submit proposals regarding rates to the Board for its review and approval.

When Manitoba Hydro applies to the Board for rate increases, Manitoba Hydro bears the statutory onus of demonstrating that the increases sought are just and reasonable.

Procedural History

By letter dated November 12, 2018, Manitoba Hydro advised of its intentions with respect to the filing of a 2019/20 GRA and requested the Board's concurrence with Manitoba Hydro's proposed approach to the process and the filing. In the November 12, 2018 letter, Manitoba Hydro stated that, based on its financial projections at the time and without any rate relief, it would experience a projected net loss in the 2019/20 fiscal year (the "test year"). Manitoba Hydro further advised that, with the most recent appointments to the new Manitoba Hydro-Electric Board of Directors ("MHEB"), a comprehensive review of Manitoba Hydro's operations, forecasts, and financial plans was being undertaken to allow the MHEB to establish a long-term financial plan for the Utility. As such, Manitoba Hydro was not in a position to file a long-term Integrated Financial Forecast ("IFF") for

review by the Board. Manitoba Hydro further advised that, upon completion of the IFF incorporating the direction of the MHEB for Manitoba Hydro's financial plan, the Utility would submit a full GRA to the Board, anticipated to be filed in late 2019.

Manitoba Hydro proposed a limited process for the Board's review of an Application for a rate increase in the 2019/20 year "sufficient to generate a minimum level of net income such that the Corporation would avoid a projected net loss in the 2019/20 fiscal year." In support of such an Application, Manitoba Hydro proposed to file information based upon Manitoba Hydro's 2018/19 outlook (combining actual financial position as at March 31, 2018 and actual financial performance and water flow conditions to September 30, 2018) and an interim 2019/20 budget (incorporating fall 2017 planning assumptions and operating expenditures).

On November 21, 2018, the Board communicated by letter its willingness to consider a one-year rate increase application based on the financial information outlined in Manitoba Hydro's November 12, 2018 letter. The Board further stated that, as Manitoba Hydro would be seeking a final rate increase, the Utility would be required to file financial and economic information sufficient to satisfy its onus to demonstrate that the rate increase sought for the test year would be just and reasonable. Additionally the Board indicated that it required Manitoba Hydro to provide the most current information available.

On November 30, 2018, Manitoba Hydro filed its 2019/20 GRA, seeking a rate increase of 3.5% for all components of the rates of all customer classes (except the non-grid portion of Diesel Zone General Service rates), to be effective April 1, 2019. Manitoba Hydro projected the increase would generate additional annual revenues of $59 million and would result in what Manitoba Hydro described as a "modest contribution to financial reserves" and which results in a "modest level of net income" of $31 million in 2019/20. Without the requested 3.5% rate increase, Manitoba Hydro projected that it would experience a net loss of $28 million from electric operations.

On February 14, 2019, and as requested by the Board, Manitoba Hydro filed a Supplement to its 2019/20 GRA, which included updated financial statements and revenue information for 2018/19 and 2019/20, based on actual results as of December 31, 2018. Rather than the $28 million loss previously projected, without any rate increase, Manitoba Hydro now projected an improvement of $92 million, with positive net income of $64 million in 2019/20. Additionally for the 2018/19 fiscal year which ends March 31, 2019, Manitoba Hydro projected net income of $95 million, rather than the $51 million originally projected in the November 30, 2018 filing.

The improvement in financial results was attributed to improved water flow conditions and related higher net export revenues, as well as to lower levels of capital spending than planned in 2018/19 with associated lower borrowing requirements and finance expense. Despite the improved projected financial results, Manitoba Hydro submitted that the 3.5% proposed rate increase continued to be necessary and in the public interest. Manitoba Hydro took the position that, with a 3.5% rate increase in 2019/20, the Utility would be able to continue to plan for a modest level of net income in the event of low water flow conditions, and would reduce the likelihood of future rate shock to ratepayers given the anticipated additional net costs associated with the in-service of Keeyask.

By procedural Orders 1/19 and 9/19, the Board approved Intervener Status for Assembly of Manitoba Chiefs, Consumers Coalition, Manitoba Industrial Power Users Group, and Manitoba Keewatinowi Okimakanak, as well as the issues in scope for the hearing of the GRA. In Order 40/19, the Board confirmed the process and scope for the oral evidentiary portion of the hearing.

The oral evidentiary hearing was held on April 23, 24, 25, and 29, 2019. The Board heard closing submissions from Manitoba Hydro and all Interveners as well as reply submissions from Manitoba Hydro on May 1 and 2, 2019.

3.0 Rate Increase for 2019/20

In Order 59/18, the Board approved a 3.6% overall rate increase effective June 1, 2018. In that Order, the Board commented that the Integrated Financial Forecast ("IFF") scenario filed in the proceeding as Manitoba Hydro Exhibit 93 supported the Board's decision on the level of the overall rate increase. In particular, Exhibit 93 was directionally consistent with many of the Board's decisions, including continued deferral of $20 million in ineligible overhead costs, amortized at a 30-year rate, and Average Service Life depreciation methodology, without amortization of the difference with the Equal Life Group methodology.

The Exhibit 93 scenario resulted in equal annual rate increases of 3.57%, beginning in 2018/19. That scenario included: the Bipole III Transmission Reliability Project ("Bipole III") entering commercial service on July 31, 2018 at a cost of $5.04 billion; no additional export revenues related to uncontracted surplus electric capacity and the assumption of uncontracted surplus dependable energy export sales at opportunity prices; and in 2019/20 $61 million in net income with debt management based on a weighted average term to maturity of 12 years. Adjusting the weighted average debt term to maturity to 20 years, the net income would be forecast at $28 million for the 2019/20 fiscal year.

Exhibit 93 also reflected an $8.7 billion control budget for Keeyask and an in-service date for the first generating unit of August 2021. However, in the last GRA proceeding, the Independent Expert Consultants retained to assist in the Board's review of Manitoba Hydro's major capital projects testified that, without project management improvements by the Utility, the final cost of Keeyask could be in the range of $9.5 billion to $10.5 billion. While the Board accepted the control budget and construction schedule for rate-setting purposes in Order 59/18, the Board also recognized that these targets would only be met if Manitoba Hydro and the general civil contractor achieved a 10% improvement in productivity.

As detailed above, at the time of the November 30, 2018 GRA filing, Manitoba Hydro was projecting that without the proposed 3.5% rate increase, it would experience a net loss of

$28 million in 2019/20. However, the February 14, 2019 Supplement filing shows that Manitoba Hydro's financial position is projected to be improved in the test year, such that positive net income is projected even without a rate increase.

Since the filing of Exhibit 93 in the 2017/18 and 2018/19 GRA proceeding and the Board's issuance of Order 59/18, there have been a number of positive developments in Manitoba Hydro's operations and financial position, as detailed below:

- in the 2019/20 test year, without any rate increase, Manitoba Hydro is projecting a positive net income of $64 million, which is higher than the net income forecast in the financial projection produced in Exhibit 93 (which included annual 3.57% rate increases) at the last GRA, even without adjusting the weighted average term to maturity incorporated into the financial projections;
- Bipole III entered service on July 4, 2018, 27 days earlier than scheduled and at a capital cost of $4.77 billion, which is $270 million lower than projected. The lower capital cost means that Manitoba Hydro has $270 million less in debt borrowing requirements and that annual carrying costs are reduced by $17M;
- due to the lower capital cost of Bipole III as well as other reductions in capital expenditures from what was forecast at the last GRA, without a rate increase in the test year, Manitoba Hydro's net debt for 2019/20 is now projected to be $567 million lower than forecast in Exhibit 93;
- Keeyask's first generating unit may enter service as early as October 2020, approximately 11 months earlier than was anticipated at the last GRA. An earlier in-service date will result in Keeyask generating revenues earlier than projected. Project risks have also been reduced, as the work in 2018 on the South Dam has uncovered the riverbed, resulting in the elimination of geotechnical conditions as a top risk;
- the control budget for the Manitoba-Minnesota Transmission Project ("MMTP") remains unchanged, despite a delay in the commencement of construction to June 2019;

- interest rates have remained below the rates previously forecast and the current interest rate environment is favourable to Manitoba Hydro. Manitoba Hydro has secured long-term debt issuances at favourable interest rates, including 49-year debt at 2.91% and a five-year borrowing of $350 million US (equivalent to $466 million in Canadian dollars) at 2.19%; and
- Manitoba Hydro has completed a term sheet with SaskPower for a 215 MW 40-year power export sale contract, beginning in 2022.

In addition, since Manitoba Hydro's original GRA filing on November 30, 2018, there have been a number of positive developments in Manitoba Hydro's operations and financial position, as detailed below:

- Manitoba Hydro is projecting net income of $95 million in the 2018/19 fiscal year, which ended March 31, 2019, which is a $44 million increase from the net income projected in Manitoba Hydro's November 30 filing;
- following nine consecutive months of below average precipitation in 2018, water conditions have improved significantly. From September 2018 through to February of 2019, Manitoba Hydro's system water flows were above average. Since that time, water flows have tracked to average. These improved water flows resulted in higher than projected extraprovincial revenues and lower fuel and power purchases; and
- the export prices that have been realized to date by Manitoba Hydro were higher than projected in the November 30, 2018 filing, while the export prices forecast for 2019/20 are currently tracking to the same levels as forecast in the November filing.

Manitoba Hydro's Position

Manitoba Hydro maintains that a 3.5% rate increase for all customer classes effective June 1, 2019 is just and reasonable. Although Manitoba Hydro's financial projections for the test year have improved from the November 30, 2018 filing, the Utility argues that the

rate increase remains appropriate as Keeyask entering service ahead of schedule will shorten the period in which to smooth customer rates to a higher level. As well, the rate increase is needed as the likelihood of a financial loss following an earlier in-service date for Keeyask is exacerbated. In this regard, Manitoba Hydro states that interest rate risk remains for the $4 billion of incremental borrowings that will be undertaken in the next few years as well as for the $4.8 billion of debt that requires refinancing over the five-year period following the test year.

Manitoba Hydro further submits that, while there have been positive changes in water flow conditions, there remains significant uncertainty in water supply for 2019/20 and significant risk of losses associated with below average water flows. Under Manitoba Hydro's analysis of net income sensitivities, there is a range of positive net income or negative net loss depending on the actual water flows experienced in the current fiscal year. In assessing the probabilities of water flow conditions in a given year, Manitoba Hydro does not assign weightings to the likelihood of any historical water flow conditions. This means that there is an equal likelihood of any historical water flow condition repeating in the future. In Manitoba Hydro's submission, the change in water flow conditions from the summer of 2018, which led to the November 30, 2018 Application, to the fall of 2018, which led to the February 14, 2019 Supplement, demonstrates the extreme variability in earnings associated with water flows.

Manitoba Hydro also says that it remains exposed to the impacts of colder than normal or warmer than normal winter weather as well as higher or lower export prices than forecast. If such risks materialize in the test year, the proposed rate increase would protect against financial loss.

Manitoba Hydro submits that the proposed 3.5% rate increase can be awarded without the Utility having filed a current IFF. The Utility states that the Board agreed to consider the rate application without an IFF and that the IFF is simply a tool that can be used in rate setting. Manitoba Hydro's position is that forecasts that have been filed in past proceedings as well as Exhibit 93 from the 2017/18 and 2018/19 GRA support a rate

increase for 2019/20 at the level of 3.5% in order to offset potential losses and build a base for the costs that will enter into the Utility's revenue requirement when Keeyask enters service. Further, Manitoba Hydro maintains the trends from prior long-term forecasts provide the Board with directional support for a rate increase in 2019/20. Manitoba Hydro emphasizes the Board's prior approval of rate increases that, in the Utility's view, were intended to smooth the impacts of major projects entering service. Manitoba Hydro states that a 3.5% rate increase in the test year will provide additional revenues on an annualized basis in perpetuity, which will have a profound effect on the Utility's financial reserves, debt levels, and financial metrics.

Intervener Positions

The Consumers Coalition submits that, because Manitoba Hydro has not filed an IFF, the Board should consider only whether the proposed rate increase is necessary for the financial health of the Utility in the 2019/20 test year. It is the position of the Consumers Coalition that Manitoba Hydro does not require a 3.5% rate increase in the test year, based on the improved financial position contained in the Utility's February 14, 2019 Supplement. The Consumers Coalition argues that Manitoba Hydro's financial position has not deteriorated since the last GRA and that some risks – including drought, interest rate volatility, weather, and export prices – have decreased in the 2019/20 test year. Relying on the evidence of its expert witnesses, the Consumers Coalition states that a 3.5% rate increase is not required to reduce the risk of financial losses in 2019/20. A 1% rate increase combined with cost control measures is sufficient to minimize the risk of financial loss in the test year and a 2% rate increase is sufficient to minimize the risk of financial loss in the test year even without any adjustments for cost control.

The Consumers Coalition submits that the appropriate level of rate increase for the test year is 1.5% to all customer classes except for General Service Small Non-Demand. The Consumers Coalition adopts the evidence of its expert witnesses and states that, in combination with Manitoba Hydro exercising cost control of its Operating & Administrative expenses, a 1.5% rate increase will assist the Utility and consumers with the transition to

Keeyask entering service while also helping to manage the Utility's net income and cash flow considerations.

The Manitoba Industrial Power Users Group also submits that Manitoba Hydro has not justified a 3.5% rate increase based on financial need in the 2019/20 test year. In particular, in seeking a 3.5% rate increase, Manitoba Hydro has not accounted for the positive improvements in its financial position and operations since the last GRA, nor has the Utility demonstrated that there have been any material or sustained negative developments compared to what is embedded in Exhibit 93. Further, the Manitoba Industrial Power Users Group adopts the evidence of its expert witness and submits that Keeyask is expected to generate annual revenues of $360 million, which will also benefit the Utility's cash flow position once Keeyask enters service. However, this Intervener states that negative net income is normal when major new capital projects enter service and as part of managing the level of rate increases. The expert witness for Manitoba Industrial Power Users Group testified that reserves would not serve a purpose if there is no need to draw down reserves in periods of negative net income or drought; moreover, rate increases in 2019/20 should not be planned as a means of preventing all net losses from Keeyask and Bipole III entering service.

The Manitoba Industrial Power Users Group recommends a 1.5% rate increase in the 2019/20 test year, consistent with an inflationary increase. This Intervener states that a 1.5% rate increase should be granted solely as a rate-smoothing mechanism for the transition to higher rates when Keeyask enters service and due to the eventual end of the Bipole III deferral account amortization in 2023/24 (which annually contributes $78 million of previously deferred revenue to net income

Two Interveners - Assembly of Manitoba Chiefs and Manitoba Keewatinowi Okimakanak - focused their submissions on the level of rate increase that would be just and reasonable for the First Nations On-Reserve Residential customer class, discussed further below in section 7.0 of this Order.

Board Findings

Revenues from a Rate Increase are Not Required for 2019/20

The Board finds that Manitoba Hydro has not satisfied its onus to demonstrate that a 3.5% rate increase in 2019/20 is just and reasonable and in the public interest. The Board further finds that Manitoba Hydro has not established that it requires any additional revenues from a rate increase in 2019/20 to flow into the Utility's general revenues.

When Manitoba Hydro filed its GRA on November 30, 2018, it sought a 3.5% rate increase for all customer classes because, without a rate increase, it projected a net loss of $28 million in the 2019/20 fiscal year. The supplemental information filed on February 14, 2019 showed a $92 million improvement in its financial forecast for 2019/20 with an updated projection of $64 million in positive net income without any rate increase. With its requested 3.5% rate increase, effective June 1, 2019, net income would be projected to be $115 million.

Based on the supplemental financial information, it is not just and reasonable to order any rate increase in 2019/20 that would result in increased revenues flowing into the Utility's general revenues.

The Board finds that there are diminished risks of Manitoba Hydro's financial position deteriorating in the 2019/20 test year. As noted by the Board in Order 59/18, drought risk should be managed through retained earnings in combination with regulatory action by the Board. The Board reiterates:

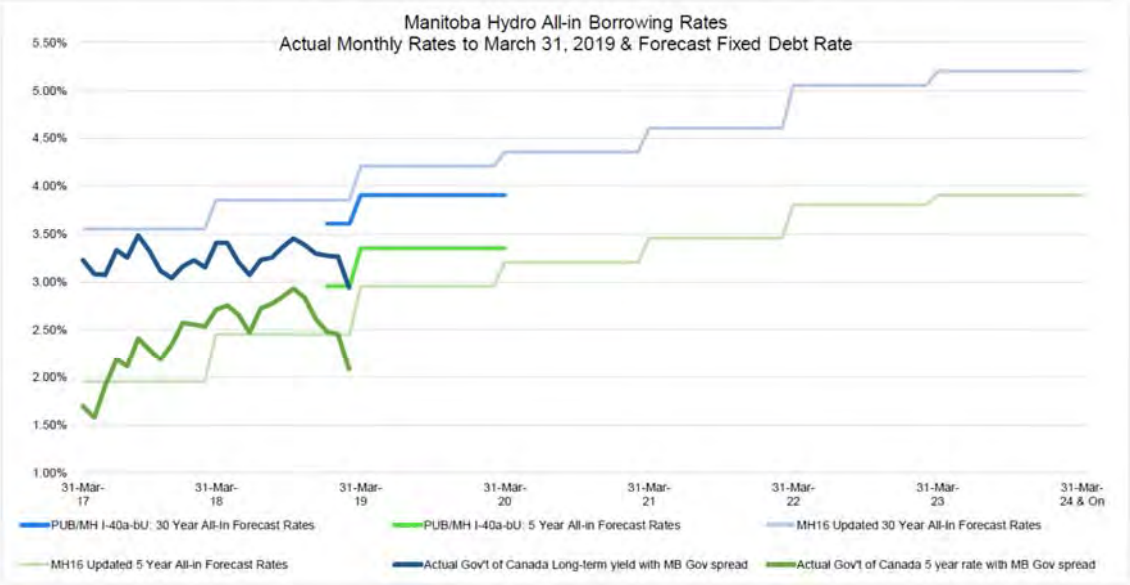
> *as the Board has demonstrated in past decisions – including in years of drought where the Board awarded rates in excess of those sought by the Utility – it will consider all of the facts and circumstances which confront Manitoba Hydro at that point in time in determining the appropriate rate relief. The Board is prepared to take regulatory action – whether through a rate rider, an interim rate increase, or a general rate*

increase – as required in times when emergent situations face Manitoba Hydro.

Manitoba Hydro experiences net income variability due to changes in water flow conditions. At the time of the November 30, 2018 GRA filing, there was a 50% likelihood that water flow conditions would result in negative net income if there was no rate increase in the test year. The improved water conditions incorporated into the February 14, 2019 Supplement filing, along with the other updates in that filing, now mean that the water flow risk has decreased to a 21% likelihood of negative net income in the 2019/20 test year. Put another way, and based on no rate increases in the test year, Manitoba Hydro is now expected to have positive net income in 79% of the water flow conditions experienced over the last 105 years, assuming Manitoba Hydro's other projections are achieved as forecast.

Similarly, interest rate volatility is no longer considered by Manitoba Hydro to be a top risk to 2019/20 net income due to pre-borrowing already undertaken by the Utility. As a result, interest rate volatility is expected to affect the net income in the test year by no more than a variation of plus or minus $7 million. For remaining borrowings, Manitoba Hydro acknowledged in its evidence that the current interest rate environment is favourable to Manitoba Hydro. Actual and forecast long-term interest rates are lower than compared to the interest rates incorporated into Exhibit 93. As shown in the figure below, actual long-term all-in forecast rates were an average of 0.5% lower for 2018/19 and, while average interest rates as of April 2019 were 0.18% higher in 2019/20, that does not account for recent debt issuances that include long-term borrowings at low interest rates.

Figure 2: Manitoba Hydro All-in Borrowing Rates Actual Monthly Rates to March 31, 2019 & Forecast Fixed Debt Rate[27]



Source: MIPUG-8 pg 16

Further, even without a rate increase, with low export prices or the warmest winter weather in 60 years, with all else remaining constant, net income in the test year will remain positive. It bears repeating that under average conditions Manitoba Hydro's current projections are that, without a rate increase, the Utility will have $64 million in net income in 2019/20.

Given the nature of Manitoba Hydro's operations, there are always risks that could affect the Utility's financial health. The Board finds that the chance that risks could materialize in the test year to the detriment of Manitoba Hydro's financial position is no higher than in any other year, and in the respects identified above, is diminished from the average. In these circumstances, it is not necessary to increase consumer rates to provide additional revenue to protect against the risk of financial loss in 2019/20.

Therefore, the Board finds that Manitoba Hydro does not have a current financial need for increased revenues from domestic ratepayers flowing to the Utility's general revenues in 2019/20.

A Rate Increase Directed to a Major Capital Deferral Account

The Board approves a 2.5% rate increase to all customer classes, except for General Service Small Non-Demand, the First Nations On-Reserve Residential and Diesel Zone Residential customer classes, and the non-grid portion of the Diesel Zone rates, effective June 1, 2019, with all additional revenue generated from this rate increase to flow into a major capital project deferral account ("Major Capital Deferral Account") to be established by Manitoba Hydro.

The rate increase approved by the Board is based on the need to enhance rate stability and predictability due to the upcoming in-service dates for major new capital projects. The evidence in the proceeding is that Keeyask could enter service as early as October 2020. As well, MMTP is scheduled to enter service in June 2020 and the Bipole III Deferral Account will be fully amortized into revenues as of 2023/24.

The Board finds that it should consider years beyond the test year in setting the rates for 2019/20. However, it is acknowledged that without Manitoba Hydro having filed a current IFF, the Board and all parties have been limited in their ability to assess the need for a rate increase in the test year based on Manitoba Hydro's future forecast levels of net debt, net income, and levels of reserves. Despite this limitation, the Board accepts the evidence of the expert witness for the Manitoba Industrial Power Users Group that the known fact of Keeyask entering service in either 2020/21 or 2021/22 at a control budget of $8.7 billion provides directional guidance. While the Board views the potential for an October 2020 in-service date for Keeyask as a positive development, the advancement of the Keeyask schedule also shortens the amount of time available for required higher customer rates to be smoothed in. The Board notes, however, that it is concerned that Manitoba Hydro did not present sufficient evidence to explain the Utility's position that an earlier in-service date would not result in cost savings for the Keeyask project. The Board directs Manitoba Hydro to file with the next GRA an explanation of the cost and revenue implications of the advancement in the Keeyask construction schedule from an in-service date of August 2021.

Keeyask is not the only major capital project with an anticipated 2020 in-service date. MMTP is scheduled to enter service in June 2020, and therefore the carrying costs of that project will also enter into Manitoba Hydro's revenue requirement. Moreover, if the construction of MMTP is delayed due to the timing of the issuance of necessary pre-construction federal permits, the costs of the project could increase and Manitoba Hydro will also incur additional costs for alternate arrangements to service the 250 MW sale to Minnesota Power that commences June 1, 2020.

As well, the known annual carrying costs of Bipole III provide further directional guidance as to the need for rate smoothing in the 2019/20 test year. The Bipole III Deferral Account established by the Board in Order 43/13 resulted in $392 million being collected as deferred customer revenues to be recognized as revenues through amortization over a five-year period beginning with the in-service date of Bipole III. However, the annual recognition of revenues from the Bipole III Deferral Account covers only a portion of the annual Bipole III carrying costs. Moreover, the Bipole III Deferral Account will be fully amortized and depleted in 2023/24, with the full amount of annual costs needing to be recovered by ratepayers beginning in 2024/25.

As the known costs of these major new generation and transmission capital projects will form a significant part of Manitoba Hydro's revenue requirement beyond the test year, it is appropriate to take steps today to assist in mitigating future rate increases. As such, the Board orders a rate increase of 2.5% in 2019/20 targeted to a Major Capital Deferral Account to assist in the transition to higher rates. This is consistent with the Board's long-standing concern that customer rate changes should be on a stable and predictable basis. Without implementing rate smoothing through a rate increase in the test year, combined with the capital costs of Bipole III and MMTP, the costs associated with Keeyask and the potential for those costs to enter into Manitoba Hydro's 2020/21 revenue requirement could lead to rate shock for consumers. The Board will determine how the deferral account will be brought into Manitoba Hydro's operating revenues at a future GRA.

The Board notes Manitoba Hydro has historically provided IFFs that included projections of equal annual rate increases premised on the Utility attaining a financial target over a specific timeframe, roughly 20 years. In prior Orders dating back to the time of the 2014 Needs For and Alternatives To Review, the Board relied on IFFs that included projected equal annual rate increases in the range of 3.57% to 3.95%.

As the MHEB is in the process of developing a new financial plan for Manitoba Hydro, those prior rate trajectories based on now out-dated financial targets are of questionable value in the current proceeding. However, those rate trajectories provide directional guidance to the Board in determining the appropriate level of the rate increase for 2019/20 to assist in smoothing consumer rates when major new capital projects enter service. This further supports the 2.5% rate increase approved by the Board.

The Board notes the evidence of the expert witness for the Manitoba Industrial Power Users Group that the Board's rate regulation of Manitoba Hydro has long used long-term financial forecasts as a tool in rate setting. This so-called "modified cost of service" approach allows for consideration of rate stability, measured rate transitions, and the appropriate level of customer-funded reserves. In the absence of a long-term financial forecast, the Board is challenged in its ability to assess the appropriate level of a rate increase in the 2019/20 test year to reduce the likelihood of future rate shock to consumers. While the evidence in this GRA establishes that it is just and reasonable to approve a 2.5% rate increase in 2019/20 for certain rate classes with the full revenues from the rate increase directed to a Major Capital Deferral Account, the Board expects that it will be necessary to assess future rates in the context of a long-term financial forecast given the expected in-service for Keeyask.

The limitations in this proceeding that arose from the Utility not filing an IFF demonstrate the importance of such long-term financial forecast being available as a tool in rate setting. The Board finds that it is not reasonable to consider another GRA absent a full IFF or other long-term financial forecast. The Board directs Manitoba Hydro to file with its next GRA filing an IFF or other long-term financial forecast in a form consistent with an IFF.

4.0 Operation & Administrative Expenses

Operating and administrative ("O&A") expenses are one of Manitoba Hydro's highest expense categories in its revenue requirement, at over half a billion dollars per year. These expenses primarily consist of wages and benefits, materials, contracted services, and overhead costs associated with operating and maintaining Manitoba Hydro's facilities and providing services to customers. O&A expenses do not include capitalized salaries and benefits for employees who work on capital projects, or materials and services related to those capital projects.

In February 2017, Manitoba Hydro began implementing a plan to reduce its total workforce by 15%, or 900 positions, through a combination of a reduction of the executive leadership and senior management teams and a Voluntary Departure Program. As of March 31, 2018, 821 employees were approved to leave under the Voluntary Departure Program resulting in annual employee-related cost savings of $92.6 million. Due to the timing of the Voluntary Departure Program, Manitoba Hydro was not able to file detailed O&A budgets and related detailed schedules as part of the last GRA. Although there were no detailed budgets, IFF16 incorporated forecast O&A expenses of $518 million in 2017/18, $501 million in 2018/19, and $511 million in 2019/20.

In Order 59/18, the Board accepted Manitoba Hydro's evidence that a detailed O&A forecast could not be filed at that time because of the ongoing Voluntary Departure Program. The Board directed Manitoba Hydro to file with its next GRA the details of its O&A expenditures. While the Board acknowledged Manitoba Hydro's efforts to implement cost containment measures, the Board recommended that Manitoba Hydro continue those efforts both in terms of staff reductions and supply chain management after the conclusion of the Voluntary Departure Program transition. The Board noted that in the 2014/15 & 2015/16 GRA, Manitoba Hydro expressed a commitment to reducing the growth of O&A expenses to 1% annually, excluding the impact of accounting changes.

In the current GRA, Manitoba Hydro relies on a high-level preliminary O&A target of $511 million, reflecting an inflationary increase of 2% over the $501 million of O&A expenses

included in the 2018/19 Financial Outlook. The starting point for Manitoba Hydro's establishment of the $511 million O&A target for 2019/20 is the ending 2017/18 actual O&A result, which was used by the Utility to in calculating the 2018/19 O&A budget of $501 million. Manitoba Hydro then escalated the 2018/19 budget by 2% to arrive at the $511 million target for 2019/20.

Manitoba Hydro did not provide a detailed O&A budget for 2019/20. The targeted levels of total OM&A expense for 2018/19 and 2019/20 remain unchanged from what was forecast at the last GRA.

Manitoba Hydro's Position

Manitoba Hydro submits that the $511 million target is valid for rate-setting purposes. This target reflects an inflationary increase of 2% over the $501 million of O&A expenses included in the 2018/19 Financial Outlook. However, the $511 million target has been re-validated by Manitoba Hydro based on current staffing levels and current business requirements. Manitoba Hydro states that the $511 million target will not change with the development of a detailed O&A budget and that it is not possible to achieve further O&A reductions. Manitoba Hydro also stated that limiting growth in O&A expenses to 1% is not sustainable, given the significant staffing reductions that have already taken place, negotiated wage settlements, and cost escalation for materials and services.

Responding to the evidence of the expert witness for the Consumers Coalition, Manitoba Hydro submits that the $22 million reduction in O&A expense identified by that witness is not achievable. Manitoba Hydro states that, in order to reduce O&A expense by $22 million, a staffing reduction of 300 employees would be required – in addition to the 821 positions that have already been reduced through the Voluntary Departure Program. Further staffing reductions would significantly increase risks to public and employee safety, system reliability, and the ability of the Utility to provide reasonable levels of customer service. Regardless, Manitoba Hydro says that its levels of Equivalent Full-Time positions are comparable to the levels in 2004/05, despite growth in Manitoba Hydro's operations in the last 15 years. Further, Manitoba Hydro argues that reductions in O&A

expense in 2019/20 will not address the fundamental issue facing Manitoba Hydro's financial health: the significant revenue shortfall following the in-service date of Keeyask and associated transmission projects.

Intervener Positions

The Consumers Coalition, the only Intervener to take a position on this issue, argues that Manitoba Hydro has not provided key supporting evidence for its 2019/20 O&A target, particularly due to the fact that the Utility did not file an updated or detailed O&A forecast or budget for this test year. As such, the Consumers Coalition submits that the Board should not adopt Manitoba Hydro's O&A budget for rate-setting purposes.

Adopting the evidence of its expert witness, the Consumers Coalition takes the position that the $511 million O&A target for 2019/20 should first be reduced for rate-setting purposes to $495.6 million, and second, should further be reduced to $489 million through the use of an escalation number of 1%. The first budget reduction is to normalize both for an $8.1 million non-recurring increase in collection costs from 2017/18 (the starting point for the Utility's O&A target) and a $7.3 million provision for unallocated transitional contingency funds for which there are no planned costs. The second reduction, based on the use of a 1% escalation number, is recommended by this Intervener as a means of sending a signal to Manitoba Hydro to further reduce costs in a period of transition while reducing the trajectory of O&A costs going forward. The Consumers Coalition argues that these reductions are equivalent to a 1.9% rate decrease by 2022/23 for customers – or put another way, a 1.9% rate increase that Manitoba Hydro does not need to collect from ratepayers.

Board Findings

The Board finds that Manitoba Hydro's 2019/20 O&A target is not accepted for rate-setting purposes. First, the target is premised on a high-level target calculation from early 2017 for the 2017/18 year, and includes two prior non-recurring costs that should be normalized in establishing a target for rate-setting purposes.

The Board finds that the 2019/20 O&A target should be reduced by $8.1 million. This is the amount of a one-time increase in collection costs in 2017/18 as a result of an assessment of collectability of arrears. The $8.1 million was used in the calculation of the 2018/19 budget, which was in turn used in establishing the 2019/20 target. The Board does not accept that the 2019/20 test year O&A target should include this $8.1 million for rate-setting purposes, as it is a one-time occurrence.

Similarly, the Board finds that the 2019/20 O&A target should be reduced by a further $7.3 million – the amount included in the 2019/19 O&A budget to support transitional business requirements arising from the Voluntary Departure Program. This amount was unallocated to specific Operating/Corporate groups and was held as a contingency. These expenses were not incurred in 2018/19 and Manitoba Hydro is not planning for these costs in 2019/20. There are also no actual expenditures associated with this unallocated funding. For these reasons, the test year O&A target should also not include this $7.3 million expense for rate-setting purposes.

Removing both of these expenses from the 2019/20 O&A target reduces the target from $511 million to $495.6 million.

Second, the Panel finds that, in developing the 2019/20 O&A target for rate-setting purposes, an escalation of 1% above the 2018/19 Financial Outlook is to be used. The Utility's primary basis for the 2% escalation rate was that it is an inflationary increase. Manitoba Hydro's evidence did not establish that a 2% escalation rate should be used. Moreover, the Board is concerned that the use of a rate of escalation of 2% will erode all of the O&A savings achieved by Manitoba Hydro through the Voluntary Departure

Program and supply chain management within the early years of Keeyask entering service. This offsetting of savings would be inconsistent with the intent of the Voluntary Departure Program and contrary to the need for Manitoba Hydro to find savings in controllable costs during a period of major capital expansion and related rate pressures.

In the absence of evidence demonstrating the appropriateness of a 2% escalation number, the Board finds that a 1% rate of escalation is to be used for rate setting purposes. This is consistent with Manitoba Hydro's prior commitment dating back to 2013 to limit operating cost increases to 1% per year. As the Board stated in Order 59/18, the Board expects Manitoba Hydro continue its efforts to reduce O&A costs, both in terms of staff reductions and supply chain management. The Board reiterates that cost control should be ongoing, and that it should continue in the post-Voluntary Departure Program years.

Reducing the escalation rate to 1% further reduces the O&A target to $489 million, or $22 million less than Manitoba Hydro's $511 million target. This is equivalent to a 1.3% rate decrease for ratepayers in 2019/20 and will have enduring benefits for ratepayers over time.

The Board is concerned about the lack of detailed information provided by Manitoba Hydro in evidence to support the O&A expenditures incorporated into the filing. As noted by the expert witness for the Consumers Coalition, the Voluntary Departure Program was complete approximately one year ago. It is difficult to understand why Manitoba Hydro has not yet been able to develop a detailed O&A budget. Given the materiality of this expense in Manitoba Hydro's revenue requirement, the Board directs Manitoba Hydro to develop and file a detailed O&A budget with the next GRA filing and provide the year over year dollar and percentage increases for the past five fiscal years. That detailed O&A budget is to include the 2019/20 year, as well as similar detail in support of any years for which Manitoba Hydro seeks a rate increase.

5.0 Financial Ratios and Cash Flow

The MHEB is currently undertaking a comprehensive review of the Manitoba Hydro operations, forecasts, and financial plans which will allow them to establish a new financial plan and financial targets for the Corporation. As such, neither Manitoba Hydro's November 30, 2018 GRA filing nor its February 14, 2019 GRA Supplement filing focused on Manitoba Hydro's financial ratio targets.

In its filing, Manitoba Hydro did include Cash Flow Statements showing two methodological or presentation changes that the Utility made for financial reporting purposes in its most recent audited financial statements. The first is to use the Indirect Method of reporting cash flows rather than the previously used Direct Method. The second change is to record capitalized interest in Operating Activities rather than as previously presented in Investing Activities. By recording the interest paid on capital projects not yet in service in Operating Activities, approximately $300 million is moved from Investing Activities where the remainder of the costs of those capital projects under construction are recorded.

Manitoba Hydro's Position

Manitoba Hydro acknowledges the additional incremental revenue from the requested rate increases does not make a noticeable impact to the debt ratio and results in only minor improvements to the EBITDA Interest Coverage Ratio and the Capital Coverage Ratio in 2019/20. However, the Utility stresses that the additional rate increase revenue on an annualized basis in perpetuity has a profound impact on the financial reserves, debt levels, and financial metrics. Manitoba Hydro calculates the net present value of a 3.5% rate increase to be approximately $600 million (using a 6.0% nominal weighted average cost of capital discount rate).

Manitoba Hydro states that the two changes in the manner in which it presents its Cash Flow Statement were made based on the direction from its former Audit Committee;

however, Manitoba Hydro advises that the Utility's cash balances remain the same regardless of the changes in presentation.

Manitoba Hydro explains that its new presentation of the capitalized interest better shows the total interest expense paid by the Utility. Manitoba Hydro further explains that this new presentation mirrors what will happen when Keeyask enters service, when the interest expense related to Keeyask moves to the operating statement.

Manitoba Hydro argues that there has been additional scrutiny of Manitoba Hydro by a credit rating agency that has identified weakening of a financial metric used by that agency.

Intervener Positions

The expert witness for the Consumers Coalition accepts the Indirect Method of presenting the Utility's Cash Flow Statement as providing a finer level of detail in terms of understanding the cash flow from operations. This is because the Indirect Method starts with Net Income and then makes adjustments for non-cash expenditures such as Depreciation Expense.

However, the Consumers Coalition witness questions the change in reclassifying interest capitalized on capital projects from Investing Activities to Operating Activities as being potentially concerning from a rate-setting perspective. According to this witness, the change will alter the perception of the amount of cash flow that is available to meet financial obligations and fund sustaining capital expenditures on Manitoba Hydro's audited financial statements.

The Consumers Coalition's expert witness also indicates that the reclassification of capitalized interest from Investing Activities to Operating Activities is inconsistent with how capitalized interest is reflected in both the income statement and balance sheet. In the income statement and balance sheet, capitalized interest is presented as an Investing Activity for financial reporting purposes. As well, this witness notes that Manitoba Hydro

is a regulated utility. The principles of regulation and rate setting are such that interest is normally capitalized as part of a project until the project is in service and then it becomes part of the revenue requirement.

The Consumers Coalition submits that Manitoba Hydro has not demonstrated that it is facing a cash flow challenge. Rather, it is the position of this Intervener that current rates are sufficient from a cash flow perspective.

The Manitoba Industrial Power Users Group submits that cash flow should not be the key consideration in analyzing the sufficiency of rates, given the Utility's hydraulic variability. Like the expert witness for the Consumers Coalition, the expert witness for the Manitoba Industrial Power Users Group states that capitalized interest for assets that are not used and useful should not be a factor for rate setting. In his view, interest for capital projects is no different than other cash expenditures needed for capital projects, such as materials and labour, which are capitalized. The Manitoba Industrial Power Users Group argues that, although interest coverage ratios can be informative in rate setting, the information conveyed by such ratios can be skewed when capitalized interest is treated as an Operating Activity.

The Manitoba Industrial Power Users Group also submits that the Board should not place weight on Manitoba Hydro's arguments about the alleged concerns of credit rating agencies.

Board Findings

The Board finds that the presentation in which capitalized interest is included in Operating Activities is not to be taken into account when considering cash flow sufficiency in a test year for rate setting purposes. The Board agrees with the expert witnesses for the Consumers Coalition and the Manitoba Industrial Power Users Group that the change in the presentation of capitalized interest on the Cash Flow Statement is inconsistent with rate setting principles and is potentially confusing to stakeholders. Should the amount of

capitalized interest need to be presented separately from other aspects of Investing Activities, a new line item under Investing Activities would address that concern.

On the issue of financial metrics, the Board's views remain as expressed in Order 59/18, including:

> *…that debt-to-equity is a questionable metric for a vertically integrated monopoly Crown utility with a debt guarantee from the provincial government. The equity level target does not have the prominence suggested by Manitoba Hydro given the context in which the Utility operates. The concern regarding the value of the equity level target is compounded when Manitoba Hydro is going through an unprecedented major investment period to more than double the value of its assets in the next four years. As noted by Manitoba Hydro's external consultant KPMG, there is a "practical recognition that this target will not be met during a period of large capital expenditures when newly constructed assets are placed in service. Accordingly, the 75/25 could remain the long-term objective." The Board supports this view…. As such, the Board is not prepared to look at the issue of pacing to achieve a particular equity level target at least until the current phase of major capital construction is completed, now projected by Manitoba Hydro to be in 2024.*

As for reserves, the Board remains of the view that:

> *Retained Earnings should be used to manage drought risk in combination with regulatory action by the Board. The Board further agrees that interest rate and export price risks over the long term should be addressed with rate increases as and when those risks materialize. Rates should not be set to increase Retained Earnings to manage those longer-term risks. As discussed elsewhere in this Order,*

the Board is prepared to consider regulatory action when required to address emerging risks facing Manitoba Hydro.

In its written rebuttal evidence and in oral testimony, Manitoba Hydro also referenced a report from a credit rating agency in support of its argument that the Utility faces financial risks in the test year. The Board reiterates its findings from Order 59/18 that, "while important, care must be taken to avoid placing too much weight on reports by credit rating agencies." The Board continues to accept that the assessment of the financial health of a utility by credit rating agencies and by capital markets are related, but are not the same thing.

Manitoba Hydro testified that the new MHEB is currently undertaking a comprehensive review of the Utility's operations, forecasts, and financial plans to enable it to establish, first, a new Corporate Strategic Plan and, second, a new long-term financial plan for Manitoba Hydro. Included in that review and planning process is consideration for meetings with stakeholders. The Board sees an opportunity for Manitoba Hydro to meet with regulatory stakeholders to further understandings of the financial reserves required for the Utility and to be considered in rate setting. As such, prior to the MHEB's development of a new Corporate Strategic Plan and long-term financial plan, there should be engagement by Manitoba Hydro with stakeholders and the Board.

In an effort to assist the MHEB, the Board repeats its views from Order 59/18 that:

there is merit to gaining better understanding of the financial reserves required for Manitoba Hydro under various circumstances. This would include consideration of risk tolerances, what risks should be protected by reserves, and the circumstances which would guide the need for more aggressive rate increases to continue full cost recovery for Manitoba Hydro. The Board is mindful that the financing and depreciation expenses related to these new major capital assets entering service already require additional revenues from rate increases. Consideration of the appropriate level of financial reserves,

for example a minimum retained earnings test, is best done through a collaborative approach with stakeholders.

The Board finds there is merit in a collaborative process as envisioned by the Board in Order 59/18. The Board directs Manitoba Hydro to participate in a technical conference hosted by Board staff or an external consultant appointed by the Board for the consideration of the use of rule-based regulation to provide guidance in the setting of consumer rates and of the question of the role and sufficiency of reserves in Manitoba Hydro's operations and the Board's rate regulation of the Utility. Board staff will invite Manitoba Hydro to a planning meeting to review and revise the draft scope of this technical conference before circulation for Intervener comments.

6.0 Revenue to Cost Coverage Ratios and Differentiated Rates

Manitoba Hydro's Cost of Service Study is used by the Board as a tool in setting rates. One of the outputs of the Cost of Service Study is the calculation of the total costs allocated to each customer class. The total allocated costs by customer class are compared against target class revenues, the ratio of which is called the Revenue to Cost Coverage ratio. If that ratio is less than unity (1.0) for a class, that means the revenue generated by the class is not sufficient to recover all the costs allocated and assigned to that class; conversely, if the ratio is greater than unity (1.0), then Manitoba Hydro is recovering more revenue from the class than its allocated and assigned costs.

Due to the inherent lack of precision in a Cost of Service Study, a zone of reasonableness is used to target the Revenue to Cost Coverage ratios of the customer classes. The Board has approved the use of a zone of reasonableness of 95-105% in assessing the Revenue to Cost Coverage ratios of Manitoba Hydro's customer classes. Revenues that are within this range are deemed to represent full cost recovery.

In Order 59/18, the Board directed the use of the Revenue to Cost Coverage ratio output of the Cost of Service Study to more closely align the revenues collected from each customer class with the costs of the electrical system that are caused by each class. Specifically, the Board approved different rate increases than the average overall rate increase for certain customer classes in order to begin to move the General Service Small Non-Demand, General Service Large 30-100kV, and General Service Large >100kV customer classes into the zone of reasonableness. For the June 1, 2018 rate increase, the Board directed Manitoba Hydro to assume a 10-year timeframe to move all classes within the zone of reasonableness, with the rate increase impact of doing so shared across all customer classes either below or within the zone of reasonableness.

The Board also noted in Order 59/18 the expected effect of Bipole III entering service on the class Revenue to Cost Coverage ratios. As Bipole III is considered to be a Generation asset in the Cost of Service Study, the Revenue to Cost Coverage ratio of classes with a greater proportion of allocated Generation costs relative to their total costs automatically

decreases with the in-service of Bipole III, without any rate differentiation. As such, although the Board directed the beginning of implementation of differentiated rates in 2018/19, the Board also held that it would examine the Revenue to Cost Coverage ratios arising from the Prospective Cost of Service Study filed with the next GRA to consider the effect of Bipole III entering service.

Manitoba Hydro did not file a new Prospective Cost of Service Study with the current 2019/20 GRA. The Utility advises that, while it completed modifications to the cost allocation model to reflect most of the Board's directives from Order 59/18, a new Prospective Cost of Service Study will not be developed until after the MHEB approves a new IFF. Manitoba Hydro continues to study the Service Drop allocator and treatment of Common Costs and intends to have the review completed in time for the next Prospective Cost of Service Study.

In the Information Request process in the current GRA, Manitoba Hydro provided a high-level indication of the anticipated shift in functionalized costs and Revenue to Cost Coverage ratios in 2019/20 with Bipole III now in service, as well as the rate differentiation required to bring all classes within the zone of reasonableness if implemented over different time periods. The information filed by Manitoba Hydro reflects the asymmetrical increase in costs by function resulting from the incorporation of the Bipole III revenue requirement into the Cost of Service Study, as explained above. The result is that the Revenue to Cost Coverage ratios of the General Service Large class are significantly decreased, with the 30-100kV and >100kV sub-classes moving into the zone of reasonableness without any further rate differentiation. The Revenue to Cost Coverage ratio of the Area & Roadway Lighting customer class is significantly increased, from 100.3% to 118.7%.

This high-level illustrative Cost of Service Study output includes the modifications to the cost allocation model discussed above and embeds certain assumptions related to the treatment of Bipole III costs. The table below also assumes that the revenue shortfall that would result from the below-average rate changes for the General Service Small Non-

Demand and Area & Roadway Lighting customer classes would be recovered through additional rate increases above the requested 3.5% from customer classes below unity.

At June 1, 2018 Rates

	Initial RCC including BPIII	Annual Differentiation 1 Year	Annual Differentiation 5 Years	Annual Differentiation 9 Years	Final RCC
Residential	96.5%	2.00%	0.40%	0.22%	98.5%
First Nations On Reserve	93.1%	2.12%	0.42%	0.23%	95.1%
GSS ND	116.7%	-10.02%	-2.09%	-1.17%	105.0%
GSS D	101.8%	0.00%	0.00%	0.00%	101.8%
GSM	97.5%	1.01%	0.20%	0.11%	98.5%
GSL 0-30kV	96.1%	2.43%	0.48%	0.27%	98.5%
GSL 30-100kV	104.6%	0.00%	0.00%	0.00%	104.6%
GSL >100kV	101.9%	0.00%	0.00%	0.00%	101.9%
Area & Roadway Lighting	118.7%	-11.56%	-2.43%	-1.36%	105.0%

Source: AMC/MH I-5

Manitoba Hydro's Position

Manitoba Hydro is seeking an across-the-board rate increase of 3.5%, to be applied to all components of all customer class rates, excepting the non-grid portion of the Diesel class rates. Manitoba Hydro advises that it intends to continue the migration of customer classes into the zone of reasonableness in its next GRA, based on the results of its next Prospective Cost of Service Study.

Manitoba Hydro says that most classes have moved to within the zone of reasonableness with the addition of the Bipole III revenue requirement to the Cost of Service Study, with only General Service Small Non-Demand and Area & Roadway Lighting above 105%. Manitoba Hydro notes that the expert witnesses for the Manitoba Industrial Power Users Group and the Consumers Coalition generally accept that any rate increase should be applied on an across-the-board basis, except for the Consumers Coalition's evidence that the General Service Small Non-Demand class should receive a less-than-average increase. Manitoba Hydro agrees that there is a strong likelihood that, due to the current Revenue to Cost Coverage ratio differential, the General Service Small Non-Demand class cannot be brought into the zone of reasonableness while maintaining the current

consolidated rate structure with the General Service Small Demand and General Service Medium classes. However, Manitoba Hydro argues that rate stability and price signaling support maintaining class consolidation, and therefore foregoing rate differentiation for the General Service Small Non-Demand class, in the near term until possible rate alternatives can be evaluated.

Although Manitoba Hydro does not support rate differentiation for the General Service Small Non-Demand customer class at this time, it acknowledges that it is likely possible to maintain the current rate structure and implement a lower-than-average rate increase for this class, depending on the level of differentiation.

Intervener Positions

The Consumers Coalition submits that any rate increase granted should be across-the-board to all rate classes, with the exception of the General Service Small Non-Demand customer class, which should receive a smaller-than-average rate increase. This Intervener argues that, as Manitoba Hydro did not prepare a new Prospective Cost of Service Study, key evidence is lacking to support any other rate differentiation. This Intervener also adopts the evidence of its expert witnesses and takes the position that the Area & Roadway Lighting customer class should receive any across-the-board rate increase ordered by the Board. This customer class benefits from how Demand Side Management costs are allocated following Cost of Service Study methodology changes directed in Order 164/16 and there is not enough information on the current record to support giving this class a lower–than-average rate increase at this time.

Should the Board direct further rate differentiation, the cost of any lower-than-average rate increase should, in the position of the Consumers Coalition, be borne by all classes within the zone of reasonableness as well as the Area & Roadway Lighting class. The Consumers Coalition also submits that the Board should direct Manitoba Hydro to prepare an updated Prospective Cost of Service Study for the next GRA and all subsequent GRAs.

The Manitoba Industrial Power Users Group submits that the granting of a rate increase should be on an across-the-board basis to all customer classes. The expert witness for this Intervener testified that the evidence filed in this GRA does not meet the evidentiary standard to award differentiated rates.

Board Findings

The Board finds that the approved 2.5% rate increase is to be applied to all customer class rates, except for the First Nations On-Reserve Residential customer class, the Diesel Zone Residential customer class, the General Service Small Non-Demand customer class, and the non-grid portion of the Diesel Zone rates. Other than these exceptions, which are discussed further below, the Panel finds that there is to be no rate differentiation between the classes. The evidentiary basis for further rate differentiation is lacking due to the fact that Manitoba Hydro did not file a new Prospective Cost of Service Study. As well, the Panel acknowledges that the addition of the Bipole III revenue requirement to the Cost of Service Study will likely move the majority of the classes within the zone of reasonableness without any further rate differentiation.

The Board directs Manitoba Hydro to prepare and file a new Prospective Cost of Service Study with the next GRA. The Board will examine the Revenue to Cost Coverage ratios arising from this Prospective Cost of Service Study and will consider adjustment to the differentiation of rates as necessary.

The Board directs Manitoba Hydro to adjust class revenue targets to continue the migration of the General Service Small Non-Demand customer class into the zone of reasonableness. Manitoba Hydro is to continue on the 10-year timeframe for class revenue to cost coverage ratio movement established by the Board in Order 59/18, such that the rate differentiation directed in this Order is on the basis of the General Service Small Non-Demand customer class moving within the zone of reasonableness in nine years from the 2019/20 test year.

The Board notes the evidence of Manitoba Hydro that the rate differentiation for the General Service Small-Non Demand customer class is possible, even with the continued class consolidation with the General Service Small Demand and harmonization of General Service Small rates with General Service Medium rates.

The Board directs Manitoba Hydro to adjust the rates for the General Service Small Demand and General Service Medium classes such that the class revenue targets are increased by 2.5%, consistent with the rate increase to the Residential, General Service Large, and Area & Roadway Lighting classes. The treatment of the General Service Small Demand and General Service Medium rates differs from those of the other classes because the General Service Small Non-Demand and Demand classes are consolidated and share the same tariff, which in turn is harmonized with the General Service Medium tariff.

The Board directs Manitoba Hydro to study and report at the next GRA on the issues associated with rate differentiation of the General Service Small-Non Demand customer class. This study is to include the intra-class impacts of any required rebalancing of customer, energy, and demand charges, whether consolidation of the General Service Small Non-Demand and General Service Small Demand tariffs remains appropriate, and whether harmonization of the General Service Small and General Service Medium rates remains appropriate. As part of this study, Manitoba Hydro is to consider class cost characteristics, load profiles, and bill frequencies of the General Service Small and General Service Medium classes that will provide the necessary information to evaluate rate design options. The Board recommends that Manitoba Hydro consider incorporating into this study the Utility's response to Order 59/18 Directive 28, which requires Manitoba Hydro to report on the rationale for the declining block rate design for General Service classes and an evaluation of the block thresholds and charges.

The Board finds that the rates for the Area & Roadway Lighting customer class are not to be further differentiated at this time. There is insufficient evidence on the record of this proceeding to support rate differentiation for this class at this time. The Board also

notes the evidence of the witness for the Consumers Coalition regarding the effect of the allocation of Demand Side Management costs being to potentially artificially move the class outside the zone of reasonableness.

7.0 Bill Affordability and First Nation On-Reserve Residential Rate

In Order 59/18 the Board set out its long-held concerns and the lengthy history with utility bill affordability issues, which will not be repeated in this Order. Beginning with Order 116/08, the Board has concluded that it has jurisdiction to order the implementation of a bill affordability program.

The majority of the Board in Order 59/18 directed Manitoba Hydro to establish a First Nations On-Reserve Residential customer class for existing First Nations. There was no rate increase for that class, such that the rate for that customer class was maintained at the August 1, 2017 approved Residential Rate. Manitoba Hydro was kept whole as the foregone revenues from the First Nations On-Reserve customer class had been factored into the level of the average general rate increase granted to all other customer classes.

As found by the Board in Order 59/18:

> *The creation of this customer class is justified by the need to address energy poverty on-reserve, supported by evidence that 96% of First Nations people on-reserve live in poverty and that reserves in Manitoba have the highest rates of child poverty in Canada. In addition, the poor housing stock on reserves in Manitoba and the fact that the vast majority of First Nations on-reserve residential customers (61 out of 63 First Nations communities) have no access to the more economical option of natural gas for heating exacerbate the issue of energy poverty. In his testimony, Manitoba Hydro's President and Chief Executive Officer described the housing conditions on First Nations reserves that he has visited as "abysmal". This results in residents on First Nations reserves having to use more energy to heat their homes. On average, First Nations on-reserve customers consume more energy than off-reserve residential customers, despite the efforts of Manitoba Hydro to use demand side management programming to improve energy efficiency for homes on reserves. Taken together, these factors*

lead to higher utility bills and a population of Manitobans that is disproportionately vulnerable to rate increases.

Manitoba Hydro's Position

Manitoba Hydro requests that the June 1, 2019 proposed 3.5% rate increase be applied to the First Nations On-Reserve Residential customer class, while preserving the rate differential that was directed in Order 59/18. Manitoba Hydro notes that it is seeking to overturn the Board's decision to direct the creation of the class at the Manitoba Court of Appeal. According to Manitoba Hydro, increasing the rate to this new class now will mitigate the potential hardship to the customers in the class in the event the Manitoba Court of Appeal accepts the Utility's position in striking down this customer class.

Intervener Positions

The Assembly of Manitoba Chiefs maintains that the evidence is uncontroverted that the customers in this new First Nations On-Reserve Residential class will be disproportionately and negatively affected by the rate increase proposed by Manitoba Hydro. This Intervener submits that the Utility has failed to justify any rate increase for this class and that for 2019/20 no rate increase should be approved for the First Nations On-Reserve Residential class.

The Assembly of Manitoba Chiefs filed expert evidence in this proceeding which reviewed Manitoba Hydro's 2017 Residential Energy Use Survey. While the data are primarily used by the Utility to develop its annual Load Forecast, the information collected also serves as a basis in designing programs and services to assist customers. This Intervener's witness excerpted several data sets to show that energy poverty is higher on First Nations reserves, average consumption is higher, and household income is much lower compared to Manitoba Hydro's residential base. At the last GRA, this witness reported that energy poverty appeared to be substantially higher on First Nations reserves than among the general population. The Assembly of Manitoba Chiefs says that the updated 2017 Residential Energy Use Survey data confirms that conclusion.

The Assembly of Manitoba Chiefs says that Manitoba Hydro was kept whole in Order 59/18 as other 1000 kWh per month customers of the Utility paid an additional $0.12 per month. Should a 0% rate increase be approved for this class in 2019/20, revenue neutrality for Manitoba Hydro would be maintained through 1000kWh per month customers paying an additional $0.09 per month.

This Intervener acknowledges that the appropriate differential or spread between the First Nations On-Reserve Residential rate and the rate for other Residential customers should be addressed at a full GRA with a proper evidentiary record, which is lacking in this proceeding.

Manitoba Keewatinowi Okimakanak submits that the rate freeze for the First Nations On-Reserve Residential class should be maintained pending the Court of Appeal process. This Intervener identifies options for addressing the foregone revenue including the diversion of water rental fees, allowing the revenue shortfall to fall to Manitoba Hydro's Net Income, or for the Board to factor in the cost into the average rate increase granted in the 2019/20 test year to all other customer classes. However, the preference of this Intervener is that other customer classes not make up the revenue shortfall through paying higher rates as this Intervener acknowledges that an additional rate increase on top of any rate increase approved by the Board could represent a hardship for some ratepayers.

Manitoba Keewatinowi Okimakanak also supports a process with a more robust evidentiary base and dialogue for the next GRA. In the position of this Intervener, this includes the need for Manitoba Hydro to engage with First Nations communities prior to the next GRA to provide notice of the Utility's rate plans, and to gain mutual understandings of interests, issues, and concerns. Manitoba Keewatinowi Okimakanak also maintains that the Provincial Government should divert a portion of the water rental fees to implement, support, and maintain a comprehensive government bill affordability program.

The Consumers Coalition submits that there is no cost of service basis to maintain the current First Nations On-Reserve Residential rates, meaning that this class's Revenue to Cost Coverage ratio is already below unity and outside of the zone of reasonableness used in assessing rates. While the monthly differential paid by other customers is small, some of those other customers may also be suffering similar affordability issues as those on-reserve customers. This Intervener maintains that the Provincial Government is best placed to address energy poverty through taxpayer funded programs.

Board Findings

The majority of the Board finds that it is neither just and reasonable nor in the public interest to approve any rate increase for the customers in the First Nations On-Reserve Residential class or for the customers in the Diesel Zone Residential class. The rates for these customers will remain at the rates approved effective August 1, 2017.

This First Nations On-Reserve Residential customer class and the related affordability measure of no rate increase for that customer class in 2019/20 are also consistent with the principle of reconciliation, the ongoing process of establishing and maintaining mutually respectful relationships between Indigenous and non-Indigenous peoples.

The Board agrees with the Interveners that submitted that the appropriate differential or spread between the First Nations On-Reserve Residential and Diesel Zone Residential customer class rates and the rate for other residential customers should be addressed at the next full GRA with a full evidentiary record.

The Board also agrees with the Consumers Coalition that the Provincial Government is best placed to address energy poverty through taxpayer funded programs. The Board reiterates its statements in Order 59/18 that the First Nations On-Reserve Residential customer class with a differentiated rate to address energy poverty on Manitoba reserves is an appropriate starting point for bill affordability in Manitoba. As the Board found in Order 59/18, it is a "modest first step in addressing bill affordability."

The Board continues to be of the view that there should be a broader bill affordability program to address energy poverty experienced by Manitoba ratepayers. However, due to administrative complexities and cost concerns, it is not feasible for Manitoba Hydro to implement a broader bill affordability program at this time. The Board acknowledges that this results in some obvious anomalies where one household on-reserve has a lower electricity rate than a nearby off-reserve household living in comparable circumstances. The Board reiterates its conclusion in Order 59/18 that these complexities and anomalies are best addressed by a more comprehensive government bill affordability program. With the introduction of a comprehensive government bill affordability program, the First Nations On-Reserve Residential customer class and lower rate built into the 2018/19 and 2019/20 years may no longer be required.

Dissenting Decision and Findings of Board Member Ring

As I did in Order 59/18 and Order 90/18, I accept that the Board has the jurisdiction to create a lower-income customer class such as the First Nations On-Reserve Residential class.

However, for my reasons as enunciated in Order 59/18, I also cannot agree with the majority's decision of a continued rate increase exemption in 2019/20 for a new customer class of First Nations On-Reserve Residential ratepayers. In brief, and beyond the issue of this being a matter outside of the role of this Board, the approach taken is still significantly under-inclusive. I agree with the Consumers Coalition that bill assistance targeted only at on-reserve First Nations customers excludes too many vulnerable consumers. First Nations customers on reserve are not the only ratepayers who experience energy poverty, nor are they the only ratepayers who have no choice but to heat with higher-cost options such as electricity as opposed to natural gas. There is a role for the Provincial Government as to the affordability of energy bills rather than the Utility or its regulator.

8.0 Regulatory Schedule and Compliance with Board Directives

From its initial letter of November 12, 2018 to its closing submissions, Manitoba Hydro has advised the Board that the MHEB is presently undertaking a review of the Utility's Strategic Plan, from which they will develop financial targets, rate strategies, and a long-term financial forecast. As part of that process, the MHEB will determine the financial targets for the Corporation, the pace at which those targets will be achieved, and any new strategies or undertakings that come out of the planning process or alter the direction of the company.

Manitoba Hydro has also advised the Board that it intends to file a complete GRA by late 2019. As communicated to the Board in the Utility's November 12, 2018 letter, the next GRA will include an Integrated Financial Forecast. In that GRA filing, Manitoba Hydro says that it will address the Board's directives from Order 59/18 not completed in time for the current GRA and deferred to the next GRA process.

As well as the general agreement among the parties as to the value brought to the rate-setting process from the filing of an IFF, as detailed below, the Board heard from some witnesses and parties that the regulatory process would be enhanced through Intervener involvement in reviewing Manitoba Hydro's compliance with Board directives.

Manitoba Hydro's Position

Manitoba Hydro advises that a more comprehensive and thorough review of the Board's prior directives that remain outstanding will occur at the next full GRA.

Manitoba Hydro does not support an Intervener request for direct involvement in clarifying the scope of a Board directive, suggesting alternative approaches, or assisting in determining the priority and timing of directives. The Utility maintains that only the Board can interpret the intent of its directives and whether the Utility has complied.

Manitoba Hydro does not accept the position of the Consumers Coalition that the Utility should conduct a review of its ratemaking principles. Rather, Manitoba Hydro says that

certain of its existing ratemaking principles may be given more weight or prominence depending on the specific circumstances of future applications.

Intervener Positions

The Consumers Coalition, the only Intervener to address this issue, suggests that there is a role for Intervener participation in reviewing compliance filings by the Utility. In the view of this Intervener, this is warranted as some directives are recommended by Interveners or have a particular effect on those customers represented by Interveners.

The Consumers Coalition also recommends Manitoba Hydro undertake a review, concurrent with its Board's overall review and strategic planning, of the rate design principles that the Utility wants to apply going forward. This Intervener cites the Board's comprehensive review of the Cost of Service Study Methodology in 2016 but says that a corresponding review of ratemaking principles should also occur.

Board Findings

The Board finds that there is to be no role for Interveners in the Board's consideration of the Utility's compliance filing. The Board agrees with Manitoba Hydro that the Board is best positioned to determine whether the Utility complied has complied with directives. Should an Intervener be aggrieved by any aspect of a compliance filing and Order, that party can seek to have the compliance Order reviewed and varied under The Public Utilities Board Act and the Board's Rules of Practice and Procedure.

The Board has initiated a process whereby prior directives and the status of those directives will be posted on the Board's website. Comments from the parties are always welcome.

The Board finds that additional information should be provided in the compliance filing to this and subsequent Orders. In the compliance filing, Manitoba Hydro is to update the test year financial forecast reflecting the directions in this Order. In the case of the current GRA, this means Manitoba Hydro is to file an updated projected 2019/20 budget.

Even without Manitoba Hydro having a current IFF, the Board agreed to consider a one-year rate application to determine whether rate increases in 2019/20 are in the public interest. The Board appreciates that the MHEB is currently involved in a detailed and lengthy review that is to provide direction to the Utility to incorporate into its next IFF. This Order provides directives designed to assist in the MHEB's review and planning process before it finalizes its review.

As well, as set out above, the Board directs that Manitoba Hydro's next GRA, expected to be filed in late 2019, is to be filed with an IFF or other long-term financial forecast. The Board notes the unusual nature of this proceeding and, while due to the ongoing review and planning process by the new MHEB, emphasizes the importance of a regular regulatory schedule and complete regulatory filings. While it will not be a directive of this Board in this Order, regular review and consideration of ratemaking principles should be part of routine utility planning, especially when the majority of a utility's revenues come from consumer rates set by the regulator. This topic may be further explored when the Board reviews prior directives at the next GRA.

9.0 IT IS THEREFORE ORDERED THAT:

1. Manitoba Hydro's Application for a 3.5% across-the-board rate increase effective June 1, 2019 **BE AND HEREBY IS DENIED** as filed.

2. A 2.5% rate increase to the Residential, General Service Small-Demand, General Service Medium, General Service Large, and Area & Roadway Lighting customer classes and to the grid portion of the Diesel Zone General Service rates effective June 1, 2019, with all revenues generated being placed into a Major Capital Deferral Account **BE AND HEREBY IS APPROVED**.

3. A 2.5% rate increase to the revenue target of the General Service Small Non-Demand class **BE AND HEREBY IS APPROVED,** altered as follows: Manitoba Hydro is to implement differentiated rates to continue to move the Revenue to Cost Coverage ratio of the General Service Small Non-Demand customer class into the zone of reasonableness, assuming a 9-year timeframe to move the class within the zone of reasonableness.

4. There shall be no rate increase to the components of the First Nations On-Reserve Residential customer class and Diesel Zone Residential class rates**.**

5. Manitoba Hydro recalculate and file, for Board approval, a schedule of rates reflecting the rate increases and rate differentiation approved in this Order effective June 1, 2019, together with all supporting schedules including proof of revenue, customer impacts, and test year revenue requirement. The compliance filing shall be provided in a timely fashion to allow the Board no less than two business days to review and approve consumer rates effective June 1, 2019.

6. Manitoba Hydro file with the next GRA an explanation of the cost and revenue implications of the advancement in the Keeyask construction schedule from an in-service date of August 2021.

7. Manitoba Hydro file with its next GRA filing an Integrated Financial Forecast or other long-term financial forecast in a form consistent with an Integrated Financial Forecast.

8. Manitoba Hydro develop and file with the next GRA a detailed Operating & Administrative expense budget. That detailed budget is to include the 2019/20 year, as well as any years for which Manitoba Hydro seeks a rate increase together with comparison of year-over-year dollar and percentage increases for the last five years.

9. Manitoba Hydro participate in a technical conference hosted by Board staff or an external consultant appointed by the Board for the consideration of the use of rule-based regulation to provide guidance in the setting of consumer rates and of the question of the role and sufficiency of reserves in Manitoba Hydro's operations and the Board's rate regulation of the Utility.

10. Manitoba Hydro study and report at the next GRA on the issues associated with rate differentiation of the General Service Small Non-Demand customer class, including the intra-class impacts of any required rebalancing of customer, energy, and demand charges, whether class consolidation and harmonization with General Service Small Demand and General Service medium classes should continue, and class cost characteristics, load profiles, and bill frequencies.

11. Manitoba Hydro prepare and file a new Prospective Cost of Service Study with the next GRA.

Board decisions may be appealed in accordance with the provisions of Section 58 of *The Public Utilities Board Act*, or reviewed in accordance with Section 36 of the Board's Rules of Practice and Procedure. The Board's Rules may be viewed on the Board's website at www.pub.gov.mb.ca.

THE PUBLIC UTILITIES BOARD

"Robert Gabor, Q.C."
Chair

"Kurt Simonsen"
Associate Secretary

Certified a true copy of Order No. 69/19 issued by The Public Utilities Board

Associate Secretary

Appendix A: Appearances

PARTY	LEGAL COUNSEL
The Public Utilities Board	Bob Peters, Dayna Steinfeld
Manitoba Hydro	Odette Fernandes, Marla Boyd, Matthew Ghikas
Assembly of Manitoba Chiefs	Senwung Luk, Corey Shefman
Consumers Coalition	Byron Williams, Katrine Dilay
Manitoba Industrial Power Users Group	Antoine Hacault
Manitoba Keewatinowi Okimakanak Inc.	Jared Wheeler, Marcus Buchart

Appendix B: Parties of Record and Hearing Witnesses

PARTY	WITNESSES
Manitoba Hydro	Sandy Bauerlein, Corporate Controller, Corporate Controller Division, Finance & Strategy, Manitoba Hydro; Liz Carriere, Director, Rates & Regulatory Affairs Division, Manitoba Hydro; David Cormie, Director, Wholesale Power and Operations Division, Manitoba Hydro; Greg Epp, Manager, Financial Planning Department, Manitoba Hydro Lois Morrison, Interim Co-Lead, Marketing and Customer Service, Manitoba Hydro; Shawna Pachal, Acting Chief Finance and Strategy Officer, Manitoba Hydro; Susan Stephen, Treasurer, Manitoba Hydro
Assembly of Manitoba Chiefs	Philip Raphals, Executive Director, Helios Centre;
Consumers Coalition	Kelly Derksen, Principal, Kelly Derksen Consulting; William O. Harper, Independent Consultant; Darren Rainkie, Principal, Darren Rainkie Consulting
Manitoba Industrial Power Users Group	Patrick Bowman, Principal, InterGroup Consultants Ltd.
Manitoba Keewatinowi Okimakanak Inc.	(No Witnesses)

Tab 83

Shocking exclusion

BIPOLE III AND UNNECESSARY $300-MILLION COST SHOULD BE PART OF REVIEW

By: Art Derry
Posted: **05/25/2013 1:00 AM**

OPINION

In April, the Manitoba government announced Manitoba Hydro's controversial plans to build two generating stations for export purposes would be tested in an independent public analysis, called a "need for and alternatives to" review. But one of the most contentious items in the capital plans -- the construction of the Bipole III transmission line -- will not be scrutinized. Manitoba Hydro says that while Bipole III will eventually carry electricity from the new generators, it is first needed for reliability of domestic supply. Therefore, it is not subject to review.

I disagree. I think the timing of construction of the new transmission line shows it is being built for export purposes, and it should be part of the "needs for" review.



i

The Bipole III Coalition, a group of people concerned about Hydro's decision to route the new transmission line on the west side of the province, has provided evidence that Bipole III can be delayed for many years if it is being built only for domestic purposes.

The distinction -- for export or domestic purposes -- is important, because of the costs involved and who will be paying them.

Delaying Bipole III's in-service date will save $300 million a year in servicing costs for each year of delay. That's $300 million a year of ratepayers' money.

Manitoba Hydro's "reliability" claim is this: The Crown utility transmits power from northern dams via two transmission lines, both running in the same corridor through the Interlake. That creates real risk in the event

Bipole I and Bipole II.

both lines go down, as happened in the downburst windstorm of September 1996. Further, both lines connect with the Dorsey converter station and then to lines for distribution to Hydro users. In January 2011, a portion of the Dorsey switchyard was knocked out of service. These are the only two significant outages suffered on the HVDC transmission system over the last 40 years.

The cost of the windstorm in 1996 in lost power was estimated by Hydro at $11.1 million. The cost of the 2011 outage was estimated at $6.6 million.

Building Bipole III as a "reliability initiative" is akin to paying $300 million a year in insurance premiums.

Manitoba Hydro says that to protect the power supply, it needs to build Bipole III by 2017. It plans to run the line down the west side of Manitoba and then connect it to a new converter station at Riel, east of Winnipeg. It is a $3.3-billion project. Compare just its servicing costs to the outage-costs experience and you see why Hydro's plans are being questioned in light of the fact there is an alternative, much cheaper option.

In hearings before the Clean Environment Commission in March, the Bipole III Coalition provided evidence that it was economic to instead relocate a new converter station for Bipole II at Riel and then delay the construction of Bipole III to 2025 and connect it to a converter station near LaVerendrye, southwest of Winnipeg.

This proposal is technically sound, cost-effective and provides a reliable system out to 2050.

This option holds significant savings for ratepayers.

First, it saves ratepayers the $300 million in annual servicing costs. (To put this annual cost into perspective, the $300-million annual servicing cost is greater than the projected revenue of $277 million from export sales to the U.S. in 2013-14.)

Also, connecting Bipole III at LaVerendrye, west of Winnipeg, makes more sense because Manitoba Hydro's plan would require running the western line south of Winnipeg and then northeast to the station.

The coalition believes this is a lot of expense for no good reason.

For domestic purposes alone, a new transmission line will not be needed until 2025.

The coalition's alternative plan would involve relocating the terminus of Bipole II (which requires complete refurbishment if it remains at Dorsey) to the planned Riel station. At a cost of $1.2 billion, this is one-third Bipole III's $3.3-billion tab. This provides reliability, reducing the potential loss at Dorsey to only 1,800 megawatts of converter capability rather than the current 3,800 MW. And it provides reliability out to 2025, when Bipole III should come into service.

The coalition's plan would see a total of three separate converter locations on the periphery of Winnipeg. Much more reliable.

It's a reasonable, cost-effective alternative. So why is Manitoba Hydro pushing for construction of Bipole III by 2017?

One can only assume that what Manitoba Hydro doesn't want to say is that it wants Bipole III built by 2017 so it can finalize contracts with export customers in the U.S., expected to start in 2019, and to avoid the scrutiny of the new line under the "need for and alternatives to" review.

But this means Manitoba ratepayers will subsidize transmission costs that should be borne by export customers.

And what are those costs? A recent Public Utilities Board order in April allowed Manitoba Hydro to raise rates by 3.5 per cent. It required that 1.5 per cent, or $20.6 million this year, of the hike be placed in a deferral account. This deferral account will be used to mitigate the rate increases that will be needed when Bipole III is placed in service. That 1.5 per cent each year will amount to only $112 million by 2017-18. That covers only 37 per cent of the $300 million per year that will have to be added to revenue -- and the rates -- to pay for the Bipole III project.

To make up the remaining $188 million shortfall in 2018, Manitoba Hydro consumers can anticipate another 12 per cent increase above the 3.95 per cent already projected for that year. Even with the deferral account in place, the implication is a rate increase of almost 16 per cent when Bipole III comes into service.

To make certain that Manitoba Hydro's proposed decade of major investment is economic, and technically sound, the Bipole III project should be part of the upcoming

"need for and alternatives to" analysis.

This is especially important given the provincial government's decision that the Bipole III line must be built on the province's west side rather than the east at an additional cost of $1 billion to Manitoba power customers.

Let's get it right -- include Bipole III in the review.

Art Derry is retired vice-president business development Manitoba Hydro.

He participated in the first 500 MW sale to Northern States Power (1992) and the economic justification which then resulted in the restart of construction of the Limestone generating plant in the mid-1980s.

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Letters must include the writer’s full name, address, and a daytime phone number. Letters are edited for length and clarity.

Tab 84

KEEYASK INFRASTRUCTURE PROJECT

Environment Licensing Process (https://keeyask.com/project-timeline/environment-assessment-process/)
Environmental Impact Assessment (https://keeyask.com/project-timeline/environment-assessment-process/activites/)
Environmental Assessment Studies (https://keeyask.com/project-timeline/environment-assessment-process/activites/environmental-assessment-studies/)
Keeyask Cree Nations

The Keeyask Infrastructure Project (KIP) was reviewed and approved by the appropriate federal and provincial authorities. Construction commenced in early 2012 and was completed in July 2014.

Directly negotiated construction contracts for KIP were awarded to Amisk Construction, a Joint Venture partnership comprised of the Cree Nation Partners and Sigfusson Northern Ltd. Work on KIP began in early 2012 when regulatory approvals were received. Amisk Construction was responsible for the construction of:

- the North Access Road which provides access from PR280 to Gull Rapids
- Looking Back Creek Bridge which is required to cross the creek at km 18.5
- the temporary 125 person start-up camp located near the junction of PR280 and the North Access Road

ENVIRONMENT
(http://keeyask.com/the-project/environment-and-montoring/)
EMPLOYMENT
(http://keeyask.com/the-project/employment/)
BUSINESS OPPORTUNITIES

Environmental Evaluation Reports (https://keeyask.com/project-timeline/environment-assessment-process/activites/keeyask-cree-nations-enviro-evaluation-reports/)

Environmental Impact Statement (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/)

EIS Summary (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/executive-summary/)

Supporting Volumes (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/supporting-volume/)

Physical Environment (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/supporting-volume/physical-environment/)

Aquatic Environment (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/supporting-

- work areas

In addition to the infrastructure required to construct the Keeyask Generating Station, service contracts were negotiated with the four Keeyask Cree Nations and included: catering & janitorial, emergency medical & ambulance services, camp maintenance & operations, security, and employee retention & support.

Keeyask Infrastructure Project Monitoring Overview (http://keeyask.com/wp-content/uploads/2014/04/MB-Hydro_KIP-Monitoring-Overview_WEB.pdf)

MAIN CAMP

The initial phase of the main camp will house approximately 500 workers. The camp will later be expanded to house 2000 workers and will remain operational until the completion of the Keeyask Generating Station.

ADDITIONAL WORK

Clearing of 31 hectares near the future site of the Keeyask Generating Station was completed. This work involved clearing access roads to borrow material, borrow material areas and work areas required to construct cofferdams for the generating station. The work was conducted over the winter to avoid disturbances to the migratory birds that may nest in the area over the summer.

Amisk sourced approximately 26,000 m^3 of rock to be used by the General Civil Contractor for cofferdam construction. This rock was sourced from Work Area A which is inside the KIP footprint.

KIP ENVIRONMENTAL MONITORING

Ongoing monitoring for KIP occurred consistent with licensing and regulatory approvals. Key components of the program

(http://keeyask.com/the-project/contracts/)

CONSTRUCTION UPDATES

(http://keeyask.com/the-project/current-status/)

volume/aquatic-environment/)

Terrestrial Environment (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/supporting-volume/terrestrial-environment/)

Socio-Economic Environment, Resource Use and Heritage Resources (https://keeyask.com/project-timeline/environment-assessment-process/environmental-licensing-process/supporting-volume/socio-economic/)

included monitoring plans for terrestrial, aquatic and heritage resources, and the socio-economic environment.

View KIP environmental reports > (http://keeyask.com/the-project/keeyask-infrastructure-project-kip#monitoring)

Regulatory Process (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/)

Federal Regulatory Process (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/response-to-requests-for-information/)

Responses to Information Requests Rounds 1 – 3 (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/response-

to-requests-for-information/round-1/)

Provincial Regulatory Process (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/responses-to-information-requests-cec-new/)

Keeyask Generation Project CEC Hearings Project Description & Physical Environment Map Book October 2013 (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/responses-to-information-requests-cec-new/keeyask-generation-project-cec-hearings-project-description-physical-environment-map-book-october-2013/)

Responses to Information Requests Round 2 (https://keeyask.com/project-timeline/environment-

assessment-process/regulatory-process/responses-to-information-requests-cec-new/cec-round-2/)

Responses to Information Requests: Round 1 (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/responses-to-information-requests-cec-new/responses-to-information-requests-cec-rd-1/)

Technical Reports Referenced in Responses to Information Requests – CEC Round 1 (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/responses-to-information-requests-cec-new/technical-reports-referenced-cec-round-1/)

Technical Reports Referenced in Responses to

Information Requests – CEC Round 2 (https://keeyask.com/project-timeline/environment-assessment-process/regulatory-process/responses-to-information-requests-cec-new/technical-reports-referenced-in-responses-to-information-requests-cec-round-2/)

Public Involvement (https://keeyask.com/project-timeline/public-involvement/)

Supplemental Filing 1 – 3 (https://keeyask.com/project-timeline/public-involvement/supplemental-filing-1/)

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Keeyask Infrastructure Project (https://keeyask.com/project-timeline/keeyask-infrastructure-project/)

- History (https://keeyask.com/project-timeline/keeyask-infrastructure-project/history/)
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Tab 85

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MANITOBA PUBLIC UTILITIES BOARD

Re: MANITOBA HYDRO
NEEDS FOR AND ALTERNATIVES TO
REVIEW OF MANITOBA HYDRO'S
PREFERRED DEVELOPMENT PLAN

Regis Gosselin	- Chairperson
Marilyn Kapitany	- Board Member
Larry Soldier	- Board Member
Richard Bel	- Board Member
Hugh Grant	- Board Member

HELD AT:

Public Utilities Board
400, 330 Portage Avenue
Winnipeg, Manitoba
March 3, 2014
Pages 1 to 320

APPEARANCES

Bob Peters	)Board Counsel
Sven Hombach	
Patti Ramage	)Manitoba Hydro
Marla Boyd	
Byron Williams	)CAC
William Gange	)GAC
Peter Miller	)
Antoine Hacault	)MIPUG
George Orle	)MKO
Michael Anderson	)
Jessica Saunders	)MMF
Christian Monnin	)IEC
Michael Weinstein	)

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--- Upon commencing at 9:03 a.m.

THE CHAIRPERSON: Good morning, ladies and gentlemen, bonjour. Welcome to the first day of the oral evidentiary portion of the Public Utilities Board's hearing with respect to a review of the Needs For and Alternatives To Manitoba Hydro's Preferred Development Plan.

Manitoba Hydro's Preferred Development Plan includes the Keeyask and the Conawapa genera -- generating stations, as well as the several -- as well as several export agreements, together with associated transmission, both in Manitoba and the United States.

You will hear repeatedly the acronym 'NFAT' used to describe the -- this public hearing, 'NFAT' being an abb -- an abbreviation for 'Needs For and Alternatives To'. While today is the first day of the oral evidence, today is not the first day of the process implemented by the Public Utilities Board to consider this NFAT. Let me expand on that comment for the benefit of those who have not been actively involved in the NFAT process.

On January 13th, 2011, the Government of Manitoba notified Manitoba Hydro of the government's intention to carry out a public NFAT review of Manitoba

Hydro's proposed Preferred Development Plan. On November 15th, 2012, the Minister of Innovation, Energy, and Mines announced that the Government of Manitoba had asked the PUB to conduct this NFAT.

On April 25th, 2013, the PUB received terms of reference from the Province of Manitoba for the conduct of the NFAT. On April 25th, 2013, the Board also released its public notice inviting Intervenors and the public to participate in the process. A reminder public notice was also issued on January 27, 2014, advising the public of the hearing and seeking further public participation.

On August 16th, 2013, Manitoba Hydro filed its NFAT business case and supporting materials. Those materials are available on the Board's website, as are other NFAT-related documents. Since August 16th, 2013, the PUB has established a procedure for conducting the NFAT. That procedure included approving five (5) Intervenors and eight (8) independent expert consultants to assist the Board in its review.

There have been thousands of written questions posed in respect of the written evidence that has been filed. Manitoba Hydro has responded to many -- to as many of the written questions as its resources permitted. Likewise, the Intervenors and the

independent consultants have also responded to written requests. Most of this information is available to the public through the PUB's NFAT website, as well as an NFAT website maintained by Manitoba Hydro.

There is, however, some information that has been deemed commercially -- commercially sensitive. For example, you will note that several of the reports filed by the independent expert consultants contain redactions of commercially sensitive information.

That leads us to today as we begin the oral evidentiary phase of the NFAT hearing. We're going to hear from Manitoba Hydro's witnesses over the next four (4) weeks, followed by three (3) weeks of testimony by the independent expert consultants in April, and then another three (3) weeks of Intervenors' expert witnesses. The Board hear -- the Board expects to hear closing submissions from the parties in May. The government has requested a report from the Board by June 20th, 2014.

With that brief background, let me turn to introductions, starting with my colleagues on this NFAT hearing panel. I'm pleased to be joined by Marilyn Kapitany, to my extreme right; Larry Soldier, to my extreme left; Rick Bel, on my -- my immediate right; and Dr. Hugh Grant on my immediate left.

I just wanted to notify that sing -- I just wanted to notify that we have a couple of visitors, Board members from the PUB sitting at the back: Ms. Karen Botte, who is the vice Chair, and Ms. Anita Neville, who are attending today. Also assisting the Board are its executive director Hollis Singh; the associate Board secretary Kurt Simonsen; the project manager Josee Lemoine, assisted by Nikita McCray (phonetic); and regulatory assistants Nancy-Anne Cribbs and Diana Villegas.

The Board is also assisted by its technical and ledal -- and legal advisors, who I'll ask the Board counsel, Mr. Peters, to introduce in a few minutes.

Members of the public unable to be at the hearing can following this hearing by reading daily transcripts that will be published on the NFAT website. The Board's mandate set out in the terms of reference were issued by the government by way of its order in council. I have asked that paper pop -- paper copies of the terms of reference be made available at the back of the hearing room. They are also available on the PUB website.

The terms of reference request a report to be provided no later than June 20th, 2014. The

report is to include recommendations to the Government of Manitoba on the needs for Manitoba Hydro's Preferred Development Plan and an overall assessment as to whether or not that plan is in the best long-term interest of the Province of Manitoba when compared to other options and alternatives.

The terms of reference set out further details as to the items that this Board will address. And for those of you who have not reviewed them, please take a copy or review the document online.

The public has been invited to provide input and comment on Manitoba Hydro's plan. Several citizens and organizations have submitted written presentations to the Board, and copies of all of those are available on the Board's website.

Additionally, the Board has heard from presenters on February 27th, 2014, when they appeared in this room to make oral presentations to the Board. We thank all of them for their comments. Should the Board receive additional requests from citizens and organizations to appear and make oral presentations, we plan to schedule those presentations at mutually available times during the hearing days.

Both the written and oral presentations will be transcribed onto the transcript record of this

proceeding and will be available on the Board's website.

At this time I'll ask the Board counsel, M. Peters, to provide his opening comments, as well as introductions and an indication of the proceeding for today. M. Peters...?

MR. BOB PETERS: Thank you, and good morning, Mr. Chairman. Good morning Board member Kapitany, Board member Soldier, Board member Bel, and Board member Dr. Grant. Good morning, ladies and gentlemen.

For the record, my name is Bob Peters. And together with my colleague, Sven Hombach, seated to my far left, we appear today as legal counsel to the Public Utilities Boards NFAT Review Panel. The Board is also assisted by its engineer advisor Larry Buhr, of LAB Consulting, on my right, and by Roger Cathcart, of Cathcart Advisors, who is the accounting advisor to the Board seated on my left; and also assisted by Margaret Smith seated across the room.

As the Chairman has indicated, today the Public Utilities Board begins a hearing that will span the months of March, April, and May of 2014. Today the Board will hear from Manitoba Hydro's president and chief executive officer Mr. Scott Thomson in the

morning. The late afternoon is reserved for introductory comments by Mr. Ed Wojczynski, also of Manitoba Hydro. And over the next four (4) weeks you will hear from four (4) different Manitoba Hydro panels of witnesses.

There is a timetable that, with the input and cooperation of all parties, has been prepared and circulated. Extra copies are at the back of the hearing room, as well as being available on the Board's website. Both the order of witnesses and witness panels, as well as the order of cross-examinations, are set out on the timetable.

Following Manitoba Hydro's witness panels, there will be the eight (8) independent expert consultants that have been engaged pursuant to the terms of reference to assist the Board. Following the independent expert consultants, there will be approximately twenty (20) witnesses on behalf of the five (5) Intervenors in this proceedings. And additionally scheduled by the Intervenors, there is one (1) panel of ratepayers, and also one (1) panel of First Nations Elders.

Mr. Chairman, Board members, ladies and gentleman, there is one (1) new procedural note that the Chairman made mention of that must be raised. And

that relates to commercially sensitive information, or the acronym as we've given it, CSI.

The terms of reference direct the Board panel to conduct the NFAT in a transparent and public process. The terms of reference also require the PUB panel to ensure there is adequate protection of any information the disclosure of which may reasonably be expected to cause undue financial loss to Manitoba Hydro or any of its contractual counterparties, or harm significantly Hydro's, its contractual counterparties', or domestic customers' competitive positions.

So to balance those objectives in terms -- that are in the terms of reference, some information filed by Manitoba Hydro and the independent expert consultants has only been filed in confidence with the Board and those persons who have signed non-disclosure agreements. Those CSI documents are not on the public record.

When it comes time to ask questions of Manitoba Hydro and the independent expert consultants on that commercially sensitive information, the Board will invoke an in-camera session, where only persons -- the only persons permitted to stay in the hearing room and to see the documents and to listen to the questions and answers are those people who have signed the non-

disclosure agreements.

The timetable that was up on the computer screens moments ago has included in-camera sessions for Manitoba Hydro's witness panels as well as the independent expert consultants. You see that the CSI sessions generally follow immediately after the public sessions for any given panel or for any given witness.

Now, this morning, Mr. Chairman, following my comments, I suggest you call on the Intervenors and the IECs for their opening comments through their legal counsel. After hearing from the Intervenors and IEC counsel, I suggest the Board call on counsel for Manitoba Hydro for any opening comments and introductions.

Now, in terms of Intervenors, the Board will hear from the Consumers' Association of Canada (Manitoba) Inc., often referred to as CAC, and they will hear through its counsel, Mr. Williams and Ms. Menzies, seated across the room.

The Green Action Centre, or GAC, is represented by its counsel, Mr. Gange, who I saw here today with Dr. Miller.

I also see that Manitoba Industrial Power Users Group will be represented through its

counsel, Mr. Antoine Hacault, seated at the front row, together with his consultant, Mr. Bowman.

Manitoba Keewatinowi Okimakanak, or abbreviated with permission as MKO, will be represented through its newly minted counsel, Mr. George Orle. And we welcome him to the hearing room. He is seated across the room beside Mr. Michael Anderson.

The Manitoba Metis Federation is present today and represented through its counsel, Ms. Jessica Saunders, who will appear as well as with her colleague, Mr. Marks.

The independent legal counsel for the eight (8) independent expert consultants is Mr. Christian Monnin and Mr. Michael Weinstein. They are across the room also, and they too should be offered an opportunity for any opening remarks this morning.

And for those who are regularly in the Board hearing, I would be remiss if I did not mention the technology that will assist the panel and the parties in this NFAT. With the able assistance of Ms. Cribbs and Ms. Villegas, documents and exhibits are to be converted to searchable PDFs with bookmarks and emailed to the Board, complete with the intended exhibit number that they be given.

Those exhibits will be added to the

electronic exhibit list and be available to be shown on the monitors on request of counsel. Anyone with questions about this procedure should see Ms. Cribbs or Ms. Villegas or, alternatively, Ms. Lemoine, project manager for the NFAT.

The electronic technology in the hearing room is intended to make it easy for all parties to view the written evidence being discussed. Accordingly, we ask that if a party is examining on or providing testimony with respect to a specific document, counsel clearly state which document they are referring to, perhaps by exhibit number, so it can be put up on the screen.

Counsel are also welcome to file paper books of documents, but we would ask all parties that any documents filed with the Board also be provided the day before they are intended to be used as searchable PDFs so they can be uploaded.

Mr. Chairman and Board members, the evidence of the witnesses is to assist the panel. And so if at any time a question is asked or a question is answered such that any of you want clarification, you are invited to please interrupt and seek clarification. All parties recognize the importance of your questions.

And, panel members, should there be

technology issues or glitches, we will request your patience as we work through them. I will indicate that the exhibit list is now electronic, and is on the Board's website to be updated daily.

The Board itself keeps a hyperlinked version, so persons in the hearing room can follow along with those of us seeing the documents on the monitors. If anyone should wish to have access to the hyperlinked version, the Board should be able to provide you with a copy with the proviso that the list will likely be updated in real time and on a daily basis. So as such, it will change.

Mr. Chairman, Board members, lastly, the outline of procedures, as we have gotten to know over the years, is now contained on the timetable document that has been circulated. The planned witness panels and cross-examinations are mapped out on the -- on the timetable by date and by party.

And so, Mr. Chairman, in your opening remarks you asked about the plans for today. And as a reminder, following my comments, each Intervenor and IEC counsel should have a brief opportunity for opening remarks before Manitoba Hydro is called on for its opening comments and introductions. As I indicated, we expect Manitoba Hydro will introduce its president and

CEO, who has his own opening comments and is available to answer questions from the parties today.

Later today, and following Manitoba Hydro's president's testimony, we expect Manitoba Hydro will introduce Mr. Wojczynski, who will map out Manitoba Hydro's plans for presenting its evidence to the Board. Mr. Wojczynski will not be cross-examined immediately following his remarks, but I understand he'll be available on other Manitoba Hydro panel -- witness panels and available to address questions on the subject matter of those other panels that he may speak to in his comments today.

Starting tomorrow, Manitoba Hydro plans to introduce its first witness panel to address issues of load forecasting and demand-side management. And with that, Mr. Chairman, and subject to any questions you may have for me, I suggest you call on the Intervenors, starting with the Consumers' Association of Canada (Manitoba)'s legal counsel, Mr. Williams. Thank you.

THE CHAIRPERSON: Bonjour, M. Williams. How are you today?

OPENING COMMENTS BY CAC (MANITOBA):

MR. BYRON WILLIAMS: Good morning, Mr.

Chair. And we're going to have some technical glitches right off the bat. I'm doing quite well. I'm a little traumatized with the new technology, but my colleague, Ms. Menzies -- we're just -- we have a PowerPoint and we're just seeing how well it's going to work. It worked well in practice.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: It's actually a -- a rhetorical technique to raise the tension as you wait for the PowerPoint to appear. There we go. Good morning, members of the panel. And, for the court reporter, is the sound okay? Okay. Mr. Peters did an outstanding job of introducing persons in the room. He -- he missed my client, Ms. Desorcy, who's hiding around the corner, and I'm not sure if all of the panel members can -- can see her. But I want to assure you, she is here looking very carefully over my shoulders.

And one of the unique terms of my retainer with CAC (Manitoba) is that as a former -- a son of a -- a family farmer who grew up on a farm, I always have to be able to make one (1) farm reference in the course of a hearing. And our client's presentation, not made in jest, is titled:

"Betting the Farm on Keeyask and Conawapa: Risk and Affordability In an Era of Uncertainty."

And it's nice to see Mr. Wojczynski here, because it was almost ten (10) years ago to the day that we sat in a larger room at the Convention Centre and we started the NFAT related to Wuskwatim. And things seemed so easy then. Manitoba Hydro was about to embark upon a bold new adventure with its partner from the Nisichawayasihk Cree. And we were confident that Hydro would manage its costs and, with its partner, would reap the rewards of the lucrative opportunities in the export market.

With the benefit of hindsight, we were all seized with a collective hubris that Hydro could master both its own costs and the intrinsic challenges of a dynamic marketplace. And when you look at this page of the PowerPoint, you can see that confidence reflected in the -- in this transcript from day 1 of the hearing.

We were told it was a relatively low-risk pra -- project, with the economics being very robes -- robust with respect to risk factors. And we were told, Don't worry about what happens when we have the high export prices. Even with the low range of

export prices for -- forecast, we've still got a good project.

So easy it seemed back then. And even four (4) years ago, we were at another general rate application, the 2011/12 General Rate Application, and we were told then we'd have a bit of a bump, that the -- that this decade, the '10s, would be the decade of investment. We'd make some significant investments and there'd be a little price cost, annual rate increases, less than 3 percent but above the rate of inflation.

But in return for that decade of investment, there would be the 2020s, the decade of returns, a magical decrease in our debt/equity ratio, price stability, and rapidly increasing equity. And you can see there the suggestion that this would be acco -- accomplished with domestic rate increases closely aligned with projected rates of inflation.

Oh, for the wist -- wistful year -- days of yesteryear as we take stock in the barrage of bad news from Wuskwatim and the prospect of rate increases double the rate of inflation, not just for this decade but for the next.

And that bitter experience raises the most basic but the most fundamental of questions: We're all sure that Manitoba Hydro, like all of us, has

learned something. But is the analysis of Manitoba Hydro in this proceeding credible?

And if one looks at the record to date and focussing on key issues such as export revenues, load forecast, and the analysis of alternatives, CAC (Manitoba) is not the only voice in this room raising concerns, fundamental concerns, about Manitoba Hydro's analytic credibility.

This is of significant concern because we're not -- we're now talking about the future, and a future that in our client's view is a future with unprecedented risks, and to a large degree risks in the American marketplace driven by three (3) major uncertainties.

One is what going to happen with long-run environmental policies, with carbon tax being the most important perhaps of them, but other related to coal retirement and transmission expansion.

Another significant uncertainty relates to the really quite dramatic changes in low-carbon technologies, the evolution or in some cases the revolution in terms of wind and solar, in terms of their costs, especially in the case of solar.

And another uncertainty, another great uncertainty, relates to the long-run price effects of

unconventional gas development, shale gas. And these factors affect -- certainly they're all in play when we look at the significant amount of revenues that Hydro still has to gain from the spot market, but also certainly the shale gas issues we expect will affect the firm contracts as well.

This uncertainty, unpredictability, is flamboyantly captured in the first bullet on this page by Binz et al. They describe the changes underway in the 21st Century electric power sector as creating a level and complexity of risk that is perhaps unprecedented in the industry's history.

More prosaically, the Brattle Group, Hydro's consultant, says, The future seems even more uncertain than usu -- usual. And so coupled with this period of unprecedented uncertainty is an evolving concern that Manitoba Hydro is still playing a bit of catch-up when it comes to assessing its resource development options. And certainly from my client's perspective, the absence of treating demand-side management energy efficiency as a legitimate resource option in the business case is a very notable example.

And this issue of catch-up is well reflected in the analysis of La Capra Associates who conclude, and this is on -- the third bullet on this

page, that:

"Hydro's review of the alternative development plans has several shortcomings, including an -- including an overly narrow range of potential development plans and the use of un -- outdated or inappropriate generation cost assumptions."

So this leads to two (2) critical questions:

1. Is the Hydro plan a robust approach to integrated resource planning, or is it an artifact from a more simple time?

And second: Is Hydro's analysis skewed against certain alternatives?

These issues might be less critical for consumers if Hydro did not enjoy a monopoly in the retail sale of power in this province, or if it was a shareholder-owned utility with shareholders prepared to bear the brunt of much of the risk. But the reality is is that Manitoba Hydro has entered an era of unprecedented uncertainty and investing a very significant sum of money with ratepayers as a primary financial backup.

And CAC (Manitoba) does not appear to be alone in that concern either. And you look at this very pointed commentary by Morrison Park, they talk about Hydro taking substantial market risks based on expectations or bets about the future. And noting that while probabilities have been placed on different potential futures, fundamental market risks are necessarily embedded in some resource plans to a far greater extent than in others, with the ultimate degree in the preferred plan; certainly in our client's view.

Morrison Park goes on to say that prices will either turn out to be high and ratepayers will benefit, or they will turn out to be low and ratepayers will have to shoulder more of that burden. Either way, ratepayers can have no certainty in advance, and no choice in the matter.

This leads to four (4) additional questions of our client: Is the gamble of this magnitude in the export market too risky? Are the risks imposed on ratepayers by Manitoba Hydro appropriate? Are risks appropriately shared between Hydro -- excuse me, between ratepayers and the province, or is there an inequitable share of risks with too much being shouldered by ratepayers? Finally, are there less risky alternatives?

And again, our client expresses its regret that the business plan of Manitoba Hydro when filed in August did not integrate DSM or energy efficiency as a supply option.

We probably don't talk about the principles of sustainable development enough in these proceedings before the Public Utilities Board. The Principle 4 is a critically important one. And it warns us that we should take caution. We should have particular care, careful regard to decisions whose impacts are not entirely certain, but which on reasonable and well-informed grounds appears to pose -- appear to pose serious threats to the economy, the environment, human health, and social well-being.

And we've already talked about some of that economic and financial uncertainty, but it's also important to realize that there is a -- some environmental betting going on unde -- and underlaying the Hydro plan. We all know the importance of reducing greenhouse gasses, ut the reality is that -- that the Nelson River watershed, an already profoundly disturbed watershed, fashe -- faces significant uncertainties and risks related to the Hydro plan.

And you see here the insight of Meyers Norris Penny, the independent consultants retained by

the Board. Flagging the uncertainty related to caribou, both migratory caribou and the SARA's protected summer-resident caribou. We see the uncertainty flagged by Mias -- Meyer (sic) Norris and Per -- Penny relating to late sturgeon populations, and to -- they're telling us it's difficult to ascertain whether the strategies proposed by Hydro will be sufficient.

And then we see the commentary by Dr. Joe Gunn, one (1) of the foremost experts on environmental assessment in -- in our country, saying -- not suggesting for sure, but just saying, If this region and its people are already at a breaking point, there's a profound risk in terms of future development. Powerful wards -- words of warning.

And it's perhaps for this reason that after issuing the terms of reference for the Public Utilities Board, that the Province of Manitoba initiated a cumulative regional assess process for the Nelson River watershed. But it seems extremely unlikely that this panel will have the benefit of that process, that review process, in making its determinations. So it leaves us with a critical -- critical macro-environmental question: Can the Nelson River sustain further hydro development?

On the next page, I -- I haven't set out the principles, relevant principles of sustainable development, but it certainly is number 2, which talks about managing the economy, the environment, human health, and social well-being for the equal benefit of present and future generations. And if we think back just to four (4) years ago, to the decade of development and the decade of returns, obviously there was going to be some -- some pain for consumers in the decade of development, but quickly repaid. That's very different from the current Hydro plan, because under the Hydro plan it appears that today's ratepayers are being asked to pay a very steep price for very uncertain returns in the far-distant future. And that point was succinctly made by Dr. Roger Higgins, an expert retained by the Consumers' Association and a former Board member of the Ontario Energy Board. He succinctly, simply says, The ratepayer impacts are not acceptable. More eloquently, the witnesses on behalf of the MKO have spoken about how, without mitigation, the Preferred Development Plan will put pressure on fixed and low-income First Nation customers.

Our client is deeply concerned about the implications of this plan for all ratepayers, whether working families struggling to pay the bills week to

week, or the most vulnerable consumers. And that concern about affordability frankly relates to all the alternatives presented by Manitoba Hydro, and our client is asking, Are any of these plans affordable?

Members of the panel, over the last months our client has been engaged in an extensive series of focus groups, advisor group meetings, and also doing a fair bit of interviewing of -- of individuals in this province. And our client has been quite struck by a sense of inevitability around Manitoba Hydro's plans and about the decision-making process. Whether fairly or not, in both the interviews conducted by our researchers and the input from our advisory group, we have detected a strong sense of fatalism with regard to the Hydro plan, a sense that Hydro occupies a preeminent role in public discourse in this province, and that the outcome of the decision-making process is inevitable.

Our client does not subscribe to this view, and it is truly appreciative of the opportunity to engage with the Public Utility Board in the recommendation process. But it does wish to highlight what it considers to be some significant concerns with this process. The first is that there never was an NFAT for Bipole III, and so the costs with Bipole III

are treated equally in terms of all those plans. We see that similarly with the sump costs; a lot of sump costs, already in Keeyask and Conawapa, being treated equally against all plans, which certainly, in our client's view, skews the playing field against the alternatives.

My Friend Mr. Peters talked about CSI -- which someone should maybe make a movie with that name, maybe a TV show -- and our client is extremely frustrated with the amount of black highlighting currently in a number of the reports from the independent experts. We know that there is a -- a welcome decision by the Board, just on Friday, in terms of providing more access to that information. But it -- it's -- it has reaped a profound disadvantage on our clients because it -- it's getting pretty late in the -- in the day to be accessing that information. And our client would be remiss if they did not also note the challenges they have had and their lawyer has had with the undertaking, one (1) that -- that I cannot in good conscience sign.

So while our client is truly grateful for the support of the PUB, for the hard work of many of the independent experts, and frankly by the candid concessions of Manitoba Hydro in its rebuttal evidence,

a challenge our client has, and I think we all have here, is can our advice to the province collectively be credible, given the many hindrances in the process? That's not a reflection on the PUB, it's just a challenge that we -- we all face.

Finally, and noting the time, my client reminds me that at the end of the day this process is not about economists, with all deference to Dr. Grant, it's not about actuaries -- oh, or Mr. Bel -- it's not about accountants, it's not about engineers, it's about people and corporations. And it is so easy to forget the human impact of this proceeding.

The fact that Hydro rates grow -- going and growing at double the rate of inflation, can impose stresses upon working persons struggling to pay the bills, upon seniors faced with escalating prices, upon the single parents who have to use a food bank by the third Thursday of the month, it's perhaps not as hard to forget that assuming the debt related to $16 billion in capital expenditures imposes risks upon all Manitoba Hydro ratepayers.

CAC (Manitoba), through this hearing, has tried to understand the human impact. They've done so through their focus groups, their advisory groups, and daily consumer contact. And it will seek to

represent the broad consumer interest, taking an evidence-based approach to three (3) core principles: ensuring affordable access to basic necessities such as Hydro, ensuring that the process is transparent, and that the decision reached is sustainable.

In bringing this perspective forward, CAC will be -- be bringing forward, first, a truly outstanding group of expert witnesses, as well as two (2) people panels: one (1), a consumer's panel with their colleagues from the MMF; and the other individual traditional land users, individual Elders, who will be bringing their individual perspective of the particular impacts that Hydro will be having upon their communities.

I thank the panel very much for your patience in listening to us and putting up with our modest technical glitches. And I look forward to participating on behalf of our client in this proceeding.

MS. MARILYN KAPITANY: Mr. Williams, you spoke about focus groups that you held during the preparation stage. Could you expand a little on the demographics of those focus groups. And I'm particularly interested in if there were any business people, small business owners, or business people

involved in those focus groups?

MR. BYRON WILLIAMS: The -- in -- in terms of -- they're ongoing and it would be part of an ongoing deliberation that CAC(Manitoba) has had over the past three (3) years. My client could probably speak to their makeup a little better than I. I'll do my best though.

The focus groups themselves would tend to be selected from residential customers, and they would be -- we would have a southern, or Winnipeg-based focus group, and also, through the auspices of a -- a colleague organization, focus groups -- a -- a northern based -- what -- people who have come from the North and remote communities.

Where -- in terms of where we would have a modest impact -- influence, in terms of our advisory groups, which are different, the advisory groups are asked to represent particular interest groups, and there would be a -- a low-income person representation coming from groups that work closely with people who use food banks, we would have an environmental perspective, we would have an indigenous perspective, a -- a faith-based perspective. And certainly, I recall in, not the most recent advisory group, but one (1) from a -- I missed the seniors' perspective, which is

consistent throughout. Our second last one (1), I believe, involved some farmers. Okay.

But I would say, in answer -- in an indirect answer to your question, perhaps -- maybe I'll get to the direct -- those groups would be less represented than the -- the residential consumer. We also have had, from time to time -- or excuse me, I should say at least one (1) occasion -- some input from industry. But that was not our most recent advisory group.

MS. MARILYN KAPITANY: Thank you.

MR. BYRON WILLIAMS: Thank you.

THE CHAIRPERSON: Merci, Mr. Williams. I turn it over to M. Gange.

OPENING COMMENTS BY GAC:

MR. WILLIAM GANGE: Thank you, Mr. Chair. Mr. Simonsen advised us that this little light down here is very dim. He's right. The opening remarks of the Green Action Centre will be given by Dr. Miller.

DR. PETER MILLER: Thank you. Greetings to the Chair, and the panel, and the other participants here. I just want to give a -- a little perspective on our organization's approach to this

matter. Green Action Centre is a non-profit governed by an elected community board and committed to advancing applied sustainability.

(BRIEF PAUSE)

DR. PETER MILLER: We try to id -- identify, educate about, advocate, and facilitate sustainable choices and practices for individuals, organizations, governments, and society.

'Living Green Living Well' is our motto. Our NFAT intervention is part of that mission. Principles of sustainability and justice guide our interventions. In these remarks I wish to highlight aspects of that perspective brought to bear on Manitoba Hydro's development plans and alternatives in this proceeding.

We agree that our society is unthinkable without electricity. Manitobans are indeed fortunate to have a premium source of reliable, storable, renewable, dispatchable, low-carbon hydro electricity.

We know that the supply of electricity comes with a variety of environmental, social, and financial risks and costs along with the benefits. We share with other parties in this proceeding the concern

that these be properly weighed, as well as mitigated and compensated where possible.

We know that -- that it is economically and environmentally costly to waste electricity, hence our focus on DSM. Generally speaking, using electricity for heat when other alternatives are available is a wasteful and environmentally harmful use system-wide. Hence, our attention to fuel switching.

We are -- we're are thus presently surprised to see in the just-filed rebuttal that Manitoba Hydro plans a major reassessment of its achievable DSM potential, including fuel -- fuel switching, conservation rates, and new technologies. Manitoba Hydro hopes to file their new Power Smart Plan and implications for resource planning in the course of this NFAT.

The hydroelectric potential in Manitoba is a renewable but limited resource. Thus, we view with alarm a domestic demand curve that raises winter peak demand by 2,900 megawatts over thirty-five (35) years, the equivalent of two (2) Conawapas or of Conawapas plus two (2) Keeyasks. This looks to be unsustainable.

We believe that not only Manitoba's DSM potential but also the potential for hydro power to

multiply renewable energy supply in combination with intermittent renewables by creating a hybrid product should be explored. Hence, our attention to the wind potential.

We will also want to explore the 750 megawatt intertie as a potentially strategic asset in this regard where hydro capacity can backstop US wind.

An NFAT requires that an appropriate range of alternative portfolios be evaluated. We were thus disappointed that the filing presented a fixed set of alternatives that were so time consuming for Manitoba Hydro to analyze that no new alternatives could be contemplated, despite the PUB's directive that they should be prepared to model some.

Thus, alternatives with load-flattening level of DSM or of wind plus an intertie were omitted. It remains to be seen what level of analysis Manitoba Hydro can provide for the integration of its new DSM projections into the NFAT scenarios, and whether there is opportunity for Intervenors or independent experts to consider, analyze, and respond to the new results.

One (1) option is to extend the hearing process sufficiently to permit this opportunity.

So those are just some brief remarks to indicate our starting point in this proceeding, and

thank you for your attention.

THE CHAIRPERSON: Thank you, Dr. Miller. I'll now call upon the counsel for the Manitoba Industrial Power Users Group, Me. Antoine Hacault.

OPENING COMMENTS BY MIPUG:

MR. ANTOINE HACAULT: Bonjour, M. President Gosselin. Good morning, Board members. Good morning, all.

Manitoba Industrial Power Users Group is an association of ten (10) major industrial customers operating in Manitoba. The purpose of MIPUG, Manitoba Power Industrial Users Group (sic), is to work together on issues of common concern related to electricity supply and rates in Manitoba.

MIPUG's intervened in each of Hydro's general rate applications since 1988, as well as the review of the Centra Gas acquisition in 1999 and Hydro's major capital projects hearing in 1990, which was the first hearing on Conawapa.

The MIPUG membership currently includes the following companies: HudBay Minerals Inc., located in Flin Flon; Tolko Industries, located in The Pas; Canexus Chemicals, located in Brandon; Koch Fertilizer

Canada ULC, located in Brandon; Erco Worldwide located in Virden; Gerdau Long Steel North America, the Manitoba mill, located in Selkirk; Amsted Rail, the Griffin Wheel Company, located in Winnipeg; Enbridge Pipelines has operations in southern Manitoba; TransCanada Keystone Pipeline, again with operations in southern Manitoba; and finally, Vale, located in Thompson.

These ten (10) companies make up about 20 percent of Hydro's domestic load. Members provide jobs to about fifty-six hundred (5,600) full-time equivalents, and about $2.3 billion to the provincial GDP.

Most members are outside Winnipeg, and many are the largest employers in their communities. MIPUG's concerns reflect the size of the members' investments in Manitoba, which requires a long-term perspective. In addition, MIPUG's concerns reflect competitive market pressures from selling Manitoba products to world markets. We'll hear some reference to competitiveness in Canada and North America, but the reality is even Manitoba companies compete internationally.

The simple point is that rates do matter. They help offset disadvantages that arise from

operations in Manitoba such as transportation and distance to markets compared to competitors throughout the world. In this hearing, MIPUG is also endeavouring to provide the Board with a view of the concerns raised during the consultation process with others in the business community in Manitoba.

To that end, there's a been a newsletter, there's been some consultations, and the consultation process will be ongoing as the information continues to be provided and this hearing continues to evolve, and we also expect that some of those members, the chambers, might wish to make some presentations at one point in time.

As we've seen, this hearing is even more intensive than the risk hearing that was quite intensive. There are a few things that it will not cover but are essential to understanding MIPUG's position.

First, industrial rates in Manitoba have risen considerably in recent years since 2004. This has occurred at a time when industrial loads in many other locations have seen prices decline, and be provided with more flexibility to manage power costs. MIPUG's presentation in the recent GRA noted how Manitoba, in its view, was no longer the lowest-priced

jurisdiction. One (1) member in particular noted that the power costs in Manitoba were now the fifth lowest of its eighteen (18) plants.

Second, since Manitoba Hydro became regulated in the late 1980s, industry has faced rates that exceed the costs to provide the service. This has tended to be a premium paid by the industry sector of 10 to 15 percent over costs throughout that time period. That cost was about $20 million per year or more that the industry was bearing.

Third, industry continues to have very limited options to manage their power costs in Manitoba, unlike other jurisdictions. The DSM Program, known as cur -- 'curtailable rates' has been capped by Manitoba Hydro, and no additional customers can now participate.

Hydro has no programs that let customers respond to times of high export prices by dropping load, letting Hydro sell power and thus allowing a sharing of revenue between the utility and the -- the industrial customers that might enable that generation of additional revenue. Customers, that's the industrial customers, have waste streams or potential to develop renewable sources of energy, and they basically have no option to generate those and provide

power back to Manitoba Hydro.

With respect to the NFAT hearing, it has the potential of becoming overwhelming if it hasn't already, and Mani -- MIPUG suggests a primary focus in two (2) areas. This is taken from the PUB terms of reference.

But firstly, focus on ratepayers' rates and risks. The hearing ultimately ends with a report to the Minister who will make final decisions. If I'm not mistaken, the Minister has many other inputs being provided from other departments and consultation processes. For example, I expect that he's dealing with conservation, economic development, Aboriginal affairs.

We say that the unique wisdom which this Board brings is a good understanding of rates and ratepayers. We hope that this perspective is central to the Board's review and report.

Secondly, focus on the decisions that must be made now. Many of the issues that are going to be discussed are matters that cannot be reversed. Primarily, this includes whether to take up export agreements with Minnesota Power and others, which also requires whether to put a shovel in the ground on Keeyask, and whether to build a US line and, if so, at

250 megawatts or 750 megawatts. These are key decisions that we must address.

Many other issues are informative, but do not, in our respectful submission, require major decisions today. They require decisions that can be altered as time goes on, for example, matters such as what level of DSM to target, whether to be more aggressive and aggressively monitor and pursue more wind generation, or whether -- whether to continue to spend to protect the Conawapa option.

These last examples that I've given are no means an ex -- exhaustive illustration, but we say that those are not critical decisions that need to be made today, and we urge the Board to make sure it gets the large and irreversible questions clearly explored and decided correctly. Other topics can always be adjusted as time goes on.

Focus on rates is key. For industrial customers, the preferred plan shows higher rates for twenty (20) to thirty (30) years in exchange for potentially lower rates over the extremely long term.

This extra cost of investment adds up to a substantial amount. For industrial customers, the total additional amounts paid over the next twenty (20) years is estimated to be over $800 million. This extra

cost affects competitiveness, it represents funds that cannot be used to invest in people -- I mentioned the fifty-six hundred (5,600) jobs -- or facilities.

At its core, we submit that the case is relatively simple. MIPUG has framed this as two (2) major questions: Is Manitoba better off with a need-based approach, sticking to its knitting, avoiding debt and commitments as long as possible, letting the current uncertain market climate settle out before committing to future plans; or is Manitoba better off pursuing current opportunities?

If the focus is on pursuing opportunities as opposed to need, the question is asked. Which plan is the best? And as we've known, there have been developments even as recently as Friday, some major announcements on potential contracts, and so I hesitate to say that there's a clear answer to that question, because I don't know what else is going to be coming. But we don't see a really clear answer to that issue or question yet: Needs-based approach, opportunities-based approached.

With respect to the process itself, MIPUG has always expressed the desire to have the least amount of CSI being blacked out and let this process be as public as possible. I, as counsel, have also not

signed the undertaking as it was presently framed because of issues similar to what my colleague, Mr. Byron Williams, expressed more recently in his letter.

On another issue, all parties and -- I congratulate all parties for their extreme efforts, including in particular Manitoba Hydro, for the answering of IRs and dealing with evidence. A lot of them have been burning the midnight oil to provide good and complete information to this Board to assist it in making its report.

Mani -- MIPUG, I believe, has one (1) IR to respond to but is making the best efforts to answer them as -- as and when they had come in. We note that -- I don't believe we've received any responses to the IRs asked of the independent experts, and that some reports, such as the La Capra Report, is noted to be work in progress. Hopefully everything continues to unfold favourably so that this Board has complete information by the time this hearing concludes.

Another example has been brought up by other parties, Hydro has apparently provided some updated cases to some parties with respect to the DSM and imports, but we don't believe that those other cases or alternatives have been shared with us fully.

We do not expect to need major changes

and major updates to the prefiled testimony. But if the incoming information leads to a need to provide a small supplement, we will be providing that for the Board and all the parties. And as previously indicated, there may be some brief presentations forthcoming from the business community, such as the Chamber and some of the MIPUG members.

We thank the Board for listening to our opening remarks, and look forward to a productive exchange of information from all parties to assist the Board in drafting its report. I'd be pleased to answer any questions, if there were some.

MS. MARILYN KAPITANY: Messr. Hacault, you -- I think I heard you say that members have no opportunity to provide power back to Manitoba Hydro.

Could you just explain briefly what you would like to see in that area?

MR. ANTOINE HACAULT: That issue was briefly dealt with at the last GRA. There's some of the facilities in Manitoba that could generate power through their own facilities as a result of excess waste, like nitrogen, things like this. So in other jurisdictions the companies have the opportunity to generate those and offset some of the loads. There's programs related to that.

MS. MARILYN KAPITANY: Merci.

THE CHAIRPERSON: Merci, M. Hacault. I now call on the representatives from MKO. I believe it's Mr. Anderson and Mr. Orle.

OPENING COMMENTS BY MKO:

MR. GEORGE ORLE: Good morning, Mr. Chairman, members of the Board. My name is George Orle. I appear on behalf of Manitoba Keewatinowi Okimakanak. I'll refer to them as MKO henceforth.

MKO represents approximately sixty-five thousand (65,000) treaty First Nation citizens in Northern Manitoba. It's been in existence for over thirty-two (32) years, and is a nonprofit advocacy organization governed by the elected Chiefs of the thirty (30) sovereign First Nations in Northern Manitoba.

MKO was granted Intervenor status to deal with the following issues: the socioeconomic impacts and benefits of the Preferred Development Plan and alternatives in respect to the MKO First Nations; and also, the impact of domestic electricity rates over time with and without the Preferred Development Plan and with alternatives.

I wish to share with the -- the Board

the instructions provided to legal counsel and experts on behalf of MKO. In accordance with the MKO Constitution, and given the fact that it is an organization of sovereign First Nations, MKO has directed its legal counsel and its experts that the position to be taken by MKO at this hearing is not to compromise or contradict the position of the four (4) First Nations, being the York Factory First Nation, War Lake First Nation, Tataskweyak Cree Nation, and Fox Lake Cree Nations, the partners.

MKO will be dealing with the matters of rates and the impact on rates upon the members and the citizens in the MKO First Nations homes.

MKO was not allowed to intervene with respect to macro-environmental impact. MKO still believes that it has a unique perspective in that area and is disappointed that it will not be able to present evidence, or at least to be able to cross-examine on areas that deal with macroeconomics.

And that may be raised at a later time. I don't wish to make it as part of the initial presentation. But there will be a time when evidence will come forward and we will be asking the permission of the Board at that time that if it is appropriate, for MKO to be given an opportunity to cross-examine on

some of the experts' reports.

The citizens of the MKO First Nations are residential ratepayers and the First Nation governments are general service ratepayers. The three (3) diesel First Nations which pay electricity bills for the schools are also First Nation education rate customers.

All of the citizens of the MKO First Nations and the MKO First Nation government facilities receive electrical service solely from Manitoba Hydro. The MKO First Nations have an interest in determining the socioeconomic impacts and benefits of the plan and alternatives in respect to the MKO First Nations, including opportunities for training, employment, contracting, and procurement.

In terms of the potential impacts of the Preferred Development Plan on future Manitoba electricity rates and bills to be paid by ratepayers, MKO recognizes the advice given by the independent expert consultants retained by the Public Utilities Board, which have indicated that the plan is expected to result in annual electricity rate increases of about 4 percent, double the rate of inflation, for the next eighteen (18) years or more.

One (1) of the independent experts,

Morrison Park Advisors, stated:

> "For the Preferred Development Plan, maximum rate increases are applied until 2032, when they reach 100 percent above 2013 rates."

Of primary importance to MKO is the fact that these high rate increases will be disproportionally shared. And that is because most MKO citizens are regarded in the low-income category. This is a category which spends a higher percentage of income on electricity than higher-income citizens.

Experts' reports have indicated that raises in electrical rates to low-income ratepayers results in their not reducing their electricity, because electricity is a fundamental need. It results in them reducing food, education, and other necessities.

Income to pay for utility charge in many cases comes from the federal government. MKO has seen no evidence, nor has it been told, that there is any obligation on the part of the federal government to accept the increased rate changes and that if the budgets remain the same, the difference between the amounts payable by the First Nations at the present time and those that they will pay in the future may not

be able to be absorbed by the economies of these First Nations communities.

MKO will also examine the distribution of the overall financial benefits that are to be received in the future. First Nations historically have been caught in the middle of arguments between the province and the federal government as to who has responsibility to provide services. If the financial benefits in the future from the payment of these rates goes primarily to non-First Nations communities, then MKO feels there should be some adjustment as to what the increased rates should be and how they should be paid by First Nations.

Part of MKO's approach to the NFAT will be to explore measures to mitigate the effect of the expected rate increases on Northern First Nations, including establishing objectives for widespread inclusion of and delivery to all First Nations customers of programs such as the Home Insulation Program, Refrigeration Retirement Program, Water and Energy Saver Programs, First Nations Programs, and ongoing Residential Loan and Affordable Energy Programs.

MKO wishes to establish objectives for the widespread inclusion of and delivery of commercial

programs to all First Nation facility and commercial general service customers. We're intending to ask for the establishment, monitoring, and measurement of the effective capture of these programs of First Nation customers. And we would like to see a design and implement appropriate rate mitigation measures for local communities aversely affected by the plan.

MKO also hopes to explore establishing effective long-term relationships that are intended to maximize an effective sharing of development benefits in order to achieve a legacy of real, measurable improvements and pre-project baseline conditions, and more equitable post-project outcomes which are also a foundational principle of emerging international sustainability criteria, good practice and the best practice regarding Hydro power projects.

Members of the Board, thank you for allowing us the opening statement. Hopefully we'll be able to expand on the position of those statements throughout the course of the hearings. And, again, thank you for allowing us the Intervenor status.

(BRIEF PAUSE)

THE CHAIRPERSON: Thank you, Mr. Orle.

I'll now call on Ms. Saunders to represent the views of the Manitoba Metis Federation. Ms. Saunders...?

OPENING COMMENTS BY MMF:

MS. JESSICA SAUNDERS: Good morning, Chair, Board members on the panel and in attendance, parties, and members of the public. In attendance today I do believe will be the leader of the Manitoba Metis Federation, President David Chartrand. And I do see board member -- board of director and -- to the Manitoba Metis Federation's Minister of Hydro, Mr. Jack Park, as well as Mr. Al Benoit, Ms. Marci Riel, and Ms. Jasmine Langham of the MFF present. Mr. Corey Shefman of our firm is also in attendance today and will be assisting in some of the hearings next week.

The PUB has provided the Manitoba Metis Federation, to which I will at times refer to as MMF, the opportunity to speak to the impact on domestic rates; financial and economic risks; socioeconomic impacts and benefits of Manitoba Hydro's Preferred Development Plan and alternatives to Northern and Aboriginal communities; macro-environmental impacts of the plan compared to alternatives; and whether the plan has the highest level of overall socioeconomic benefit to Manitobans.

We are pleased to appear before you today to give you, the other parties, and the public an idea of the unique perspective from which we will provide our review of Manitoba Hydro's business case and whether or not its Preferred Plan offers the most benefit to Manitobans.

We would like to begin our comments today in explaining who the Manitoba Metis community is, who the MMF is, and what the MMF hopes to accomplish in its role as an Intervenor in assisting the PUB in its task of coming up with recommendations to the Government of Manitoba on Hydro's plan.

As set out in the Manitoba Metis Federation's constitution, the Metis Nation is one of the Aboriginal peoples of Canada referred to in Section 35 of the Constitution Act of 1982. The Manitoba Metis community refers to the collective of those individual citizens that comprise the Metis Nation within Manitoba, and the MMF has been created to be the democratic and self-governing representative body of the Manitoba Metis community.

For greater clarity regarding the composition of the Manitoba Metis community, there are a number of rural and urban brick-and-mortars commun -- brick-and-mortar communities throughout Manitoba, north

and south, within which Metis citizens reside and have settled.

The Manitoba Metis community in this regard transcends the common meaning of a mere location where people reside and refers to a distinct identity based on certain criteria.

The Metis -- the Manitoba Metis community is comprised of, among other things, socioeconomic, cultural, and kinship networks of interconnected parts. For instance, there are Metis settlements in and around Gillam, Thompson, and the Keeyask and Conawapa project areas, and those in around Lorette and Richer in the Manitoba-Minnesota transmission line area, and these sediment -- settlements, together with other settlements of such nature in Manitoba, comprise the Manitoba Metis community.

The MMF represents the Manitoba Metis community at the local, regional, and provincial levels through province-wide ballot box elections. While it is currently going through a reregistration process to identify Metis citizens, it is estimated that the MMF has an adult membership of fifty-two thousand (52,000). The president, a vice president, and two (2) board of directors for each MMF region comprise the MMF's board

of directors.

The Manitoba Metis Federation supports development in this province, so long as it's done in a way that promotes sustainability and economic prosperity for the Manitoba Metis community and for all Manitobans.

The history and early beginnings of trade and industrial development in Manitoba are interwoven with the history of the Manitoba Metis community as the founders of this province. The provisional government of 1869 led by Louis Riel negotiated Manitoba's confederation in 1980 (sic).

These founders of Manitoba and the forefathers and mothers of the Manitoba Metis community had a certain vision for the Metis and for all of Manitoba when this province was first founded.

The Metis of this territory, which started out as the Red River Settlement, governed this province long before there was a government of Manitoba, and utilized these waters of everyday life, business, and trade long before there was a Manitoba Hydro or a Winnipeg or Manitoba Gas Company.

I would like to briefly share a story with you. Not far from where we stand today, Cuthbert Grant, a notable Metis leader, constructed his mill on

Sturgeon Creek in 1829. He also led the Metis in the battle of Seven Oaks in 1816, and that was the first time that the -- the flag of the Metis Nation, the infinity flag, was flown, but that's another story.

Grant's Mill, though, was the first water mill to be built west of the Great Lakes. It was constructed so that he could provide for his people, the Metis, with ground wheat meal. He knew very little about milling, and it's said that he lost most of his personal fortune in this venture.

I would be remiss if, on behalf of my client, I didn't mention the work of St. James-Assiniboia Pioneer Association that ensured that reconstruction of his mill on Portage Avenue at Sturgeon Creek.

On its website, the Grant's Old Mill Museum notes this of the mill:

> "It marks not only the initiative of pi -- of a pioneer leader, but might well be distinguished as the beginning of industrial enterprise in the Red River Settlement."

This history shows the deep roots of the Metis that this province have, not only tied to the land and waters the Metis exercise their rights as

Aboriginal peoples within, but also as the first entrepreneurs and pioneers in the building of industrial enterprise in Manitoba.

To further demonstrate the importance of this review to my client, the Keeyask and Conawapa generation stations are being developed in the Manitoba Metis Federation's Thompson region. The process of assessment of potential impacts to the Metis began in 2013 and is still underway.

The Bipole III transmission line, while not a project component in and of itself under review in the NFAT, it will export power generated from Keeyask and Conawapa to the USA, and it runs right through the Metis breadbasket. It will greatly impact Metis rights, culture, economy, and way of life.

The Manitoba-Minnesota transmission line, the power to be generated through this line no matter what route is chosen, runs right through the Metis territory, or as it was referred to in the MMF land claim, the old postage stamp province.

For my clients, much is at stake in Manitoba Hydro's planning for these new developments in considering the socioeconomic and macro-environmental effects of these developments to the Manitoba Metis community, and to them as ratepayers in considering the

financial and economic risks of the plan.

The MMF has provided evidence with the assistant of -- with the assistance of Management and Solutions in Environmental Science, MSES, and Camerado Energy Consulting in socioeconomic and macro-environmental matters. The report of Camerado Energy Consulting on macro-environmental matters provides a comprehensive evaluation of the macro-environmental impacts of the plan.

The report of Camerado Energy -- Energy -- pardon me, Camerado Energy Consulting, as I said, provides this comprehensive evaluation of the macro-environmental and socioeconomic implications of additional wind resources in Manitoba.

The evidence of Whitfield Russell Associates examines Manitoba Hydro's plan, and completes a thorough analysis of the financial and economic risks of the plan when compared to alternatives. This analysis involves consideration of Keeyask and Conawapa, and to a certain extent, Bipole 3 as it relates to the inextricable link in terms of system engineering, impacts, and ratepayer -- impacts on ratepayers, and financial risk.

Manitoba Hydro has brought a motion to stroke -- strike portions of this evidence as it

relates to matters that are out of scope of the NFAT. The MMF responded in arguing that it does relate to in-scope matters, and should be heard. Hydro has provided its rebuttal evidence on this, and the parties are awaiting a decision as to whether or not the motion from Hydro will be allowed or dismissed.

As my colleague Mr. Williams noted, we're also pleased to be presenting a ratepayer impacts panel with the Consumers' Association of Canada, Manitoba Chapter.

So in closing, I would like to go back briefly to the story that I shared with you. Cuthbert Grant, as a Metis leader and entrepreneur, put all of his fortune into building this mill so that he could provide for his people, and we are reminded of his contributions every time we drive by that mill on Portage Avenue. Today, he is celebrated by the Manitoba Metis community and members of this province for those contributions.

What we have in front of us in this review is a plan and a number of alternatives put forth but (sic) what my client has called the Crown corporation that Manitobans own.

We are talking about billions of dollars, our economy, and the legacy we will be leaving

behind for future generations. The Manitoba Metis Federation would respectfully ask that this panel, the parties, and the public keep in mind this question in the NFAT. When we look to the impacts of these plans being proposed, what will be the legacy of Manitoba Hydro and this government ten (10) years from now, thirty (30) years from now, seventy (70) years from now?

In general terms, to some, seventy (70) years may seem like a long time. But to the Metis, whose history and legacy predates the very first gas or electric lighting in this province, seventy (70) years is not a long time. The Manitoba Metis Federation believes that we all must be accountable to our future generations, starting with our participation in this review of Manitoba Hydro's plan, and examining whether or not it will bring the economic prosperity for Manitobans that Manitoba Hydro says it will now and into the future. Thank you very much.

THE CHAIRPERSON: Thank you, Ms. Saunders. I now call on M. Christian Monnin on behalf of the independent expert consultants.

OPENING COMMENTS BY MR. CHRISTIAN MONNIN:

MR. CHRISTIAN MONNIN: Merci, M.

President, members of the panel. I'm -- to my immediate right is Mr. Michael Weinstein, and we're pleased to be here this morning on behalf of the independent experts and consultants. On a going-forward basis I'll be using the vernacular of these proceedings and referring to them as IECs.

For the purposes of our opening statements, we will be addressing four (4) points this morning, and I assure you it will not be long. A brief introduction to the IECs: We touch upon the reports and their status. Also touch upon how we intend to proceed with their evidence in -- as Mr. Peters said earlier, in approximately three (3) weeks in April, and some concluding remarks regarding process.

As -- as most here know, the IECs, as per the terms of reference -- reference, have been requested to address certain questions and issues set out in the terms of reference under five (5) general headings. In addition to that, the terms of reference indicate that additional questions and issues are to be addressed at -- which flow from the terms of reference, and those are enshrined in the scope of work.

I'm sure most of you -- I surmise most of you are avail -- are familiar with what's contained in the scope of work, so I won't go through that

deliberately this morning. I expect that will be well-tilled soil by the time we're done these hearings.

Who are the IECs? For those of you who want to bone up on that, they can go see report number -- Order number 127-13 at pages 9 of 19. At a very high level, we have Knight Piesold, who will be dealing with construction, management, and capital cost matters; Power Engineers dealing with transmission matters; Elenchus Research Associates Inc., dealing with load forecasting and demand-side management, and energy efficiency matters.

We also have Potomac Economics, dealing with Midcontinent Independent System Operator market; again, for those familiar with the vernacular, MISO. MMP will deal -- will be dealing with macro-environmental matters. Typlan Consulting LTD., socioeconomic matters; Morrison Park Advisors, dealing with financial analysis and public sector finance matters; La Capra Associates, dealing with power resource planning and economic evaluations, together with business case and risk assessment. A subcomponent of La Capra is EnerNex as a subcontract dealing with wind matters.

With respect to the filing of the reports, we've heard about CSI redactions being done.

In substantial conformity with the NFAT revised pre-hearing schedule dated January 10th, 2014, all the IECs, say for La Capra and Morrison Park, filed these reports. These reports have been reviewed for CSI content, and public reports have been filed with the website, and CSI reports obviously have not been.

Also in substantial accordance with the revised pre-hearing schedule, La Capra and Morrison Park advisors filed their reports in or around January 24th, 2014. As noted by M. Hacault earlier, La Capra's first report on January 24th, 2014, was an initial report, and this is largely due to the timing of receipt of certain data regarding, among other things, alternative development cases. On account of this fact, La Capra finalized its supplemental report on February 28th, 2014, and this report is presently going through the CSI redaction -- or CSI review.

There's also a supplemental report by the IEC Knight Piesold. They were requested to review additional information in relation to its initial report, and that additional information pertains to Manitoba Hydro's intention toward the Keeyask general and civil contact in early 2014. That supplemental report was filed on February 18th, 2014, and is also going through the CSI content process. It's our

understanding that this is still in process, and the same pertains to the IRs, the Information Responses of the IECs with respect to CSI content.

It's my understanding that there is possible adjustments being done to the report, CSI redactions, and also the IRs, and these are to be respectively completed by March 7th and March 14th.

I would like to just briefly touch upon the intended procedure with re -- how we will be providing evidence with the IECs come April. I -- I don't think I would be accused of overreaching when I say that we are dealing with an ambitious and aggressive timeline in these proceedings. Without any further de -- digression on that point, for the purposes of the direct evidence, it is our intention that each IE team -- IEC team will have one (1) individual that will, in the interest of efficiency, will be providing the direct evidence. However, some IECs may rely on a panel of individuals from their respective teams in order to address the cross-examination.

We are presently not in the position to advise of the makeup of these IEC witnesses and panels, but we expect to be able to -- to do so by the end of this week.

I want to briefly touch upon -- include -- concluding remarks, brief -- briefly touch upon a procedural issue, and that pertains to the PUB's decision regarding IECs counsel's right to limited cross-examination. We acknowledge the uniqueness of this right is mirrored by the uniqueness of this hearing. I cannot stress enough our recognition that this is a limited right, and our obligations -- our obligation -- these are obligations that we do not take lightly, and hope that they will be used sparingly.

And subject to any questions or comments, those are my opening statements, and thank you very much.

(BRIEF PAUSE)

THE CHAIRPERSON: Merci, M. Monnin. And I call on Ms. Ramage. Good morning, Ms. Ramage.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Yes, good morning, Mr. Chair. Before Manitoba Hydro begins, and given the hour right now at 10:30, I'm wondering if it might be a -- a time to have a break so I can speak to Mr. Thomson

about what we've heard this morning, and -- and then Manitoba Hydro will provide its opening comments through myself and Mr. Thomson.

THE CHAIRPERSON: Okay. Let's do that. Let's take fifteen (15) minutes. Is that an adequate time to -- yes? Okay. Thank you.

--- Upon recessing at 10:33 a.m.

--- Upon resuming at 10:52 a.m.

THE CHAIRPERSON: I believe everybody is in position. Good morning, Ms. Ramage and Mr. Thomson.

OPENING COMMENTS BY MANITOBA HYDRO:

MS. PATTI RAMAGE: Thank you, and good morning, Mr. Chair, Board members Kapitany, Soldier, Bel, and Grant. For the record, my name is Patti Ramage and I am counsel for Manitoba Hydro in this NFAT. Seated directly behind me is Marla Boyd, who is co-counsel in the NFAT.

As you may have surmised through the exchange of correspondence over the last number of weeks, a number of Manitoba Hydro's legal counsel will be assisting us through the course of the NFAT. So

just as the witness panel changed to provide you with Manitoba Hydro's subject matter experts on various topics, so too will legal counsel taking up this chair.

This hearing is the culmination of more than a decade of work for many of Manitoba Hydro's employees that you're going to be hearing from in the coming weeks. Given the importance of the Preferred Development Plan to both our ratepayers and the Province of Manitoba, it seems only fitting that opening remarks in this hearing be delivered by our leader, our president and chief executive officer, Mr. Scott Thomson, who is seated immediately to my left.

In our back row this morning we have Mr. Ed Wojczynski and Ms. Joanne Flynn, who are the NFAT project leads. Mr. Wojczynski is the division manager of Portfolio Projects, and Ms. Flynn is the division manager of Power Planning. Both will be testifying as the hearing proceeds. Seated next to Ms. Flynn is Mr. Bruce Barrett. He is our new vice president of Major Capital Projects, having recently joined Manitoba Hydro from BC Hydro.

Having heard the opening comments of both Board counsel and My Learned Friends to the left, I can't quite bring myself to turn the microphone over to Mr. Thomson without providing a brief comment

myself.

You have already received massive quantities of information regarding the Need For and Alternatives To the Preferred Development Plan, both from Manitoba Hydro, our perspective, as well as from the Intervenors and the IECs. And I fully expect much more is coming.

One of Manitoba Hydro's primary objectives during this hearing is to assist you in sorting through this material and identifying the relevant and accurate information that is needed in order to make your recommendation on the -- the decisions that must be made by government this coming June.

Over the course of the next eight (8) or nine (9) weeks, as you listen to the evidence, remember there are key decisions that government must make this June. Mr. Wojczynski is going to outline them in his presentation later this afternoon. But in a nutshell they are: Do we continue to capitalize on our water-rich resources and commit to the construction of the Keeyask generating station?

And do we commit to construction of a new interconnection with exp -- with our export customers to the south and the export contracts that

facilitate that interconnection? And if so, will that be a 250 megawatt transmission line or a 750 megawatt transmission line?

When you are listening to the evidence ask yourself: Will this information help me make the recommendation on those key decisions? If so, I'd suggest we classify that information as stage 1 information. It's relevant to the decisions that need to be made immediately.

For example, if the evidence deals with whether we should make the decision to abandon the Keeyask hydro pathway in favour of gas, I'd suggest that be stage 1 information and kept it top of mind.

If, however, the information deals with decisions that must be made at a future date -- for example, supplementing Manitoba Hydro's resource mix with a potentially promising but still emerging technology -- I'd suggest that be classified as stage 2 information. That information will aid in identifying which pathways you want to keep open, but it is not necessary for today's decision making.

There is so much information on the record of this pre -- proceeding, it's very easy to get bogged down in the details. Classifying information as stage 1 or stage 2 is a good decision-making tool. It

will help identify and separate primary considerations from secondary considerations.

The amount of information out there is virtually without end, and we could go in circles forever. But we have critical decisions that need to be made today, and there are risks with all decisions. Please, do not allow yourselves to be drawn into focussing solely on the negative. The system we enjoy today is because of decision makers who took a balanced approach. They weighed downside risk against upside potential. And that is the kind of thinking that Manitobans need today.

Manitoba Hydro sees this as an important step in what has already been a deci -- a decade-long decision-making process. It has no doubt been a long haul, but we are anxious to get underway and satisfied that, at the end of this process, you will agree that -- that the pathway Manitoba Hydro proposes to embark on is in the best interests of Manitobans.

Now, before I turn the microphone over to Mr. Thomson and -- or -- and have him sworn, there was a few housekeeping matters that I thought should be attended to arising out of comments this morning.

The first deals with -- MIPUG made a comment regarding cases shared with some parties and

others. Manitoba Hydro is not entirely sure what is being referenced, but we thought it important to point out that if it is the DSM case that is referenced in the rebuttal, that information is forthcoming, but it has not been provided to any party as of yet. And Mr. Wojczynski's going to expand upon that this afternoon.

If it is the La Capra no-new-generation case that we saw in La Capra's evidence filed on Friday, in that case, La Capra selected the load, had Manitoba Hydro run SPLASH models, but they developed the case. It's not Manitoba Hydro's case. And it's our understanding that case is fully contained in the La Capra materials. So hopefully that clarifies that for parties.

The second matter which I've briefly discussed with Mr. Monnin at the break, he referenced a -- a Knight Piesold report dated February 18th that is waiting on Manitoba Hydro. We've looked at our records. We have not received that report as yet. Mr. Monnin is going to ensure that we get that report, so that should be -- we will then review it, and hopefully that can be distributed to the parties forthwith after that.

So that concludes my introductions. I think it might be appropriate now to have Mr. Thomson

sworn in, and then he can deliver opening comments on behalf of the Corporation.

MANITOBA HYDRO PANEL 1:

SCOTT THOMSON, Sworn

EXAMINATION-IN-CHIEF BY MS. PATTI RAMAGE:

MR. SCOTT THOMSON: Good morning, Mr. Chair, panel members, ladies and gentlemen. My name's Scott Thomson, and I'm very pleased to be here with you today, given the importance of this proceeding for Manitoba Hydro, its customers, and the people of Manitoba.

This hearing's a culmination of an extraordinary effort by many people over many years. Getting to where we are today is a significant accomplishment that we at Manitoba Hydro can be quite proud of.

But in the broader context, this proceeding is only one (1) more step amongst many towards a longer-term objective of ensuring that Manitobans continue to have access to safe, reliable, and cost-effective electricity for generations to come.

Today, Manitobans enjoy electricity rates that are among the lowest in North America. This

is not an accident. The benefits that we enjoy today are a direct result of forward-thinking planning decisions made decades ago.

Investment decisions were made with a view not just with an eye to short-term objectives, but also to how future generations would be affected. My view, and Manitoba Hydro's view, is that we should continue to make our resource planning decisions with careful regard to how they will affect our children and our grandchildren in the decades to come.

One (1) thing that's certain as we sit here today is that under whatever reasonable scenario that can be constructed, Manitoba needs new resources in the not-too-distant future. Our population is growing. The economy is growing. Households are using more electricity than they used to. Our analysis shows that even without any new exports, Manitoba will require new electricity resources to meet domestic load by about 2023.

Different scenarios regarding, for instance, population growth, economic growth, and demand-side management activity only affect the timing of when new resources become critical. Given the long lead times required to develop new supply resources, we're at a decision point on what paths to take in

meeting our growing domestic load.

We've carefully examined a number of options. I'm convinced, and we hope to persuade you of this as well, that the plan that Manitoba Hydro has identified as its Preferred Plan is the right path forward.

And I do want to underscore that the Preferred Development Plan is not without flexibility. While construction on the Keeyask generating station and other aspects of the Preferred Plan must begin shortly, Manitoba Hydro will always maintain the flexibility to respond to future circumstances when it comes to future resources identified as part of the path. Conawapa, for instance, will only get built if the business case remains sound.

Having made those introductory remarks, my intention today is to address a few of the themes that run through Manitoba Hydro's business case and have been emerging as the proceeding has unfolded. My hope is to frame these issues for the panel and explain at a high level Manitoba Hydro's perspective of them.

As you know, Manitoba Hydro is putting forward a number of witness panels that can speak better than I can to the more detailed elements of the analysis. I'll touch on the following matters: the

first are mandate, why the Preferred Development Plan is the appropriate path forward, managing uncertainty when developing a long-term plan, gated decision points, Manitoba Hydro's views on natural gas generation as a supply option, ratepayer impacts, and the role of exports.

The mandate of Manitoba Hydro, a Crown corporation of the Province of Manitoba, is set out in the Manitoba Hydro Act. There are three (3) components of our mandate that should be stressed. First, our mandate includes providing for the continuance of a supply of power adequate for the needs of the province. Second, the Act references engaging in and promoting economy and efficiency in the development, generation, transmission, distribution, and supply of end-use power. Third, it also references marketing power to persons outside the province on terms and conditions acceptable to the Board.

Now, as I've already mentioned, the fundamental driver of the NFAT analysis is the increasing electricity demand in Manitoba. We can, and likely will, debate the pace of this growth and debate different ways to slow it through energy conservation or demand-side management initiatives.

However, what is crystal clear in my

view is that: A) the Manitob -- that Manitoba Hydro has an obligation to meet the province's future demand for electricity, and B) new supply will be required sooner rather than later to meet that obligation.

As I noted a minute ago, our statutory mandate contemplates exports on appropriate terms. As I'll discuss later, exports have been a major reason why Manitoba Hydro's rates remain so low relative to many other jurisdictions. Revenues from exports help to offset costs for domestic customers.

While our need is associated with domestic load, it is appropriate and important, in my view, to look at the potential for export revenues to be enhanced. These opportunities exist right now and they're real. Manitoba Hydro already has in place significant commitments from the US utilities to -- to purchase new power supplies. And of course, all of our resource planning is done with an eye to the pri -- the principles of sustainable development.

In leading up to this proceeding, Manitoba Hydro investigated a wide range of potential options to meet our growing domestic demand, including demand-side management, or DSM, imports, wind, solar, biomass, and natural gas, as well as hydro, and many others. We believe that among the variety of

alternatives considered we've arrived at the best path forward to achieve our mandate.

Our plan is about meeting the electricity needs of Manitobans in a way that maximizes benefits to Manitoba over the long term, effectively manages the risks and supports long-term sustainable development. It's also about taking timely action that respects the lengthy time frames for planning, regulatory approval, and construction that are today's reality for developing reliable electricity supply infrastructure.

Our analysis shows that even without any new exports, Manitoba will require new electricity resources to meet domestic load, as I said, by about 2023. As such, the Preferred Plan includes the construction of the Keeyask generation station to be in service in 2019, the construction of the Conawapa generating station with an earliest in-service date of 2026, the construction of a 500 kilovolt, 750 megawatt transfer capacity interconnection with the United States at an earliest in-service date of 2020, and new export sales commitments with Northern -- Northern States Power, Minnesota Power, and Wisconsin Public Service.

Our Preferred Plan also includes DSM.

As you well know, unlike a generating station, the size of DSM is not fixed. It is continually under review by Manitoba Hydro and will be expanded as it is determined to be economic. We believe our Preferred Development Plan is the best long-term solution for Manitoba customers and Manitobans when compared to other options and alternatives, for a number of reasons.

It provides the lowest electricity rates for Manitobans over the long term. It provides the highest level of system reliability and energy security to Manitobans. It supports Manitoba Hydro's long-term financial health with higher levels of tangible fixed assets and equity. It has the lowest levels of regional greenhouse gas emissions. It provides the most jobs and greatest socioeconomic benefits. It provides training, employment, business, and income opportunities for Aboriginal communities in the vicinity of the new generating stations. It provides the highest level of financial transfers to the provincial government, which benefits all Manitobans, and it has the most flexibility to deal with future uncertainties and take advantage of additional export opportunities.

This last point relating to flexibility to deal with future uncertainty is important. It's my

second theme, and I propose to turn to it now. Dealing with uncertainty. As noted earlier, we're planning for the long term. By definition, a long-term plan is driven by and informed by the assumptions we make about the future. These include energy prices, interest rates, and capital cost estimates and variables, such as load growth, future energy conservation, severe drought, and possible increases or decreases in river flows due to climate change.

No one, not Manitoba Hydro and not one (1) of the many experts who will be participating in this review process, has perfect knowledge about the future. This means we -- we all must use the best information available to us and rely on assumptions and planning for an uncertain future.

It's not a simple undertaking. The world is dynamic place and change is ongoing. The thing is, we do not have the luxury of engaging in perpetual analysis, as Ms. Ramage said. It takes years to plan and build a hydro generating station.

Similarly, it takes years to get permits, obtain and prepare a site, and build a gas-fired generating station. These long lead times require us to initiate these steps long before there's an actual need for the energy. If we wait too long, we

will have failed in our mandated Hydro.

At some point, we must put a stake in the ground and move forward to be in a position to meet our obligation to Manitobans. It's time to put that stake in the ground. While this may seem daunting, the panel should be able to proceed with confidence. It will have the benefit of a very significant amount of very good information on which to base its assessment and recommendations, and it can be confident that Hydro proceeded through a logical step-by-step analysis in reaching its conclusions.

For starters, Manitoba Hydro has presented a wide range of energy options, including natural gas, DSM, wind, and hydro. We've performed extensive multistage resource planning analysis to come up with viable plans. Part of that analysis involved engaging with neighbouring utilities so that opportunities to work together for mutual benefit are included.

Second, we performed extensive modelling of all viable plans using a wide range of inputs and what I understand to be cutting-edge, probabilistic methods and scenario analysis to come up with a Preferred Plan. In addition to our -- to our internal staff expertise, we engaged external expert consultants

to assist in this modelling and analysis.

This work has enabled Hydro to respond to changing conditions and develop plan sensitivities to gain understanding of how shifts in underlying assumptions might impact or alter our Preferred Plan over time.

Third, on Keeyask, which is the first major component of the Preferred Development Plan, Hydro has undertaken the necessary steps to bring us to the point where we can begin construction with confidence. There have been extensive community consultations. We've submitted mutually beneficial partners -- partnerships with our First Nations partners. We've conducted environmental studies. The CEC hearings are now complete, and we look forward to their report in April.

We've conducted significant field investigations, engineering analysis, and construction preparations. We've recently selected a -- a very experienced and capable contractor for the general civil contract. We're intending to award the contract next week with construction being conditional on the -- upon final project approvals.

We're completing the process of incorporating the successful build into our overall

project cost estimate, including assessing the adequacy of project contingencies and management reserves. The estimate will be reviewed for approval this week, and preliminary results shared with you next week.

What I can say to you today is that the general civil contract price is higher than what we had estimated, but based on what we know, we don't see the updated estimate changing our conclusion that Keeyask is beneficial and justified by the variety of significant benefits it brings to the table.

With the award of the general civil contract, over 80 percent of the value of construction contracts will be committed. We'll have the benefit of greater confidence around the Keeyask -- we have the benefit of the greater -- greater confidence around the Keeyask cost estimate, one of the larger var -- variables in the plan analysis.

Finally, Manitoba Hydro has developed a comprehensive Risk Management Plan for the Preferred Plan, including detailed contract provisions and project management requirements. Here I would point to lessons learned from Wuskwatim and revisions to our capital planning processes.

All of these steps were important for improving our confidence in the appropriate path

forward. We can also address the uncertainty by remaining flexible in how we respond to changing circumstances. Hence, the Preferred Plan is not a fixed plan. It's a pathway which sets us in the direction of more hydro and an inner -- and interconnection capacity, but it will be adapted as necessary as we go along.

To allow for this adaptation, we've built in a number of gated decision points into the Preferred Plan. The use of gated decision points is my next topic. We need to make a decision this year, as Ms. Ramage said, about whether we're moving forward with Keeyask or not, and we need to decide about building the 750 megawatt interconnection.

Prospectively, there is what we refer to as a gated decision point for proceeding with Conawapa. The decision of whether or not to proceed with Conawapa will be dependent on a number of factors, some of which are controllable by us, some of which we can influence, and some beyond our control.

We can and, based on our assumptions, should continue to proceed on the path of planning for Conawapa, but we do not need to commit to its construction until early 2018 if we want it in service by 2026. In the interim, we'll continue to monitor and

review key variables, including load growth, DSM plans, new export contracts, which we continue to pursue with -- with partner utilities in the US, capital cost estimates for Conawapa and natural gas plants, natural gas price forecasts, energy price forecasts, and others.

If, for example, load doesn't materialize and alternative sources of supply, including DSM, become more cost effective, our plan has the built-in flexibility to delay Conawapa, or shelve it indefinitely.

I mention DSM because as -- as you'll hear in more detail later today, we're looking at significantly increasing our level of DSM programming as part of our ongoing resource planning process. The preliminary results indicate that an increased level of DSM, even if the initiatives are very successful, does not alter the conclusion that Keeyask and the new 750 megawatt interconnection are justified, but it'll be important to continue to monitor and evaluate how additional DSM could affect other elements of our plan, including Conawapa.

At this point, I want to shift gears and address head-on the subject of natural gas generation. During the course of this process, you'll unnec --

undoubtedly hear the suggestion that we should be developing natural gas generation rather than hydro.

First of all, I can assure the panel that Manitoba Hydro has considered all possible sources of new supply that could meet the province's future needs, including natural gas. We've -- we already have gas generation in our resource mix. It was only twelve (12) years ago that Hydro constructed a 280 megawatt gas generation facility at Brandon.

In our NFAT analysis, an all-gas option was the base case which we compared all of the other plans to. As you may or may not know, half of my professional life prior to joining Manitoba Hydro included working for a large natural gas utility. So I'll be the first person to say that natural gas-fired generation has favourable attributes, and in some circumstances it could be the best option, but I have no hesitation saying to you today that the all-gas solution isn't the best option before us.

Our evaluations comparing new hydro with natural gas generation options, including assessment of natural gas supply and demand, and its competitive environmental dimensions utilizing industry best practices, based on current inter -- industry consensus forecast gas prices, we concluded that gas generation

options would result in the highest net cost and the highest long-term electricity rates for Manitobans.

At the same time, gas-fired generation produces significant greenhouse gas emissions and provides fewer social benefits when compared to hydro-based solutions. But having said that, consistent with the gated decision points built into our Preferred Plan, we will continue to assess natural gas along with other options as the future unfolds.

Turning to rates, I mentioned at the outset of my opening statement that Manitobans are fortunate to enjoy electricity rates that are amongst the lowest in North America. No one wants to see their electricity bills rise, and we would prefer to avoid that, too.

We will continue to do what we can to control costs in our operations, but we're at a point where we need to make significant investments to maintain and review our existing generation, transmission, and distribution systems, maintain our corporate financial health, and of course develop new sources of supply.

All of the options before us today will lead to increased rates. Over the long term, however, the expected rate impact of our preferred development

plan is lower than the alternatives.

I'll turn for a moment to the topic of the role of exports and assessing potential paths forward. One of the reasons that we have low rates in Manitoba is our electricity exports. We have several significant export arrangements in place that allow us to maximize the benefit from existing -- our existing resources. Revenues from export sales offset revenue requirements that would -- would otherwise have to be recovered from our domestic customers.

As I've mentioned, domestic load growth is driving our decision to build new generation, but there currently exists a window of opportunity where we can take advantage of new generation to increase export revenue and mitigate the risk of investing in new supply.

We continue to see a demand for clean, reliable hydroelectricity in the US, and in particularly the Midwest market we serve, where utilities are looking to diversify their supply portfolios by replacing aging coal-fired sources, limiting their exposure to the price volatility of the natural gas markets, and in some instances, securing environmental attributes of renewable hydro power.

Manitoba Hydro now has in place new

long-term export agreements that, along with domestic demand growth, have essentially sold out all of the surplus associated with Keeyask. In all cases, these agreements reflect prices substantially more attractive than those in our existing firm export contracts.

As new hydro generating stations come online, we will sell the surplus energy available to help pay for those stations. Large committed sales contracts include Minnesota Power for 250 megawatts between the years of 2020 and 2035; Northern State Powers (sic) for 125 megawatts between '21 and '25; Wisconsin Public Service, 108 megawatts recently announced on Friday, between 2016 and '21; a previously announced deal of 100 megawatts commencing in 2021 and growing to 308 megawatts in the period 2027 to 2036.

The Minnesota Power NSP sale and the 100 megawatt Wisconsin sale that was announced in -- in 2011 do require the development of Keeyask. A decision to delay or not to proceed with the construction of Keeyask would mean foregoing the revenue that would flow from these contracts for decades. These utilities would build or procure alternative resources, essentially taking Manitoba Hydro out of play in the foreseeable future.

There is significant potential for

export of hydro generation beyond the output of Keeyask. In addition to signed contracts, we've entered into signed memorandums of understanding to enter power sales discussions. On the table for discussion with export customers are up to 600 megawatts with Great River Energy and up to 500 megawatts with SaskPower, and we're pursuing discussions with another of addi -- a number of additional US utilities as well.

Of course, MOUs are not signed contracts, and I fully expect to be challenged on our outlook regarding the rate of electricity demand growth in our targeted US markets. I also expect you'll hear differing views about the opportunities for Manitoba Hydro, given competition from natural-gas-fired generation, the uncertainty about the retirement of coal-fuelled generation, and the market impacts of carbon restrictions or taxes in these markets.

There will always be debate around such outlooks. We are comfortable that our outlooks are reasonable. We also view the MOUs as an indication of strong commercial interest, and an important step on the road to future sales contracts. Virtually every one of our existing firm export contracts was preceded by an MOU. As well, our 500 megawatt contract with

Xcel is up for renewal and repricing in 2025. This would have to be supplied from Conawapa. There won't be capacity to renew that without it.

So where does leave us with our Preferred Development Plan? Keeyask is sold out, as I've said, and the benefits of the new US interconnection can be realized with this project. Prospects for Conawapa are very promising. Assuming Conawapa proceeds, the recently announced 308 megawatt WPS sale would utilize about 30 percent of its dependable energy output. Even partial successes under the 600 megawatt MOU with GRE, and the 500 megawatt MOU with -- with SaskPower, could fully subscribe the balance of the firm energy available from Conawapa until we grow into the demand.

The sale to Minnesota Power has triggered a new transmission line from Winnipeg to Duluth, Minnesota that will be required by around 2020. Minnesota Power is championing the development of this line in the US. Those of you who follow the challenges of developing new transmission lines in North America will understand the significant opportunity that -- that presents itself today. This new line will provide enhanced access to markets for our surplus energy for its -- over its entire life, not just for the term of

the initial sales contracts. It will also strengthen reliability supply in Manitoba by doubling our ability to import electricity in times of drought or other emergencies.

If we were to pursue a gas path as the next step in our supply portfolio, we will lose export sales and a customer who is championing the development of the US interconnection. When and if Hydro power expansion was reinitiated, we would be back to the drawing boards for increased transmission to help enable future surplus power sales and imports for reliability. The new Min -- the new Minnesota tie-line is a time limited opportunity.

Having addressed my list of topics, I'll return to my initial observation about how far we've come. Our plan is the result of many years of Manitoba Hydro experience and studies, and is fully supported by Manitoba Hydro staff, management, and as recently as their meeting last week, by our board of directors. Many of our staff have essentially been working seven (7) days a week for months now, just as I'm sure the same could be said for other participants and independent consultants.

I'm proud of our team and the professional product that we've brought forward. It's

not always easy for people to listen to lengthy public critiques of their work, especially for those individuals who have poured the better part of the last year of their lives into first the preparation of the filing, and subsequently responding to many hundreds of interrogatories, often at great personal sacrifice. However, at every opportunity I've tried to make it very clear that Manitoba Hydro welcomes the public scrutiny, financial, environmental, and otherwise, that this process provides of our plans.

As we move forward with this review I would encourage all of us to do our best to make this process as much as possible about constructive dialogue. Many of the points we may hear during this review have been heard before, during the '60s, '70s, and even the 1980s, we move -- as we moved forward with earlier Hydro power developments. Many of those developments were not without controversy in their day, and certainly not without their issues. I'd be the first to say that our view of how such developments should be undertaken, particularly with regard to the environment and affected communities, has changed for the better since then.

However, one (1) thing hasn't changed from decades past, and that's our need to consider the

long-term interests of Manitobans. The projects of past decades were the produce of good foresight. They've stood the test of time and have provided our province with reliable, inexpensive energy that has made us the envy of our neighbours. They've powered our homes, businesses, and industries for nearly forty (40) years. I'm confident that Manitoba Hydro's Preferred Development Plan offers the best opportunity to build on that legacy by providing reliable, cost effective, and renewable energy for this and future generations of Manitobans.

Recognizing that this panel has a significant time commitment, I'll conclude my ope -- or challenge -- I'll conclude my opening remarks at this time. And I think I'm about five (5) minutes ahead of schedule so hopefully we can keep that going.

(BRIEF PAUSE)

MR. RICHARD BEL: Scott, what proportion of the total cost of Conawapa and Keesak (sic) is covered by those new export contracts depending on their being built?

MR. SCOTT THOMSON: In total, the committed sales contracts that we've got are a little

over $9 billion. And those are over, you know, a time-frame spanning out to -- to 2035.

I think the thing that's important to recognize is that the -- the plants themselves have lives of seventy-five (75) to a hundred (100) years, so we would never anticipate that -- that the sales that we make in the first ten (10) years would pay for the plants in total. And ultimately, we're not building them to supply the US market need; we're building to -- to supply Manitoba demand. But as you bring capacity in, in chunks, you need to have a -- a way to lay off the surplus in the early years.

So the -- the fact that -- that of the two (2) projects of just over $16 billion combined -- the fact that we do have a revenue stream on the order of $9 billion in -- between now and -- and 2035 provides a significant contribution towards that.

MR. RICHARD BEL: Thank you.

THE CHAIRPERSON: Mr. Thomson, you said there's a -- there's a window of opportunity for the tie-line to the US. Could you explain that one?

MR. SCOTT THOMSON: Yes. Minnesota Power has -- has agreed to champion the development of the line. The -- the contract that we've entered into with them for 250 megawatts of capacity could be satisfied with a 230 kV line. And they -- they were committed to -- to building a 230 kV line to -- to be able to take the power under their agreement. They've agreed to pursue a larger line, which would allow us opportunities to make the sales to Wisconsin and -- and other -- other deals that we will firm up over time.

If -- if Keeyask were not to proceed, there would be no reason for them to -- or if we -- if we don't get regulatory approvals to -- to do that, then they wouldn't be building the -- the tie-line 'cause we wouldn't be able to supply them under the contract. So if -- if the -- they have a need early -- in the early '20s and the -- and the transmission line is targeted to go into service in 2020, if -- if that contract falls away, they -- they won't build the line, and then we -- we'll be left short.

THE CHAIRPERSON: I'll turn the microphone over to you, Mr. Peters.

MR. BOB PETERS: Thank you, Mr. Chairman. I recognize the timetable had -- had these comments going to 11:30. And it appeared there might have been a lunch break, and I'm not sure if that has prompted attention from the media who wants access to any of the parties. But I'm prepared to continue at least till noon, if that's satisfactory, and then I can re-calibrate.

I can tell the panel that, based on my informal discussions with colleagues opposite, in addition to my questions, there will probably be another hour and a half worth of questions for Mr. Thomson as long as he's prepared to be with us this afternoon.

And I believe Mr. Wojczynski is looking to keep the last hour of the day for himself in terms of his presentation. So with that in mind, and backing up, we need to hear from Mr. Wojczynski starting at 3:30, and then we should be finished with Mr. Thomson by then.

So I'm prepared to continue if it suits the panel.

THE CHAIRPERSON: Let's continue, please.

MR. BOB PETERS: All right. Thank you.

CROSS-EXAMINATION BY MR. BOB PETERS:

MR. BOB PETERS: Mr. Chairman, I have circulated a book of documents. I'll refer to it in a few minutes, and it's been marked as PUB Exhibit 58-1. I do have some extra copies at my side. I'm not sure if anybody wants the paper. If they do, they're welcome to it.

I understand from Ms. Ramage that, Mr. Thomson, you've got a copy of my thirty (30) tabs in the book of documents?

MR. SCOTT THOMSON: Yes, sir.

MR. BOB PETERS: Does it matter where we start, sir?

MR. SCOTT THOMSON: I'm in your hands.

MR. BOB PETERS: All right. Let's start with your Manitoba Hydro Exhibit 84, which is a document provided last week. And this happens to be your beef -- brief biography that's been filed for the purposes of the NFAT.

Is that correct?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And, Mr. Thomson, I want to thank you for your opening comments and your being available today to answer parties' questions. I would like to make it clear at the outset that my

questions are not seeking answers that contain commercially-sensitive information.

Would that be clear?

MR. SCOTT THOMSON: M-hm.

MR. BOB PETERS: And your answer was yes?

MR. SCOTT THOMSON: Yes, it was.

MR. BOB PETERS: And if any answer of yours, you feel to complete your answer to the Board, needs to contain the CSI, I would make the recommendation that you would undertake to provide that answer through your counsel, Ms. Ramage, and then that written answer could be provided to the Board on blue paper, as is the confidential information in these proceedings.

Would that be satisfactory, sir?

MR. SCOTT THOMSON: Certainly.

MR. BOB PETERS: And, Mr. Thomson, you've been the President and CEO of Manitoba Hydro -- you just had your two (2) year anniversary.

Have I got that right?

MR. SCOTT THOMSON: That's right.

MR. BOB PETERS: And if I am also correct, today is your second appearance before the Public Utilities Board?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And before -- and for the benefit of the newer members of the Board, you alluded to it in your opening comments, prior to Manitoba Hydro you were an executive fic -- Vice President in the Finance and Regulatory Affairs Department in energy supply with FortisBC Holdings?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And you'll have to help me out here, because I'm -- I always get this wrong, but BC Gas became Terasen, and that became FortisBC Holdings?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And your involvement was with Terasen Gas before it merged with Fortis?

MR. SCOTT THOMSON: Yeah. Initially, the -- the company was called BC Gas Utility Limited when -- when I joined. And there was a -- a name change along the way to Terasen.

MR. BOB PETERS: And that was predominantly a natural gas distribution utility, as you mentioned?

MR. SCOTT THOMSON: That's correct. When Fortis acquired the -- the gas assets from -- from Kinder Morgan in 2007, Fortis owned and operated a -- a

electric distribution and generation utility in -- in southeast BC. And that's when I -- I got involved in the electric industry directly.

MR. BOB PETERS: Directly before that you were with the natural gas distribution and had about nine hundred and twenty thousand (920,000) customers?

MR. SCOTT THOMSON: Yeah, it was about nine-fifty (950) by the time I left.

MR. BOB PETERS: And predominantly in communities outside of the mainland?

MR. SCOTT THOMSON: No, we -- we served -- we -- we served 96 percent of the -- the gas customers in the province. It was only the -- the northeast that was served by Pacific Northern Gas.

MR. BOB PETERS: And did Terasen generate electricity using natural gas as a fuel?

MR. SCOTT THOMSON: No, we didn't. We supplied BC Hydro and their thermal operations at Burrard Inlet.

MR. BOB PETERS: So Terasen generated electricity using water as a fuel?

MR. SCOTT THOMSON: No, sorry, FortisBC did in their -- in their electric operations. They -- they operated four (4) facilities.

MR. BOB PETERS: The electric customer base that you had when you were in British Columbia was about a hundred and eleven thousand (111,000)?

MR. SCOTT THOMSON: Direct. And then about fifty thousand (50,000) through municipal -- or that we supplied to municipal utilities.

MR. BOB PETERS: Would it be fair and true, Mr. Thomson, that you didn't have prior experience overseeing the construction of hydro-generating stations?

MR. SCOTT THOMSON: That would be -- that would be true.

MR. BOB PETERS: And I was going to say certainly who would have in terms of the magnitude of Keeyask and Conawapa, but that's -- that's unprecedented in Manitoba's history?

MR. SCOTT THOMSON: Well, we've certainly built stations as big as Keeyask before. Conawapa will be bigger. And we do have a -- a few people that are still around from those days, but they are -- they are thinning out.

MR. BOB PETERS: When you were hired by Manitoba Hydro to succeed Mr. Brennan as president, Manitoba Hydro already had a preferred development plan, did it not?

MR. SCOTT THOMSON: Yes, it did.

MR. BOB PETERS: And that Preferred Development Plan included Keeyask and Conawapa, as well as exports at that time?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Can you tell the Board, under your presidency, what, if any, major changes have been made to Manitoba Hydro's Preferred Development Plan?

MR. SCOTT THOMSON: I -- I suppose the most significant thing would be that we've -- we've firmed up a number of the -- the sales contracts that support the Preferred Development Plan over the past couple of years, culminating them in the most recent announcements. And then of course assumptions that we've made have -- have been born out or been amended as time passed for -- for economic circumstances.

MR. BOB PETERS: And speaking of recent announcements, including the one that was made this past weekend, Mr. Thomson, Manitoba Hydro and Wisconsin Public Service have some to a tentative agreement on a 308 megawatt sale.

Is that right?

MR. SCOTT THOMSON: That's -- that's correct.

MR. BOB PETERS: And I'm not looking again for any commercially sensitive information to be disclosed on the public record, but -- and I understand through counsel that contract has not yet been filed in a redacted form on the public record, or un-redacted with this Board.

Is that your understanding as well?

MR. SCOTT THOMSON: That -- that's correct.

MR. BOB PETERS: Are you able, at this time, Mr. Thomson, to indicate to the Board whether transmission is included in that contract?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Would you mind just clarifying what you mean by 'including transmission'?

MR. BOB PETERS: Has it been disclosed, or can you disclose publicly who's paying for the transmission line to ship energy to Wisconsin Public Service?

MS. PATTI RAMAGE: Mr. Peters, maybe I can help with the clarification. Are you talking the transmission investment, as opposed to who pays under the MISO -- or under the tariffs for transmission?

MR. BOB PETERS: Thank you, Ms. Ramage. I'm -- I'm asking who's paying for the investment in the transmission line, the physical transmission line, that is needed to carry the 308 megawatts to -- help me out, is it Green Bay?

MR. SCOTT THOMSON: Okay. We're -- we're building the line to the border. Minnesota Power is -- is going to be the majority owner of the US side of the transmission line. And the -- we'll be looking to incorporate investments from -- from other players south of the border. We have agreed to back-stop, as necessary, the -- the investment -- the minor -- a mon -- sorry, a minority investment in that line up until the time when it can be sold off to third parties.

MR. BOB PETERS: Thank you. And if I'm dancing on eggshells you're going to tell me in short order. But what you've just indicated is that for the first time ever Manitoba Hydro is planning on investing in an asset located in the United States.

Is that correct?

MR. SCOTT THOMSON: A transmission -- well, we -- we hold transmission rights in the US, but the -- this would be the first time we -- I believe, we've -- we've invested in a -- in a transmission line per se.

MR. BOB PETERS: And the size of the transmission line, and we -- we talk about the 750 megawatt transfer capability as being the -- the large line or the larger of the two (2) lines that were being considered.

Is that correct?

MR. SCOTT THOMSON: That's correct. And -- and it would only be if the 750 megawatt intertie was built that we would have an investment. If -- if a two-fifty (250) line gets built that would be funded by Minnesota Power exclusively.

MR. BOB PETERS: Okay. Well, let's just take this one (1) step at a time then. If the -- if the -- you already told the Board this morning in your comments that you have a 250 megawatt sale lined up with Minnesota Power, correct?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And Minnesota Power is prepared to build their own transmission line to the Manitoba border to come and get that power and bring it back down to the Minneapolis area?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: However, to have the opportunity to sell additional power in the states, Manitoba Hydro is proposing that the transmission line

now be up-sized to 750 megawatts as opposed to the 250 megawatts, correct?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And so the only way that Manitoba Hydro can get the energy to Wisconsin Public Service is on a line that is 750 megawatts of transfer capability?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And that 750 megawatt line that Manitoba Hydro is proposing to build, the first third of it, or the two hundred and fifty (250) out of the seven-fifty (750), would still be paid for by Minnesota Power, who you've indicated was prepared to build their own transmission line on their deal?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: So what's left over is, by up-sizing it by an additional 500 megawatts, there's additional capital costs and operating costs that go along with that?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And would it be correct to say that Manitoba Hydro plans to own 49 percent of the line?

MR. SCOTT THOMSON: No, we don't plan on owning that much and, ultimately, we expect to -- to

be able to sell that off. The -- the -- with -- with the two-fifty (250) that -- that Minnesota Power is taking and the three hundred and eight (308) that Wisconsin's taking, there are only -- there -- there remains about 200 megawatts of -- of capacity that would have to be taken up. And we're -- we're confident that we're going to be in a position to do that. We -- we've -- it is commercially sensitive, but I -- we are in discussions with -- with parties about that investment.

MR. BOB PETERS: So the question that precipitated this line of questioning, Mr. Thomson, is: Can you tell us on the public record whether Wisconsin Public Service is prepared to contribute to the 750 megawatt transmission line as part of the recently announced 308 megawatt sale to WPS?

(BRIEF PAUSE)

MR. SCOTT THOMSON: They -- they'll get a delivered product as part of that.

MR. BOB PETERS: I take from your answer that a delivered product means that there's no express payment by Wisconsin Public Service for the transmission line costs, but whatever it pays in the

price of the product Manitoba Hydro delivers will include, from Manitoba Hydro's perspective, a portion on account of transmission costs?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: But Manitoba Hydro would still then be notionally responsible for the capital costs, at least to two-thirds (2/3s) at this point in time, as well as two-thirds (2/3s) of the operating and maintenance costs?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Yeah, Minne -- Minnesota Power will be holding 51 percent of the line. The -- the maximum holdings that we could -- would have would be forty-nine (49).

MR. BOB PETERS: And I take it that that 51-49 percent demarcation isn't necessarily based on financial contribution; it's based on recognition of -- of sovereignty issues, that Manitoba Hydro does not want to be a majority owner of a transmission line located in the United States?

MR. SCOTT THOMSON: That's true in part, yes.

MR. BOB PETERS: Well, what part of

that isn't true?

MR. SCOTT THOMSON: As far as that goes, that's true. We -- we don't want to hold a majority interest in a US asset.

MR. BOB PETERS: All right. So -- so let's not get caught up on 49:51, because the amount of dollars spent won't -- won't track that ownership interest necessarily?

MR. SCOTT THOMSON: That's -- that's fair.

MR. BOB PETERS: Okay. And we know that because Minnesota Power is only in for 250 megawatts, which is one-third (1/3) of the capacity of the line, and yet they're going to own 51 percent of it?

MR. SCOTT THOMSON: And -- yeah. And I think that there -- there's other -- there's other elements of -- of contra -- contractual elements with Minnesota Power probably -- which probably would be best for you to follow up with Mr. Cormie on his panel, he -- he'll be able to speak to it in some detail, and then through the -- the CSI piece.

MR. BOB PETERS: All right. Thank you for that, Mr. Thomson. If I can turn to the PUB Exhibit 58-1. Maybe we'll start at page 3 and look at

-- it's at -- it's Tab 1. It's the PUB's terms of reference.

I was just putting this up, Mr. Thomson, to -- to try to narrow down with you what specifically Manitoba Hydro is asking for this PUB-NFAT panel to do in respect of this -- this hearing that it's conducting.

MR. SCOTT THOMSON: Well, the government's asked the -- the panel to review our plans and make recommendations as it sees fit on them. I think what -- what both myself and -- and Ms. Ramage were speaking to this morning, there are some -- some key elements that have to be dealt with sooner rather than later in terms of -- of moving forward with -- with the first step of our -- our preferred plan, which is around the -- the Keeyask generating station and the interconnection.

And -- and so as a -- as a first step, we're -- we're hopeful that we'll be persuasive with the panel and -- and that they'll recommend that that -- that we proceed down that avenue and preserve the -- preserve the -- the option of -- of building Conawapa as events unfold into the future.

MR. BOB PETERS: Would it be a correct interpretation of your comments that, if this panel

deals with the Keeyask issue and the size of the transmission line issue, in terms of positive recommendations, those would be the only two (2) matters that Manitoba Hydro says are -- are key at this point in time?

MR. SCOTT THOMSON: Those are most critical. Whether -- whether we -- whether we follow that path to build Keeyask or if -- if the determination of the panel was to -- to pursue an all-gas alternative, that would pre-empt a number of things. But if -- if we proceed down the path of -- of Keeyask, we would -- we -- in the fullness of the hearing and the evidence that's been filed and -- and yet to come out in -- in the process of the hearing, I think that -- that the second piece around Conawapa and -- and preserving the option to move forward is also important.

Part -- as I'd mentioned, I think part of what we will be doing over -- in the ensuing years is continuing to -- to monitor and update our analysis to -- to ensure that moving forward with the second phase of the plan makes sense at -- at the time that we have to make those decisions.

MR. BOB PETERS: Would it be fair and accurate, Mr. Thomson, to suggest that the long-term

nature of the Conawapa generating station is one that is not in clear focus as we sit here today because there are many variables?

MR. SCOTT THOMSON: Yeah. We're not as far progressed in terms of -- of that element of it. You know, if I -- if I -- if we think about where we sit with Keeyask, where we've -- where we've identified about 80 percent of the -- the contractors and contract value of -- of moving forward on that project at this point in time, there's -- there's a great deal of -- of certainty around that.

Conawapa was a very well-defined -- is a very well-defined project. We've -- we've been down this path before. There's -- the engineering's been done and we've -- we've incorporated all the lessons learned from -- from Wuskwatim in -- in the assessment of that and -- and the estimating of that. So, you know, I think that -- I think that there's a lot of evidence that's been placed on the record around that, and it makes sense to -- to deal with that at this point in time. I wouldn't -- I wouldn't want to see us just preempt this and -- and bifurcate the hearing.

MR. BOB PETERS: I understand your point, and I'll ask Ms. Villegas to help me turn to page 13 in Board counsel's book of documents, found in

Tab 2, which just set forward an extract of the Preferred Development Plan from Manitoba Hydro's filing.

You mentioned in your last answer to me, Mr. Thomson, that Manitoba Hydro wants -- wants, in my words, the green light on Keeyask, correct?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Because the green light on Keeyask really means either a red light or a yellow light on an all-gas scenario.

MR. SCOTT THOMSON: That's correct. If we -- if we proceed down the path of moving to Keeyask, we have the optionality of Conawapa or gas in the future beyond Keeyask.

MR. BOB PETERS: Now, in terms of the commitment to Keeyask, is it on the public record -- and I believe it is, so I'll ask the question in a way that I think is appropriate -- that there is no mandatory requirement for Manitoba Hydro to commence Keeyask construction in the summer of 2014 if Manitoba Hydro still wants to preserve the export contracts, some of which are shown on the screen.

MR. SCOTT THOMSON: There's -- there are some provisions in the -- in the contractual arrangement that we have with -- with Minnesota Power

that would allow for -- for regulatory delay. If a proj -- projects that get delayed tend to cost more money. We're -- we're in a position where we're ready to go this summer. We've identified the contractors, and we have made investments to date in -- in the project. So -- so if the -- if it's put on hold, it's almost certainly to cost more in the long run.

MR. BOB PETERS: Okay. Well, we'll -- we'll deal with that part of your answer, if not with you, we'll -- I'm sure we'll talk to -- to others about that -- that portion. But let's just talk about the -- the delay possibilities of constructing Keeyask.

Can you indicate on the public record for how many years Manitoba Hydro can delay the construction of Keeyask for regulatory purposes without losing the export contracts that Manitoba Hydro has -- has signed?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Sorry about that. There's -- there's up to a two (2) year regulatory delay allowed.

MR. BOB PETERS: And so if for any reason the provincial government wanted to or requires

additional time to finalize its decisions, there are additional years for such delay, that's two (2) years you're telling us, and you would still preserve the contractual arrangements that Manitoba Hydro has negotiated?

MR. SCOTT THOMSON: That's correct. I -- the two (2) year window, it is -- is there for regulatory purposes, but we've also got to accommodate the construction schedule as well, so.

(BRIEF PAUSE)

MR. BOB PETERS: Just on the point, your second point. I want to come back to it. You said projects delayed cost -- end up costing more money, and one (1) of the reasons for that delay is the financing costs of whatever money has been spent to date?

MR. SCOTT THOMSON: That's part of it, yes.

MR. BOB PETERS: And --

MR. SCOTT THOMSON: And -- and then general escalation in pricing.

MR. BOB PETERS: The general escalation in pricing would be for the contractual commitments,

and the buying the -- the components?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: Can you indicate -- when you indicate that, in your opening comments, up to 80 percent of the Keeyask costs will be, in my words, committed once the Keeyask civil contract is let, have I got that evidence from you right?

MR. SCOTT THOMSON: You have, subject to approvals to proceed. So I -- we're -- we're not -- we -- we -- there are outs if we don't get regulatory approval.

MR. BOB PETERS: And si -- 80 percent of the construction costs will be let, or in place.

Is that 80 percent of the $6.2 billion?

MR. SCOTT THOMSON: It's the -- it's the -- the hard construction related costs. A -- a significant portion of -- of the six point two (6.2) is associated with -- with financing.

MR. BOB PETERS: Okay. Let me ask it this way. Are you able to put on the record what the dollar amount is that -- what does that 80 percent equate to in dollars?

MR. SCOTT THOMSON: You'd probably be better to wait and ask the panel that -- that's going to deal with capital costs on -- on the var -- I -- I

just don't have the information in front of me, and -- and it would make more sense to have -- have those folks deal with it.

MR. BOB PETERS: When -- okay, when you talked about those contracts having different outs in it in terms of a two (2) year regulatory delay, as an example, are there any financial penalties as a result of the delay?

MR. SCOTT THOMSON: There are -- in -- in the -- the most significant of the contracts, the general civil contract that we've negotiated, there are -- there are clauses that would allow for delay, and there's clauses that would deal with cancellation. They're -- they're relatively nominal in the -- in the scheme of the project, but beyond that, that is commercially sensitive.

MR. BOB PETERS: And can you indicate to the panel how much money of -- and -- and let me start off, maybe, by this question.

Would I be correct in understanding that the Keeyask generating station, for purposes of this NFAT, has been priced out in service at $6.2 billion?

MR. SCOTT THOMSON: Say that -- please say that again?

MR. BOB PETERS: All right. I'll

change it. What is going to be the in-service cost of Keeyask?

MR. SCOTT THOMSON: Yeah, we're -- we're -- as I mentioned in my -- my remarks, we're in the process of finalizing our -- our review of our contingencies and management reserves. That information is going to be shared with Knight Piesold -- Piesold later this week, I believe, and -- and then be available by next week for Panel 2.

MR. BOB PETERS: That answer suggests to me that the $6.2 billion number may not be fixed in stone.

MR. SCOTT THOMSON: Well, we're -- we're finalizing a revision to cost estimates. Once -- with the general civil contract being the -- the most significant piece of the project, the -- the bid that -- that we had received was -- was within our -- our pro -- our point estimate and -- and contingency, but it -- it caused us, as would normally be our custom when we -- when we enter into a significant arrangement, to review the adequacy of the reserves. It's a -- it's a major milestone in the -- in the project then.

So based on that, the -- the preliminary indication is that there is going to be a change in our -- in our reserve estimates, and -- and that

information will be available for next week.

MR. BOB PETERS: On page 70 of the book of documents, found at Tab 20 -- twenty-three (23), there's -- there's a graph that depicts over time the capital cost increases on Conawapa, Keeyask, Bipole 3, and Wuskwatim. You've be familiar with those since you came to Manitoba Hydro, sir?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: I -- I didn't understand from your last question and -- and -- or your last answer to my question that the Keeyask generating station -- you were going to look at the management reserves and the contingencies is what I heard, but I was given to understand that the management reserves and contingencies are already built into the $6.2 billion number?

MR. SCOTT THOMSON: Yes, they are.

MR. BOB PETERS: All right. So what you're telling the panel is, based on Manitoba Hydro's review, the panel next week will be in a better position to indicate whether that $6.2 billion figure is firm, or whether it's different than 6.2 billion?

MR. SCOTT THOMSON: They will be able to confirm that. And -- but I can tell you today, it's going to be adjusted upwards.

MR. BOB PETERS: All right. So that takes out the surprise as to whether it's up or down, but the magnitude of the increase, is that something that's -- you're able to quantify, at least estimate at this time, or is that something you have to wait?

MR. SCOTT THOMSON: I -- I'd prefer if -- if we -- if you could bear with us for a couple more days. We are -- we're finalizing it and going over it at the executive committee tomorrow. I've seen the preliminary results, but --

MR. BOB PETERS: Okay. I'll respect you want to take it through your executive and that'll -- that'll also get reported to your board, I take it?

MR. SCOTT THOMSON: M-hm. Yes.

MR. BOB PETERS: In terms of the Keeyask cost to date, is it correct that Manitoba Hydro has spent approximately $1 billion on the Keeyask project to date?

(BRIEF PAUSE)

MR. SCOTT THOMSON: I'm -- I'm advised by my colleague that it's not to date, but expected to be by June when the decision has to be made.

MR. BOB PETERS: You mean -- you mean

it's not June?

MR. SCOTT THOMSON: Jesus, I hope not with this weather.

MR. BOB PETERS: You're not alone. There is a response, and I am corrected, that June of '14, the expected expenses that will have been already paid for by Manitoba Hydro will be $1 billion for Keeyask.

And -- and likewise, is it -- for Conawapa, there's been approximately $300 million spent -- expected by June of '14?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Mr. Thomson, I don't want you to divulge any discussions you've had with the province, but I take it that Manitoba Hydro is in communication with the province, because it nominally owns the share for all Manitobans?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And in -- in terms of the permissions that Manitoba Hydro requires from the province, on tab -- on page 18 of my book of documents, I have a couple of extracts from the Manitoba Hydro Act, and perhaps on page 19 it's set out even better, that the -- Manitoba Hydro needs the permission of the Lieutenant Governor-in-Council to develop new power

generation stations, correct?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And I also understand from the legislation -- I'm not asking you to put your lawyer's hat on. You -- you have enough of them around you at this time. But Manitoba Hydro also requires the permission of the province before Manitoba Hydro can spend over a certain amount?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Much like me with my wife, but the numbers are quite a bit different here. The -- the budgetary approval that Manitoba Hydro requires is for expenditures in excess of $5 million -- million?

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Peters, I reluctantly admit I don't have the Act memorized, and I'm not a hundred percent sure on the answer to that. So in fairness to Mr. Thomson, it -- it will read as it reads. But rather than myself review the -- the Act on the spot, maybe we could defer that to --

MR. BOB PETERS: All right.

MS. PATTI RAMAGE: -- this afternoon.

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: I'll -- I'll move along, and I know -- recognize we're approaching the lunch hour.

Manitoba Hydro, Mr. Thomson, does not yet have final approval from the Lieutenant Governor-in-Council to construct Keeyask, does it?

MR. SCOTT THOMSON: That's correct. We have approvals to do the work that we've done so far --

MR. BOB PETERS: All right. In terms --

MR. SCOTT THOMSON: -- in the infrastructure project.

MR. BOB PETERS: I'm sorry for cutting you off. You have approvals for the infrastructure projects?

MR. SCOTT THOMSON: The Keeyask infrastructure project, building the roads and -- in and -- and the -- the preliminary work, the camps.

MR. BOB PETERS: Is that preliminary work is what's costing $1 billion?

MR. SCOTT THOMSON: That's a portion of it.

MR. BOB PETERS: Has Manitoba Hydro obtained specific approvals along the way, Mr. Thomson, or is it a blanket approval that Manitoba Hydro was

operating under in terms of its expenditures on Keeyask?

MR. SCOTT THOMSON: Not a blanket approval.

(BRIEF PAUSE)

MR. SCOTT THOMSON: We -- we didn't have a blanket approval for the -- the full amounts, but the various components where we needed approvals have been obtained.

MR. BOB PETERS: Mr. Thomson, has the Manitoba Hydro Electric Board retained any independent expert consultants to conduct any due diligence on Manitoba Hydro's Preferred Development Plan?

MR. SCOTT THOMSON: No, I don't believe they have.

MR. BOB PETERS: And to your knowledge and Manitoba Hydro's knowledge, has the Government of Manitoba retained any independent expert consultants to conduct any due diligence on Manitoba Hydro's Preferred Development Plan?

MR. SCOTT THOMSON: I -- I believe that was the purpose of this whole proceeding.

MR. BOB PETERS: All right. So you

understand that the government hasn't retained it -- any of its own independent expert consultants, but the government is relying on the Public Utilities Board to conduct this NFAT and provide a report as part of the government's due diligence?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Mr. Chairman, in light of the hour, I would suggest I stand down for the lunch hour. I am prepared to continue after lunch for a limited period of time, recognizing that by two o'clock I will have to turn the microphone over to other counsel to finish by 3:30, which will allow Mr. Wojczynski to finish by 4:30. So that would be my game plan recommended, sir.

THE CHAIRPERSON: And what is your recommendation for us to resume these proceedings?

MR. BOB PETERS: I'd say 1:15 would be fine, if that suits the panel.

THE CHAIRPERSON: There seems to be a consensus that we can start at 1:00 if that --

MR. BOB PETERS: I'll be here.

THE CHAIRPERSON: Okay.

MR. BOB PETERS: Okay. One o'clock.

THE CHAIRPERSON: One o'clock, then.

MR. BOB PETERS: Thank you.

--- Upon recessing at 12:05 p.m.
--- Upon resuming at 1:01 p.m.

THE CHAIRPERSON: Good afternoon. I think we're ready to resume the proceedings. I just want to remind all attendees that those with microphones to be careful about the management of your microphone, particularly making sure that you turn it off, because the asides that you deliver to your colleagues can be overheard if the microphone is still on. So please be mindful of the sensitivity of these devices. Thank you.

I think we're ready to turn it over back to you, Mr. Peters.

MR. BOB PETERS: Thank you. Good afternoon, Mr. Chairman and the panel, Mr. Thomson, Ms. Ramage.

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: Mr. Thomson, before lunch you answered a question from Board member Bel. Do you recall that, about the revenues coming from the various contracts?

MR. SCOTT THOMSON: I believe so.

MR. BOB PETERS: And again I'm throwing

out the CSI warning here, that I don't want you to delve in an area that you don't want on the public record for competitive or financial reasons. But when Manitoba Hydro goes to market to sell energy, Manitoba Hydro has, in essence, different products.

Would you agree with that?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And I would suggest that probably Mr. Cormie will be the gentleman who knows what those products are inside and out. And that would be your understanding, as well?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Now, some of those -- when we talk about energy and the products, it may not be intuitive to those who aren't in the -- in the energy industry, but some electricity is worth more than other electricity.

Would that be true?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And I'm not going to talk about any particular contract in my questions at this time, Mr. Thomson. But for example, we -- we talk about firm energy.

And what the panel will learn is that firm energy is exported by Manitoba Hydro out of

Manitoba Hydro's dependable energy?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And that's a -- that's one of the most valuable products that Manitoba Hydro can sell?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Because that's the product that's being sold to everybody in this room, is dependable energy?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And for those residential customers, they're paying approximately seven (7) cents a kilowatt hour for it?

MR. SCOTT THOMSON: That's the delivered cost, yes.

MR. BOB PETERS: All right. And your export partners who buy that similar product will have a price that's negotiated between them and Manitoba Hydro for that product?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And that dependable energy has its highest value during the peak hours of the day for your counterparties generally.

Would you agree with that?

MR. SCOTT THOMSON: Generally, yes.

MR. BOB PETERS: All right. And let's -- let's leave the caveat on the table that if Mr. Cormie is listening or reading and disagrees with this, we'll give him ample opportunity to -- to clarify the record.

So the peak energy that comes out of the dependable energy on a firm contract for Manitoba Hydro is probably one of Manitoba Hydro's most valuable products that it sells?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And that leads to then there are other products that Manitoba Hydro also sells to its counterparties that is not as valuable.

MR. SCOTT THOMSON: It follows.

MR. BOB PETERS: All right. And when I talk 'counterparties', I'm talking about a bilateral agreement between Manitoba Hydro and a named US utility, correct?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And the other option for Manitoba Hydro, in terms of export sales, is not to have a counterparty on the other end of the deal, but Manitoba Hydro could just sell it into the MISO market?

MR. SCOTT THOMSON: Yeah, real time or day ahead.

MR. BOB PETERS: And -- and the MISO market is -- as it says, it's an electricity market where buyers and sellers meet and all electronically done so that sellers can put their product into the market and buyers can buy out of the prod -- out of the market what products they need?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Now, when you and Board member Bel were talking about -- I believe your number was $9 billion in sales to 2035, and that was your number, sir?

MR. SCOTT THOMSON: Yeah.

MR. BOB PETERS: Would it be correct to say that that $9 billion in sales is made up of the sales of different products?

They're not all the same product?

MR. SCOTT THOMSON: That's true.

MR. BOB PETERS: And if they're not all the same products, they probably don't all have the same price?

MR. SCOTT THOMSON: That's true.

MR. BOB PETERS: All right. And the alternative to selling it to a counterparty, from Manitoba Hydro's perspective, is that if it has surplus energy, it can just sell it into the MISO market rather

than go to a counterparty and -- and execute a bilateral contract?

MR. SCOTT THOMSON: That -- that's true.

MR. BOB PETERS: But there may also be reasons that counterparties want to buy certain products from Manitoba Hydro that they might be able to shop around for in the market but they prefer to buy them from Manitoba Hydro?

MR. SCOTT THOMSON: Yeah, they have -- they probably have options to do other bilaterals. I think that certainly when we enter into firm contracts, we're -- with -- with customers, there's a mutual benefit in that they're -- they're looking at it to provide dependable energy to their customers as opposed to buying surplu -- they -- they'll have a portion of their portfolio that they'll -- they'll look at, and balancing requirements and whatnot that they'll go to the market with, but they'll have an -- a -- an element of their supply stack that they -- they have committed.

And they'll buy some of that in the States from coal plants and -- and gas plants and -- and some of them have entered into arrangements with us.

MR. BOB PETERS: And is it -- are you

able to put on the public record your answer to whether or not Manitoba Hydro also sells products that aren't firm energy under its contracts with bilateral arrangements?

MR. SCOTT THOMSON: Yeah, I believe that's -- that's true.

MR. BOB PETERS: And that maybe was a little awkward in my questioning, but what you're telling the Board is that perhaps instead of selling it into the MISO market, Manitoba Hydro could sell it to a counterparty pursuant to some of these long-term contracts?

MR. SCOTT THOMSON: Yes, that's true.

MR. BOB PETERS: All right. And that leads me to the discussion again you had with Board member Bel, and in terms of coming up with a quantity, are you able to put on the public record your answer to this question, as to whether or not any of Manitoba Hydro's sales of $9 billion comes from products that wou -- that would otherwise or could otherwise be sold into the MISO market?

MR. SCOTT THOMSON: Well, it -- it could all be sold into the MISO market, but -- but it would be inopportune to do so. We can maximize the value by entering into long-term arrangements with --

with customers. If we went a hundred percent spot, we wouldn't expect to -- to achieve the same value that -- that we've been able to do with this -- this arran -- the arrangements that we've entered into.

MR. BOB PETERS: All right. And if -- but you wouldn't want to go a hundred percent spot with your dependable product, because that's your -- your highest value product, correct?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: But you may also have a -- a lower valued product that would ordinarily be sold into the -- that could be sold into the MISO market that you could also package up as part of a -- an export contract to a counterparty if you could find one?

MR. SCOTT THOMSON: Well, that's true, and we often do. From year to year, we'll enter into arrangements for short term over the winter that we can shape -- shape shorter term arrangements that are -- are -- and extract a higher value from that. It'll depend on reservoir levels from year to year, whereas when we -- when we go out to the market and we sell long-term firm, we know that that power's going to be available in low-water years because we -- we base that -- that energy availability on the lowest flow

conditions that -- that we've had in the last hundred (100) years.

So we -- there's only a certain amount that we can sell up to in -- in that and we do -- we do pursue those sales, as -- as they are -- can be higher value. But from year to year, and seasonally, we might enter into short-term arrangements as well.

MR. BOB PETERS: Thank you for that answer Mr. Thomson. Good point you made in your answer to the panel is that, dependable energy is what gives rise to the firm contracts that Manitoba Hydro can sell, correct?

MR. SCOTT THOMSON: Correct.

MR. BOB PETERS: And dependable energy is defined as that energy that would be available in Manitoba over the last hundred years of actual precipitation and water regimes?

MR. SCOTT THOMSON: That's correct. And -- and based on the installed capacity of the plants.

MR. BOB PETERS: The dependable energy will increase as your installed capacity goes up and that's the essence of the NFAT in terms of what you're going to see with Keeyask and Conawapa?

MR. SCOTT THOMSON: That's correct,

we're reusing the same water that's already gone through other turbines.

MR. BOB PETERS: But dependable energy then could be considered -- and tell me if this is true -- as the lowest level of water that Manitoba Hydro expects to experience based on it's hundred years of history?

(BRIEF PAUSE)

MR. SCOTT THOMSON: In essence that's true, plus -- plus any contractual imports that we have in -- in thermal capacity.

MR. BOB PETERS: Okay, I should have --

MR. SCOTT THOMSON: Because we --

MR. BOB PETERS: -- dependable hydraulic resource than is the lowest water flows that you've had in the last hundred years?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And you have other dependable energy. And we'll get into the -- into the Power Resource Plan, but alas not with you. At least not today.

MR. SCOTT THOMSON: Not, alas.

MR. BOB PETERS: So, Mr. Thomson, where

we're going then is, your dependable product is -- it's not called guaranteed, but it's the next best thing to guaranteeing it, based on your hundred years of water flows.

MR. SCOTT THOMSON: That's -- that's correct.

MR. BOB PETERS: And if you have water flows that are above that dependable level, that gives you opportunity to sell excess power?

MR. SCOTT THOMSON: That's true --

MR. BOB PETERS: And that excess power, sir, would be not quite as valuable, in any event, as your firm dependable power?

MR. SCOTT THOMSON: That's probably fair to say, although at times power can be worth -- you know spot power can be worth a lot more than -- than firm committed contracts. I mean that's a market dependant --

MR. BOB PETERS: Okay. Good answer then in the sense that what you're telling the panel is the market is what the market is, but, generally speaking, your dependable product has a better value than the -- than the non-firm market product?

MR. SCOTT THOMSON: I think as a general rule that's fair.

MR. BOB PETERS: And so when you gave Board member Bel the $9 billion number, does that include any non-firm energy, or is all of that 100 percent firm dependable energy?

(BRIEF PAUSE)

MR. SCOTT THOMSON: My understanding is that's just firm contracts. But Mr. Cormie could confirm that.

MR. BOB PETERS: All right and -- and to give Mr. Cormie an opportunity to gear up to confirm that, I'm going to ask an undertaking through your counsel to provide it when Mr. Cormie testifies so that we can go through it for the benefit of certainly Board Member Bel and others.

And that undertaking is to -- is to provide the firm price revenue from the contracts that are listed. If we go to Tab 13, page 49 of Board counsel's book of documents -- thank you Ms. Villegas -- you'll see -- you'll see a sheet that breaks down the contracts. And one (1) of the columns that's missing is the -- is the period in which the export is to occur. I'm going to ask that, that also be filled in, if Manitoba Hydro agrees. I'm on page 49, sir -- maybe

I've lost you -- Tab 13 of the book of documents.

MR. SCOTT THOMSON: Well, the term of the contracts is listed there.

MR. BOB PETERS: Yes, but the period -- and when I say, "period," I'm talking about you know we've learned about 5x16 power, 2x16 power, and -- and that type of in -- information.

I believe one of your counsel will have the worksheet that includes that information, and I'm going to ask that this be updated and include on this as well now the 308 megawatt contract with Wisconsin Public Service.

--- UNDERTAKING NO. 1: Manitoba Hydro to provide the firm price revenue from the contracts that are listed and an updated worksheet to include the 308 megawatt contract with Wisconsin Public Service

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: In addition to that request, it's either going to be Undertaking Number 1(b) or number 2, I would like you to break down as by

contract how much of that $9 billion comes from which contract and for which product, and certainly the -- the time frame would be -- would be on that in -- information as well.

MR. SCOTT THOMSON: Okay. That'll have to be done on blue paper. That'll be a confidential filing.

MR. BOB PETERS: I understand that, and thank you, sir. I -- I can also indicate that on blue paper currently, Manitoba Hydro provided a response to PUB Information Request First Round 1 -- no, sorry, Fir -- First Round Question 282(a) and 282(b), which contains a -- a considerable amount of that information, although there might have been a little duplication in -- in those two (2) answers.

But to break it down in terms of dollars by contract, I would like the time frame included, and the product that is being sold to generate that revenue included, and I'd like that to also be clear as to whether it includes a capacity payment, whether it includes transmission payments, and whether it includes energy charges, so that we can explain to the -- to the panel that answer you gave about the $9 billion.

MS. PATTI RAMAGE: Mr. Peters, we can accept that undertaking, subject to the same proviso

that you began with at the beginning of this. If Mr. Cormie sees any issues with any of those requests, we will have to get back to you and -- but at this point we can accept what we've heard.

MR. BOB PETERS: And, Ms. Ramage, while we're conversing, I wonder if Manitoba Hydro could also, when it's responding to that, determine if it can compile a public version of that document which may require some aggregation, but at least then it can be discussed on the -- on the public record.

MS. PATTI RAMAGE: We can certainly undertake to determine if we can do it.

MR. BOB PETERS: That's all I'm asking at this time. Thank you, Ms. Ramage.

(BRIEF PAUSE)

MR. BOB PETERS: It's all part of Undertaking 2, yes. Thank you.

--- UNDERTAKING NO. 2: Manitoba Hydro to break down as by contract how much of the $9 billion comes from which contract and for which product, as

well as time frame, and determine if Manitoba Hydro can compile a public version of that document

MR. BOB PETERS: Thank you, Mr. Thomson --

THE CHAIRPERSON: Mr. Peters, could I just in -- interject a few questions, since you were talking about export contracts.

I just want to clarify one (1) thing that I thought I heard this morning, which is that the -- the firm power that's available for sale as a result of Keeyask has now all been committed.

MR. SCOTT THOMSON: Yes.

THE CHAIRPERSON: So there would be no further contracts that you would be comfortable with signing involving a counterparty for the production of dependable energy out of -- out of the Keeyask generation station?

MR. SCOTT THOMSON: Unless it -- yeah, that's correct, but we -- we anticipate with our internal load growth and the -- and the committed sales that -- that it's -- it's all utilized. There might be a sh -- very short-term piece. I'd like to confirm

that with Mr. Cormie.

THE CHAIRPERSON: Now, I -- again I want to confirm that you -- I thought I understood you to say that the -- the power sale that you just recently announced, the two fifty (250) that relates to the Minnesota Power, leaves a portion of that 750 kV line that would be available for transactions.

MR. SCOTT THOMSON: That's correct, yeah. Fi -- it's a 500 kV line, 750 megawatts of transfer capacity, and -- and so, yes, the -- the -- there's two fifty (250) committed with MP. The three hundred and eight (308) -- and so that leaves the -- the balance is -- is available still to contract.

THE CHAIRPERSON: Now, I know that you would have some available dependable power between now and 2019. In other words, we're not using -- we're not -- we -- we haven't committed the entire dependable energy from the system, as it currently stands, from now till 2019.

You would be in a position to sell some of that power on a -- on a firm basis into the US?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Mr. Chairman, I --

I understand I misspoke in my previous response, that there is some other available capacity in the period beyond 2019, but I -- I think it might be better to have Mr. Cormie explain that.

THE CHAIRPERSON: In relation to my earlier question with respect to the system that currently stands now, you know, now to 2019, when -- assuming the Keeyask comes into play, the -- there is some dependable energy that is available for sale on a long-term basis now?

MR. SCOTT THOMSON: We have other resources that -- other than -- than the hydro resources that are available to us. It's a question of whether there's poten -- you know, a buyer available for that. The -- the attributes of those resources, they -- they have that capability in -- in the US.

THE CHAIRPERSON: The reason I'm asking -- the reason I'm asking, it's not really germane to the -- to the Pre -- Preferred Development Plan, but germane to my understanding, I -- I -- you know, I do know that MISO is undertaking a review of the available resources for -- and during the period of '15/'16 because they're concerned about reserve levels and so on during that period because of coal retirements.

MR. SCOTT THOMSON: M-hm.

THE CHAIRPERSON: I guess the question is -- my -- my reaction to that was it represents an opportunity for Manitoba Hydro to sell power to distributors in the US who are faced with this tight -- tight system.

And I guess the question is: Is that something that you're exploring at -- at the moment, or is that something that --

MR. SCOTT THOMSON: In the interim... Short-term sales to -- to the extent that we have capacity available and -- and from time to time, as -- as I'd mentioned previously, that -- that power -- we're in ongoing discussions with -- with utilities in -- in the US.

THE CHAIRPERSON: Back to you, Mr. Peters.

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: Thank you. The book of documents has at Tab 5, starting on -- perhaps we could jump to page 24, has some extracts from Manitoba Hydro's Corporate Strategic Plan published November 2013, Mr. Thomson?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: Your fingerprints are

all over that?

MR. SCOTT THOMSON: I'm familiar with the document.

MR. BOB PETERS: All right, sir. This document actually replaces the one that got filed in the NFAT. This is a new document that I don't think was filed in the NFAT, correct?

It replaces the previous Corporate Strategic Plan?

(BRIEF PAUSE)

MR. BOB PETERS: Let's -- let's -- that's just a question anyone can research, but I -- I think this is a new document, or prepared certainly after Manitoba Hydro filed its NFAT?

MR. SCOTT THOMSON: We -- we updated our Strategic Plan, yes. I -- I just wasn't sure whether you had last year's plan in the original filing. I was trying to check that.

MR. BOB PETERS: We do. We -- we have -- we have --

MR. SCOTT THOMSON: Okay. Then yes, this would be a different plan.

MR. BOB PETERS: All right. And that -

- my question was this wasn't part of the NFAT filing? And I just wanted to bring it forward for parties' and the Board's benefit, and you've already claimed some ownership of authorship in this document, Mr. Thomson?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And on page 24, which you'll see in front of you, on page 24 of the book of documents, you will see in front of you an extract from the -- from the Corporate Strategic Plan.

In -- in essence, you're -- you're saying here what I think the Board heard you say this morning, is that Manitoba Hydro wants to commit down a pathway without committing to final decisions that don't, at this point in time, have to be made?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And the plans can be modified as circumstances unfold?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And one (1) of those circumstances would be load growth, correct?

MR. SCOTT THOMSON: That's one (1) of the factors we'll continue to evaluate, yes.

MR. BOB PETERS: And, in essence, if the load growth is higher than what's forecast, you'll need new resources sooner; and if it's slower than

forecast, you won't need new resources as quickly as you're currently planning?

MR. SCOTT THOMSON: Yeah.

MR. BOB PETERS: And while we're on the topic of load growth, you'd mentioned something in your opening comments this morning about Manitoba Hydro load growing. And on page 37 of the book of documents found under Tab 7, there is a less than average depiction of a -- of a chart showing electric heat customers' forecast, and it did not come out on the scanned copy, and I'll try to remedy that with a better colour copy for those who -- who want one.

But, in essence, Mr. Thomson, are you aware that from 2011 through '12 to '13 the -- the number of residential heat customers forecast has declined for the Corporation? You won't see it on that chart, sir.

MR. SCOTT THOMSON: No.

MR. BOB PETERS: I apologize.

MR. SCOTT THOMSON: Could I ask you to -- to -- when you reference the pages, the tabs that you're referring to? It just makes it a lot easier for me to find my notes on it.

MR. BOB PETERS: Reference it by tab, sir?

MR. SCOTT THOMSON: Yeah. You had --

MR. BOB PETERS: For tabs?

MR. SCOTT THOMSON: -- you had tabbed headings on -- on these documents.

MR. BOB PETERS: Yes, I did, and I'm -- I'm currently under Tab 7 --

MR. SCOTT THOMSON: Perfect.

MR. BOB PETERS: -- page 37. I apologize.

MR. SCOTT THOMSON: Yeah. No, that's okay.

MR. BOB PETERS: I've tried to make the page numbers paginate with the PDF, and that was not an easy task for me.

MR. SCOTT THOMSON: Okay. And sorry, I'm -- I'm oriented now.

MR. BOB PETERS: Is it correct to the panel that Manitoba Hydro revised its 2013 load forecast and now projects reduced customer numbers using electric heat by about fifteen thousand (15,000) at the end of the twenty (20) year forecast, like the number of customers is forecast downwards?

MR. SCOTT THOMSON: My understanding is that -- that, yes, there's fewer electric space heating customers in the 2013 forecast.

MR. BOB PETERS: And that's based on Manitoba Hydro's most current information, or is there a 2014 load forecast available?

MR. SCOTT THOMSON: This is the most recent information, as I understand it, and certainly the -- the load forecasting panel that's coming up next will be able to speak to that.

MR. BOB PETERS: Abs -- absolutely. And the -- and the -- also, now found at Tab 8, page 39 of the book of documents is a 2011, '12, and '13 residential load forecast by the standard customers, and standard customers are those who do not use electricity for space heat.

That's your understanding, sir?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And is there a conscious move afoot within Manitoba Hydro to have customers switch from electric space heat to gas space heat?

MR. SCOTT THOMSON: There's currently an -- an education program ongoing to -- to explain the -- the benefits of -- of using gas for space and water heating.

MR. BOB PETERS: Does that education include the results of the fuel switching report that

Manitoba Hydro did where I recall it being approximately seven thousand dollars ($7,000) cheaper for customers to convert to gas rather than stay on electric heat?

MR. SCOTT THOMSON: Yeah, the -- the savings attributable to -- to electric space heating is -- is included in that educational material.

MR. BOB PETERS: So perhaps, unlike your prior employment in British Columbia where you were trying to extol the virtues of gas heat, Manitoba Hydro, because it owns both sides of the energy sector, finds itself in a position it does not want to promote one over the other.

Would that be true?

MR. SCOTT THOMSON: Well, we want to make the -- the -- all of the information available to our customers and allow them to -- to make up their minds about what makes the most sense for them. There's the -- the Provincial Energy Plan has a very long-term objective of -- of getting the province off a carbon economy, so in the very long term that -- that's -- that's a stated goal.

We are -- we are trying to make the information available to our customers so that they can make informed choices.

MR. BOB PETERS: Almost a political answer, Mr. Thomson, but -- but you're -- you're not -- if -- if a customer walks up to you at lunchtime today and said, Should I heat with gas or heat with electricity, Manitoba Hydro wouldn't give him a direct answer? It would say, Here's the material, you decide for yourself?

Have I summarized your answer correctly?

MR. SCOTT THOMSON: Yeah. I -- yeah. I mean, it would depend on the person's perspective, but I -- I use natural gas for space heating in my home, and if I was building a new home, I would build it with natural gas space heating. I'm making that on -- on a whole host of -- of different determinants, but -- but it's -- it's cheaper, and broadly speaking, it -- it provides benefits to the customer, the utility, and the province as a whole.

MR. BOB PETERS: So what benefit to the province as a whole does heating with gas have relative to -- relative to heating with electricity?

MR. SCOTT THOMSON: The -- the -- to the extent that we were -- we create surplus that can be sold, there's -- there's a benefit in terms of -- of revenue. So there's a -- a net benefit to the province, the provincial economy, in terms of what we

can export power for that -- that would be freed up. And that's in the -- in the report that you were referring to.

MR. BOB PETERS: All right. In terms of simple math, I told you earlier that the residential rate was seven (7) cents a kilowatt hour, or seven point zero-two (7.02).

You'd accept that?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And so if you were to export your energy at a price less than seven point zero-two (7.02) cents, Manitoba Hydro would actually be losing money?

MR. SCOTT THOMSON: Over the long haul, we can -- if we can shape that -- that product, it's -- it's beneficial. And -- and we're -- we're utilizing capacity that exists on the natural gas system, so there's revenues that are -- that are achieved from -- on -- on the gas system.

MR. BOB PETERS: All right. Does -- does Manitoba Hydro then not raise a concern with greenhouse gas emission by converting from electric to gas heat?

MR. SCOTT THOMSON: Well, that's another one of the areas where there's -- there's

challenges from a regional perspective. The -- the exported power, it's displacing -- largely displacing thermal generation outside the province, which is about twice as intense in terms of emissions as -- as is the -- the combustion of natural gas in a -- in a high-efficiency furnace. So there's a net reduction in regional greenhouse gas emissions even if there's a -- an increase in provincial gas emi -- or GHGs.

And again, that's another -- that's another challenge for the way the score card works in terms of -- of who gets to account for what, but on a -- on a regional basis, it's -- it's -- it reduces the amount of greenhouse gas emissions.

MR. BOB PETERS: Manitoba Hydro imports electricity at night?

MR. SCOTT THOMSON: At times, yes.

MR. BOB PETERS: Probably every night for the last six (6) months, eight (8) months? Would you know that, or is that a question for Mr. Cormie?

(BRIEF PAUSE)

MR. SCOTT THOMSON: I -- I can't speak to whether it's every night, but -- but that information can be -- be made available on the next

panel.

MR. BOB PETERS: All right, but you understand that Manitoba Hydro will import electricity at night and, maybe the word is pond the water, or keep that energy in reservoir, and try to sell it at a higher price later?

MR. SCOTT THOMSON: Absolutely.

MR. BOB PETERS: And when Manitoba Hydro imports energy, it's importing out of the MISO market?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And im -- importing at night, if that's what Manitoba Hydro does, it's likely importing coal-based energy?

MR. SCOTT THOMSON: It can be coal, it can be base-load gas, and it can be wind. When -- the wind blows when the wind blows, and -- and so there's an opportunity there for us to bring that -- that power across the line.

In fact, that's one of the reasons why some of our US customers that have wind generation, they -- they want to buy our hydro power. It's -- it's an opportunity.

But as you -- as -- as Mr. Peters suggested, there -- there are ar -- arbitrage

opportunities for us, and -- and that helps us to keep our rates low as well. We can -- we can hold back water from -- in the reservoirs and -- and buy it cheaply and sell it for higher value in the day market.

MR. BOB PETERS: Does Manitoba Hydro specify what generation source created the electricity that Manitoba Hydro imports?

MR. SCOTT THOMSON: I -- I don't believe so, no.

MR. BOB PETERS: Manitoba Hydro doesn't say, We don't want coal generated electricity, we only want wind or gas?

MR. SCOTT THOMSON: We -- as far as I'm -- I know, we don't.

MR. BOB PETERS: And you probably couldn't do that from a MISO market perspective, where it's all fungible, in any event?

MR. SCOTT THOMSON: I think that's fair.

MR. BOB PETERS: And in terms of the document that's in front of you on page 39 from Tab 8, what is -- what is your understanding as to why the residential standard customer count is -- is decreasing from in the forecasts?

(BRIEF PAUSE)

MR. SCOTT THOMSON: I don't believe it is. The -- the eleven (11) line is the -- the lowest on the -- on the graph I've got in front of me. I think it's off slightly from last year, but it's up from eleven (11), unless I'm looking at the wrong document.

MR. BOB PETERS: I'm going to have to get a better copy, and I think that'll be a matter for tomorrow. But I think we are -- I think the -- the bottom line is the...

MR. SCOTT THOMSON: The bottom line's the 2011 forecast?

MR. BOB PETERS: Yes, correct. And -- and if you follow where we are, the 2013 I thought was the bottom line on this graph starting near the -- the left axis.

MR. SCOTT THOMSON: And it goes up and eclipses the previous year line.

MR. BOB PETERS: There -- there is a crossover at some point --

MR. SCOTT THOMSON: Yeah.

MR. BOB PETERS: -- in the future, but it's dropped in recent times, and my -- my question was

why does -- why does that appear to be happening?

MR. SCOTT THOMSON: Why don't you ask that for the detailed panel?

MR. BOB PETERS: All right, I'll take that.

MR. PATTI RAMAGE: Mr. Peters, could it -- we also ask perhaps if you gave us the source of the graph so we could check?

MR. BOB PETERS: Oh, sure. We'll provide that. I believe it was the load forecast that's shown in the right-hand column, Ms. Ramage, 2011, 2012, 2013 load forecast numbers.

If we turn the tab to --

MS. PATTI RAMAGE: Is there -- sorry. Is there an IR, or where it's --

MR. BOB PETERS: No, it's taken right out of the load forecasts.

MS. PATTI RAMAGE: So it's been prepared --

MR. BOB PETERS: Yes. Yes.

MS. PATTI RAMAGE: -- by a Board advisor. Okay. Thank you.

MR. BOB PETERS: Check Appendix C and D of those load forecasts and you'll find the -- the data.

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: Tab 9, Mr. Thomson, page 41 of the book of documents. You had mentioned earlier to the panel in your opening comments that -- that the industry sectors -- or there was growth happening in Manitoba, and would it be correct to say that when it comes to the top consumers, at this point in time, that that growth is not evident?

MR. SCOTT THOMSON: No, I don't think that would be -- be correct. The -- there were -- there were a couple of -- in -- in this graph that you're referring to, there was -- there was a loss of a large customer that -- that had an adjustment to that.

But following that, we -- we expect -- we expect to see that continue to -- to grow, and in re -- in recent times, we've been seeing that.

MR. BOB PETERS: Well, then if we turn to Tab 10 and page 43, we see out of one of the load forecast documents, a -- a graph of general service top consumers.

Do you see that?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And the -- the blue dots, if that's what they are, the dark ones, show the history or the actual results and -- and make reference

and visually depict that Manitoba Hydro has perhaps lost some load from top consumers?

MR. SCOTT THOMSON: Yes. I think that the -- the significant one was the loss of Tembec when it closed its Pine Falls operation.

MR. BOB PETERS: All right. And then Manitoba Hydro provides a forecast in -- in the -- the red -- on the red line as to what that forecast will look like for top consumers?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And then the green line is also Manitoba Hydro's forecast, but it takes out the potential large industrial load factor that's put into the load forecasts. Is that correct?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And you'll see in the chart on the bottom of -- of that page 43 that the PLIL is a number that Manitoba Hydro, after the first few years -- thank you -- puts down to approximately 100 gigawatt hours -- exactly 100 gigawatt hours a year, correct, starting in 2016/17?

MR. SCOTT THOMSON: Yes, I believe that's correct.

MR. BOB PETERS: And, so that -- that potential large industrial load is -- for a lack of

word, it's -- it's speculation as to what may happen for that customer class.

MR. SCOTT THOMSON: Yeah. I think that that forecast, or projection, is -- is based on historic experience. The -- the load growth from that sector was about 91 gigawatt hours a year over the last twenty (20) years, if you remove the effect of -- of the Tembec closure.

MR. BOB PETERS: So at this point in time, there's no committed customer for that hundred gigawatt hours a year, but it's -- Manitoba Hydro has used that as a proxy for what growth could come from existing or new customers?

MR. SCOTT THOMSON: Yeah. We -- I think that the average annual load growth since 2010/11 has been about 2 percent a year, which -- which was comparable to the annual average load growth over the last twenty (20) years. There's -- there's that short interim period where we're -- where we're holding back, and then the -- the forecast resumes picking up in anticipation of that in the future, so.

MR. BOB PETERS: We started this afternoon, once we got past the undertaking discussion, to talk about some of the risk factors that you had mentioned in your Corporate Strategic Plan, and that

was way back in Tab 5, page 24, Mr. Thomson, if you want the reference.

One of the other risks was the Power Smart results, and I heard you say, I think, repeatedly today that Manitoba Hydro is perhaps changing its plans, and is going to be more aggressive on looking for economic DSM?

MR. SCOTT THOMSON: Yes, that's correct.

MR. BOB PETERS: And at this point in time, has Manitoba Hydro been able to quantify where that's going to take the Corporation with -- with their plans?

MR. SCOTT THOMSON: Yeah. I think -- just one sec.

(BRIEF PAUSE)

MR. SCOTT THOMSON: I'm advised that the panel that's going to be on tomorrow is going to speak to the expended DSM program and, next week, the economics of that.

MR. BOB PETERS: Thank you. The -- the long story short on that, Mr. Thomson, in terms of a risk factor if DSM is taken up more aggressively by

Manitobans, that would mean there wouldn't be a need for new supplies for Manitobans as early as you had mentioned in your opening comments.

MR. SCOTT THOMSON: On some plans, yes. There -- there'd be an acceleration of -- if -- if, for instance, we were to proceed with Keeyask and the export sales, then -- then we would be accelerating the need beyond a no-sale scenario.

MR. BOB PETERS: And I suppose the converse is true, that if the -- the -- if the product, or if the energy isn't needed for Manitobans, it would afford an opportunity to try to sell it on the export market for more than what you would make if you sold it to Manitobans.

MR. SCOTT THOMSON: It -- it could provide that opportunity, yes.

MR. BOB PETERS: One of the other identified risks in your Corporate Strategic Plan was the export contracts.

And when you referenced the export contracts, Mr. Thomson, are you referring to just the number of them, or are you determining the duration of them?

MR. SCOTT THOMSON: Yeah. All of the above. As -- as we move into the future and we secure

the contracts, the risks go down. So -- so we're making progress in that regard.

MR. BOB PETERS: But you'd agree that these contracts have an end date on them?

MR. SCOTT THOMSON: They -- they are for specified terms, yes.

MR. BOB PETERS: And as you're testifying before the Board, there is no certainty that after those dates, that those contracts would be renew -- renewed by that counterparty, or even taken up by some other counterparty.

MR. SCOTT THOMSON: That's true, although we're -- we ultimately are building the projects for -- for domestic purposes, and we would anticipate that at a point in time in the future, we'd no longer be able to serve them because our domestic load has increased.

I referenced NSP or -- or the Xcel renewal in -- in 2025. We won't be trying to replace that sale if -- if we don't build Conawapa because we wouldn't be in a position to -- to re-up that -- that agreement.

(BRIEF PAUSE)

MR. BOB PETERS: If you flip ahead to Tab 15 and page 53 of the book of documents, Mr. Thomson, let's just talk about your last answer. On this chart, trying to graph some of the information from Appendix 11-3 seems to suggest that at a certain point in time, looking at the right side of the chart, that the total export sales goes flat in approximately -- is that 2048?

Do you see that?

MR. SCOTT THOMSON: I -- I see where it goes flat, yes.

MR. BOB PETERS: And that suggests then that if the total export sales have gone flat, it also suggests then that the domestic load has also gone flat at that point in time. Would that be correct?

MR. SCOTT THOMSON: I'm not sure that follows.

MR. BOB PETERS: All right. Would you agree, though, that what you're showing, if these numbers are properly depicted, and we'll let the next panel or the second next panel discuss that, that when the export volume -- the sales go flat, the export revenue line, the red line, keeps going up, which seems to suggest that the exports become more valuable, either through price or volume or whatever else

happens.

MR. SCOTT THOMSON: Yes. We've -- we've -- I mean, this extends beyond the term of the existing arrangements, obviously, but there's -- there's an inflation, an expectation that they'll -- they'll inflate, which is pretty standard in -- in the arrangements we've entered into.

MR. BOB PETERS: What you're telling the Board is that, without being specific about what contracts, there's generally a provision of some escalation to go along with the fixed prices.

MR. SCOTT THOMSON: That's generally standard, and I'd ask that we talk about that in any detail that -- in -- in the confidential panel.

MR. BOB PETERS: If you can take it, subject to check as we often say, that the domestic load on Schedule 11-3, page 272 of 432, shows domestic load going flat at that point in time.

Is that a realistic assumption?

MR. SCOTT THOMSON: I'd prefer you ask that to the next panel.

MR. BOB PETERS: All right. We'll do that. Let's turn back then to talk about export revenue and Tab 11, page 45, because export -- export prices is a -- is a major risk faced by the

Corporation, Mr. Thomson?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And on this chart, although again, we -- what -- what we're trying to show in -- in general terms is that the historical export line with the orangey-red line, solid line with the circles on it, for lack of better description, on page 45 of Board counsel's book of documents, which is PUB Exhibit 58-1, that shows the actual average unit export revenue for Manitoba Hydro since approximately 2004?

MR. SCOTT THOMSON: Yes, both firm and -- and opportunity.

MR. BOB PETERS: Right. And you're making the point that blended into this is -- is what the opportunity and the firm price have as an average?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: What also is shown here is that there were forecasts along the way over the years that Manitoba Hydro had where there was an expectation that the export prices were going to increase and increase, in some cases, significantly?

MR. SCOTT THOMSON: Yes, based on -- in -- in part on -- on contracts that we had been negotiating and -- and the forecasts -- the external forecasts.

MR. BOB PETERS: Well, the Wisconsin deal that -- that was signed this last weekend, the term sheet for that goes back to March of 2008. Have I got that right?

MR. SCOTT THOMSON: I believe that's correct.

MR. BOB PETERS: So a lot of these deals were being negotiated way back when, in -- including the NSP and maybe Minnesota Power?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And since then, the circumstances haven't turned out as forecast, at least in terms of Manitoba Hydro's forecast. Would that be true?

MR. SCOTT THOMSON: Well, we've -- we've revised our forecasts each year.

MR. BOB PETERS: Does that mean you never get them wrong?

MR. SCOTT THOMSON: Well, forecasts are never right.

MR. BOB PETERS: It's just a question of how wrong they are. Is that -- is that -- that the reality? The blue solid line on page 45 that's shown on the screen, that's the export line now used for the NFAT purposes. Do you accept that?

MR. SCOTT THOMSON: I believe that's correct, yes.

(BRIEF PAUSE)

MR. SCOTT THOMSON: Sorry, no. I'm -- I'm looking now -- I -- I have a hard time these days seeing certain font sizes, but I believe that was picked up from the forecasted unit revenues for the CEC hearing around Wuskwatim.

MR. BOB PETERS: I was looking at the solid blue line, which was the IFF adjusted Preferred Development Plan unit revenues. The solid blue line, the lowest one on the -- on the chart.

MR. SCOTT THOMSON: Yeah. I see the solid blue line, and I'm --

MR. BOB PETERS: You're just not sure that's the right reference?

MR. SCOTT THOMSON: If you're -- just one (1) moment, please.

(BRIEF PAUSE)

MR. BOB PETERS: Mr. Thomson, I'm going to interject, if you will let me, before you answer

that. I'd like you to disregard that arrow. There was a shaded area on this page that didn't come through on the scanning and the photocopying, and there was a -- a range of export prices that was given at the Clean Environment Commission hearing into Wuskwatim.

I can indicate that I know My Friends at MIPUG have similar documents, and I didn't -- I didn't want to dwell on what was presented at the Wuskwatim hearing, but if you can disregard that arrow and just focus on the blue line, would you be prepared to take, subject to check, that it represents the Preferred Development price unit revenues that are contained in the NFAT filing?

MR. SCOTT THOMSON: I'm not sure I can do that. I believe this was a GRA document not filed in this proceeding.

MR. BOB PETERS: It -- it was a GRA document that was updated for this hearing.

MR. SCOTT THOMSON: Okay. Just one (1) sec.

(BRIEF PAUSE)

MR. SCOTT THOMSON: We're having a hard time identifying the source of the documents, whether

this is built into our analysis here or not so -- because this isn't our document.

MR. BOB PETERS: No, it -- it was taken as an exhibit and then we added a line based on what we were given as the average export unit revenues coming out of the IFF used to support the NFAT. So the blue line, the dark blue line, wasn't yours or it wasn't Manitoba Hydro's, but it was plotted based on our interpretation of the IFF adjusted that was used in the NFAT.

But let's -- let's approach it this way Mr. Thomson; the -- the -- for those who want the definitive source, it's on page 271 of 432 of Appendix 11.3, which is one of the source documents that we were using.

The average export unit revenue since 2008/09 have been about thirty dollars ($30) a megawatt; would that be correct, Mr. Thomson?

MR. SCOTT THOMSON: Since which period?

MR. BOB PETERS: Since 2009.

MR. SCOTT THOMSON: That appears to be correct based on what's on this page.

MR. BOB PETERS: All right and that's about forty dollars ($40) a megawatt lower than what was forecast way back in IFF-09, according to the

materials that's plotted

MR. SCOTT THOMSON: As -- as plotted yes.

MR. BOB PETERS: All - all that tells the --

MR. SCOTT THOMSON: 2011 on --

MR. BOB PETERS: All that tells the panel, Mr. Thomson, is that export prices have changed since Manitoba Hydro was forecasting them back in 2008/09.

MR. SCOTT THOMSON: That's true. We had a pretty significant economic downturn that occurred around that time.

MR. BOB PETERS: And subsequent to that economic downturn, have we recovered from it?

MR. SCOTT THOMSON: Well, the -- the economy has been responding in the US, yes.

MR. BOB PETERS: All right. And the prices are still low?

MR. SCOTT THOMSON: Yes, and they've recovered somewhat in the last year. We've seen a -- a surge in our -- in our export revenues.

MR. BOB PETERS: And we'll talk to the panel about the dollars and cents of that. But -- but it's still -- it's still below what was predicted back

in 2008/09?

MR. SCOTT THOMSON: Yes, and I guess the only point I would like to make is that -- that these forecasts do move and that -- that our current analysis is based on a much different forecast than -- than had been made four (4) years ago.

MR. BOB PETERS: And if you take it subject to check your new forecast is the solid blue line above that arrow that I asked you to cross off?

MR. SCOTT THOMSON: Subject to check.

MR. BOB PETERS: All right, and when we talk about forty dollars ($40) a megawatt lower, we can convert megawatt -- dollars per megawatt into cents per kilowatt, help some of the lawyers in this room.

And the forty dollars ($40) a megawatt is really about four (4) cents a kilowatt hour, correct?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And so when we see the sales, the actual history here, shown as the historical export unit revenues, around the thirty dollars ($30) a megawatt hour, that's telling this Board that on average Manitoba Hydro has been exporting it's energy for three (3) cents a kilowatt hour?

MR. SCOTT THOMSON: Approximately up

until in the period nine (9) through twelve (12), yes. It's a wholesale price of power.

MR. BOB PETERS: I'm sorry?

MR. SCOTT THOMSON: It's a wholesale price of power, you can't -- you can't equate that to what residential customers pay in the province. Doesn't include all the costs of distribution and -- and all the other costs that -- that are related to -- to -- an industrial power customer would be more akin to that. And that's approximately what our industrial customers are paying.

MR. BOB PETERS: Okay, I'm sorry, I've got your point. Your point is, you don't want to compare the three (3) cents a kilowatt hour that you're selling on export on average, to the seven (7) cents you're getting from residential customers?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: It would be more akin to the four (4) cents or whatever you're -- the -- the MIPUG customers are paying. And we could look at their rate sheet to see what that is.

MR. SCOTT THOMSON: They're more akin to, yeah, an industrial customer load. Our firm sales, which are industrial customers, are -- are customers that are buying dependable energy. Our firm export

sales are higher than -- than the domestic rates, but the -- the opportunity or spot market prices, we're -- we're getting what we get in the marketplace.

The alternative would be to -- to spill that water and make no money on it, so it's a -- it -- its cost of production is -- is in the three and a half (3 1/2) dollar a megawatt, point three (.3) cents, that's -- to -- to produce. That's the -- the cost of the water rental.

So when -- when we sell power for twenty dollars ($20) on the spot market overnight, it's only costing us three and a half (3 1/2) dollars to produce. It's still good for our customers. It still creates revenue and benefit for Manitoba.

MR. BOB PETERS: And that assumes, Mr. Thomson, that the cost you receive on the export can carry the costs of things like depreciation, finance expense, and O&M in addition to the one-third (1/3) of a penny that you pay the province for water rentals.

MR. SCOTT THOMSON: Yeah. What I -- what I was referring to was, when we sell surplus power when there's more water available to us, we've are -- we're -- we're paying the costs of -- the fixed costs of our -- our system, and we're better off to sell into the spot market even at these lower prices than to --

to not generate electricity with -- with that water. We -- we get a positive contribution to the benefit of the customers in the province.

MR. BOB PETERS: In the few minutes I have left, Mr. Thomson, let's just please jump ahead to Tab 12, page 47 of the book of documents. I just wanted to come back to this chart because you had mentioned to the Chairman and the panel members that -- you'll see it on the screen in front of you, just to make sure you're looking at the same page.

You had said something to the effect that Manitoba Hydro won't renegotiate one (1) of the NSP deals if certain things happen.

Do you recall saying that earlier this afternoon?

MR. SCOTT THOMSON: Yeah. What I was referring to when -- when I mentioned that was that was that absent -- absent Conawapa, I understand we're not going to be in a position to extend that deal.

MR. BOB PETERS: Can you -- on this chart --

MR. SCOTT THOMSON: That -- that blue line presupposes the -- the Preferred Development Plan where we've got Keeyask in '19 and Conawapa in 2025.

MR. BOB PETERS: And where the spike

occurs sometime after 2026, that's the -- that's the onset or the in-service of Conawapa --

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: -- as it's depicted. And you're -- you're telling the Board that if Conawapa is not built, that blue line, instead of going up will come down.

MR. SCOTT THOMSON: That's right.

MR. BOB PETERS: And depending on how far it comes down will determine how much is available to be sold on any firm contract to any counterparty after 2026?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: Can you tell the Board, where does the WPS 308 megawatt sale fit on this graphical depiction?

MR. SCOTT THOMSON: It -- it -- you'll see -- I believe the -- the original -- it's the dotted line five (5).

MR. BOB PETERS: Yeah. It's the WPS 100 megawatt arrangement, and when it expires, it's -- the 100 megawatts goes up to three hundred and eight (308).

Is that the public announcement?

MR. SCOTT THOMSON: Yeah. When -- once

-- that -- that's right, but I -- I'm not sure that the three hundred and eight (308) is depicted here, just --

MR. BOB PETERS: I'm sorry. It's not on this graph yet.

MR. SCOTT THOMSON: Yeah.

MR. BOB PETERS: But I'm just asking you, where would it fit?

MR. SCOTT THOMSON: The three hundred and eight (308) addition would be in the piece -- the -- the final segment that's in the -- the green hatched. It would be above that, so starting in 2026/7, going out just slightly beyond the -- the graph.

MR. BOB PETERS: So it would carry on past the Minnesota Power deal --

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: -- that's set to expire at that time.

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And from a financial basis, if I turn to -- quickly to Tab 18 and page six -- fifty-nine (59), Mr. Thomson, your --

MS. PATTI RAMAGE: Mr. Peters, can I just interject --

MR. BOB PETERS: Yes.

MS. PATTI RAMAGE: -- for just a

second? I just want it on the -- the chart that was there, because we're having some confusion in terms of -- for Mr. Thomson's benefit, again in terms of a reference. I think the last two (2) -- to clarify, because I don't know the record off by heart, is this a Manitoba Hydro chart?

MR. BOB PETERS: No, it's not.

MS. PATTI RAMAGE: It is not. I -- it may be helpful for all parties as -- as we go forward, a lot of these charts look alike and I think it's beneficial to know who produced a chart, because there's a certain assumption that this is Manitoba Hydro's evidence, and particularly for Mr. Thomson's benefit.

The subject matter experts, I'm not always sure that they would necessarily agree with what's depicted on the chart and, so it's helpful for Mr. Thomson if he knows who created the chart and whether it's his own staff whose information he's looking at, or someone's interpretation of that.

So with that caveat, carry on, but I think Mr. Cormie may have some comments on these charts.

THE CHAIRPERSON: I wonder if you wouldn't be in a position to make an undertaking to us

to deliver us a similar chart which encompasses the new contract, disposed in the same way, but I would add a line that indicates what's available, dependable energy there so that we understand what's available for sale rela -- for -- for long-term fixed contracts relative to what is available overall?

I think that would be very useful for me, and I'm not sure about the other members, but just to make sure that it's --

MS. PATTI RAMAGE: I think I'd be more comfortable with that if I knew Mr. Cormie for -- and his staff agreed with the contents of the chart.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Yes, subject of course to I have to speak to Mr. Cormie if he has any concerns with that, but I would be more comfortable.

--- UNDERTAKING NO. 3: Manitoba Hydro to provide a similar chart to PUB/MH I-012a which encompasses the new contract, and add a line that indicates what dependable energy is

available for long-term fixed contracts relative to what is available overall

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: And, Mr. Thomson, just to jump in here, what's attempted to be depicted in this chart, or -- or the one that Manitoba Hydro prepares or has prepared relative to the same as this, the bottom portion, those rectangular shapes that are coloured blue and red and green, those are depicting the contract announcements that Manitoba Hydro has made, correct?

MR. SCOTT THOMSON: I presume that's what they do. I mean, the --

MR. BOB PETERS: All right.

MR. SCOTT THOMSON: -- they're identified as having been sales contracts.

MR. BOB PETERS: And in terms of --

MR. SCOTT THOMSON: I haven't done the conversion in my head in terms of gigawatt hours to -- to verify that that's correct.

MR. BOB PETERS: And it's the -- it represents the contracts that the Board understands are under a fixed price arrangement that Manitoba Hydro

has. Would you accept that, subject to check?

MR. SCOTT THOMSON: Subject to check.

MR. BOB PETERS: And that blue line at the top that oscillates up and down, you'd understand that to be the -- the energy exports that are not under firm price contracts, but rather under market price scenarios.

(BRIEF PAUSE)

MR. SCOTT THOMSON: Evidently the -- the bees have been buzzing. Our subject matter experts have concerns and -- and don't accept the chart, so I'd prefer not to answer anymore questions on the chart until we've -- we've prepared something.

MR. BOB PETERS: I understand that, and we'll await the answer to the undertaking then. The last area that I want to ask you about, Mr. Thomson, is at Tab 18, page 59 of the book of documents, and from the Ivey School of Business, you should be able to help me on this one.

The -- Manitoba Hydro has gained revenues as a result of the foreign exchange difference between Canada and the United States, sir?

MR. SCOTT THOMSON: No more -- very

recently, yes. We've -- we -- in -- there's been a decline in the exchange rate in the last several years that -- that's been negative to -- to revenues on a -- on a unit cost basis.

MR. BOB PETERS: And I'll try to put this correctly for the economists in the room, as well. The weaker the Canadian dollar relative to the American dollar, the better it is for Manitoba Hydro as an exporter?

MR. SCOTT THOMSON: Generally speaking, that's true. The -- we -- we have a -- a natural hedge in our operations in terms of the -- the amount of debt that we carry in US dollars, and it -- and it's a fairly effective hedge so the -- the -- over -- over the near term, and -- and given our existing configuration, it doesn't have a huge positive or negative impact.

But as we move forward in time, the -- depending on the level of debt we place in US -- US denominated debt and the -- and the related revenue streams, you know, the -- the effectiveness of the hedge will likely decline somewhat. So when -- when the US dollar strengthens, it -- it tends to be favourable to our operations. Sorry, that wasn't an easy answer, but...

MR. BOB PETERS: Well, on this -- on this information which came, and has been before the Board in -- in general rate applications, Manitoba Hydro -- if you -- if you take the revenue Manitoba Hydro gets on its US sales, and then factor -- factor out the exchange rate, you can determine how much money Manitoba Hydro gains simply as a function of the exchange rate.

MR. SCOTT THOMSON: Is that another way to say how much they -- they are in US dollars?

MR. BOB PETERS: Well, we know how much they are on line 'B' in US dollars. Let's go back to 1999 and 2000. Manitoba Hydro made two hundred eighty-six million three hundred and thirty-seven thousand dollars ($286,337,000) on US -- on exports to the US. And in terms of US revenue, in US dollars it was $244 million. And the difference would have been a surplus in favour of Manitoba Hydro?

MR. SCOTT THOMSON: Yeah, it would -- it's just -- it's US dollars translated to Canadian dollars.

MR. BOB PETERS: Right. And in terms of this NFAT, Manitoba Hydro is forecasting the exchange rate closer to the one point zero four (1.04) in the near term?

MR. SCOTT THOMSON: Yeah, I'll accept that, subject to check. I think that's right. In the near term.

MR. BOB PETERS: Mr. Thomson, is there a capital expenditure forecast '13 that's been prepared?

(BRIEF PAUSE)

MR. SCOTT THOMSON: We haven't filed that.

MR. BOB PETERS: I know it hasn't been filed. I think it was referenced in one of the IEC reports.

Is that a document that's available to be filed?

(BRIEF PAUSE)

MR. SCOTT THOMSON: We're having -- we're -- we're just talking about fiscal years and calendar years here.

I understand that the '13/'14 capital expenditure forecasts will be filed with the general rate application, which will be later in March.

MR. BOB PETERS: Okay. Well, let's not close the microphone to Mr. Peters yet, if we can, and let me just go down that road, Mr. Thomson. I remember, perhaps not this last weekend, but maybe it was the weekend before, Manitoba Hydro had another public announcement about issuing its third quarter report?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And Manitoba Hydro has net income on its electric operations over a hundred million dollars better off in the most current nine (9) months than it did a year -- in the previous year's nine (9) months?

MR. SCOTT THOMSON: I believe that's right.

MR. BOB PETERS: And there's also -- I think one (1) of the reasons for that turnaround was attributed to things like the PUB rate increase from last year, correct?

MR. SCOTT THOMSON: There's a portion of it associated with that. The -- the majority of it related to water levels and -- and export sales.

MR. BOB PETERS: And a portion related to the cold weather?

MR. SCOTT THOMSON: That played a

factor, too. It's we -- it's -- it's the only silver lining to this winter cloud.

MR. BOB PETERS: And that cold weather -- your quar -- your third quarter report stopped in December 31 of 2013?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And my recent memory is that January and February have been colder than normal.

MR. SCOTT THOMSON: I hope so.

MR. BOB PETERS: And that all means the silver lining that you talked about, that Manitoba Hydro's revenues will be above what would be based on normal expectations?

MR. SCOTT THOMSON: Yeah, I think we -- we included some outlook information in the -- in the press release.

MR. BOB PETERS: And even in light of -- in -- in light of the improved financial position of Manitoba Hydro, you're indicating that Manitoba Hydro is going to be filing a general rate application for rates effective April 1st, 2014?

MR. SCOTT THOMSON: That's correct.

MR. BOB PETERS: And what's the rate increase that's going to be sought?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Can I say that it's consistent with what we've been filing, but it's not part of an application that's been filed yet, so.

MR. BOB PETERS: All right. I'll tell you my recollection of what's consistent, Mr. Thomson. You tell me if I'm off-side or if I'm in the ballpark. The last IFF I remember seeing included annual rate increases going forward of 3.95 percent for the next eighteen (18) to twenty-two (22) years?

MR. SCOTT THOMSON: Yes.

MR. BOB PETERS: And that's in the ballpark of where you're talking about this rate increase coming up?

MR. SCOTT THOMSON: Yeah, the interim application will be for a year.

MR. BOB PETERS: And did I understand then that the CEF13 is available but it's not available to the NFAT proceeding?

MR. SCOTT THOMSON: We're in the final stages of putting together a general rate application, so I'll have to check.

MR. BOB PETERS: All right. If -- if CEF13 is available, would you undertake to file it in

these proceedings through your counsel?

MR. SCOTT THOMSON: Sure.

MR. BOB PETERS: All right.

--- UNDERTAKING NO. 4: Manitoba Hydro to File CEF13, if available

MR. BOB PETERS: Mr. Chairman, at this point I am going to thank Mr. Thomson very much. I appreciate him answering my questions. And, subject to the Board's plans, turn it over to counsel opposite.

THE CHAIRPERSON: Thank you, Mr. Peters. Over to you, Mr. Williams.

MS. PATTI RAMAGE: Before Mr. Williams begins, can we have a two (2) minute break?

THE CHAIRPERSON: Yes, two (2) minutes, please.

--- Upon recessing at 2:17 p.m.

--- Upon resuming at 2:20 p.m.

THE CHAIRPERSON: I believe we're ready to resume the proceedings, so Mr. Williams, please.

CROSS-EXAMINATION BY MR. BYRON WILLIAMS:

MR. BYRON WILLIAMS: Good afternoon, members of the panel and Mr. Thomson. My client's not able to be here this afternoon. She did want to express her appreciation to you through me for your courtesy in -- in attending. It's -- it's much appreciated.

I hope you'll forgive me if I -- I don't ask you too many questions. That -- that'll be all right with you, sir?

Now, just from your discussion with Mr. Peters, Mr. Thomson, it would be fair to say that you're not the detail guy supporting the Manitoba Hydro Application? Would that be fair?

MR. SCOTT THOMSON: That's fair.

MR. BYRON WILLIAMS: You're the high level vision guy?

MR. SCOTT THOMSON: I guess you could say that.

MR. BYRON WILLIAMS: And the vision for the hydro plan, as you testified this morning, dates back about a decade. Agreed?

MR. SCOTT THOMSON: Yeah. The -- we've been working on it a long time.

MR. BYRON WILLIAMS: Yeah. And you joined Hydro in 2000 -- 2012, almost two (2) years ago,

in February, agreed?

MR. SCOTT THOMSON: Yeah, that's right.

MR. BYRON WILLIAMS: And, so by the time you joined the Corporation, for example the JKDA with the Keeyask Cree Nation partners had been signed in 2009, correct?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: And the contract with NSP and with Minnesota Power, those had been signed, agreed, in 2011?

MR. SCOTT THOMSON: Yes, subject to check.

MR. BYRON WILLIAMS: Okay. I think you can trust me on these ones, sir.

MR. SCOTT THOMSON: Okay

MR. BYRON WILLIAMS: And the 100 megawatt sale to WPS commencing in 2021 had also been signed, agreed?

MR. SCOTT THOMSON: That's right.

MR. BYRON WILLIAMS: And the decision to sequence Keeyask ahead of Conawapa had already been reached by the time you joined the Corporation?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: Okay.

THE CHAIRPERSON: Mr. Thomson, could I

ask you to put -- to move the microphone to the other side of your -- your left-hand side. That'll probably be easier.

Yeah. That'll be -- I think we'll get a -- we'll get a better reception if you're speaking to that one.

MR. SCOTT THOMSON: Okay.

THE CHAIRPERSON: Thank you.

MR. SCOTT THOMSON: Is that better?

THE CHAIRPERSON: Yeah

CONTINUED BY MR. BYRON WILLIAMS:

MR. BYRON WILLIAMS: I was trying to take tactical advantage of you having to twist your head, Mr. Thomson, so.

Despite your recent start with the Corporation, I take you -- take it that, at a high level, you're familiar with the NFAT business case?

MR. SCOTT THOMSON: Yes, I am.

MR. BYRON WILLIAMS: And at a high level you're aware of the screening process and the alternatives analysis?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: And I know you've been really busy since you got here, but would I be

correct in assuming that prior to pro -- partaking in -- - in this NFAT you would have taken the time to review the report and recommendations of the joint panel into the Wuskwatim NFAT?

Would you have done that, sir?

MR. SCOTT THOMSON: I haven't seen that in detail.

MR. BYRON WILLIAMS: Okay. Coming back to 2013, can we agree that at the time the Hydro business case was filed in August of 2013 that an economic analysis to evaluate the attractiveness of higher levels of DSM was not able to be completed at that time, sir?

MR. SCOTT THOMSON: Yes, that's true.

MR. BYRON WILLIAMS: And we can agree -- - or you will agree with me, that the Hydro business case filed in August of 2013, in the business case, the Corporation was unable to provide an integrated evaluation of DSM and supply options which would have allowed for the assessment at the optimum level of DSM, correct?

MR. SCOTT THOMSON: I think that's true. I think that sensitivity information had been filed at that point, and -- and we were waiting for the -- the DSM potential study results to come out to -- to

have a better understanding of what was -- what was possible.

MR. BYRON WILLIAMS: Okay. And, sir, again recognizing that you haven't memorized the report from Wuskwatim into the NFAT, but going back to that report, would you be aware that in that proceeding it was recommended that in any future Manitoba Hydro -- Hydro NFATs, that portfolios should include consideration of hydro electric sequencing as well as coordinated implementation of other initiatives, such as DSM programs and SSE programs?

Were you aware of that, sir?

MR. SCOTT THOMSON: Not the explicit details, but -- but I'll accept that.

MR. BYRON WILLIAMS: Okay. And you'll be aware -- or you'll accept, subject to check, that the Wuskwatim recommendations were made in September of 2004?

MR. SCOTT THOMSON: Subject to check.

MR. BYRON WILLIAMS: Roughly nine (9) years before this NFAT filing, agreed?

MR. SCOTT THOMSON: Agreed.

MR. BYRON WILLIAMS: And would you agree that nine (9) years would be sufficient time to integrate DSM into hydro resource planning in such a

way as to provide alternatives for examining an optimized DSM por -- portfolio, sir?

MR. SCOTT THOMSON: Well, I think that work had been done. A consultant had been hired. And as I understand it, the -- the Corporation anticipated the -- the DSM potential study about a year before it was delivered. It was -- it was quite late.

And so the -- the work plan had -- had anticipated that -- that we would have had that and we would have been able to integrate that sooner. The analysis is -- has been done subsequent, and -- and the -- the DSM load forecasting panel, which is next, tomor -- I believe, starting tomorrow, will be addressing questions around that.

MR. BYRON WILLIAMS: And, Mr. Thomson -- and if this is an unfair question, your counsel will -- will chip in -- but, to your knowledge, has the detailed analysis supporting this DSM analysis been -- been filed on the public record or is it just the reference to the -- in rebuttal evidence?

(BRIEF PAUSE)

MR. SCOTT THOMSON: It's -- it will be filed. Mr. Kuczek, tomorrow, will be in a position to

give you an idea of when.

MR. BYRON WILLIAMS: So it's -- it's not yet filed, sir?

MR. SCOTT THOMSON: Correct.

MR. BYRON WILLIAMS: Now, you had a really enjoyable conversation with My Learned Friend Mr. Peters this morning, so I won't go too much into the American transmission line, but I do have just a couple of questions of -- of follow-up.

And -- and for clarity's sake, I'm referring to the 750 megawatt American portion of the line that you discussed with Mr. Peters this morning.

Okay, Mr. Thomson?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: And just in terms of that line, and just to try and summarize your conversation with Mr. Peters, would it be fair to say, referring specifically to the American portion, that initially Manitoba Hydro may own up to 49 percent of that line, sir?

MR. SCOTT THOMSON: Yes, initially.

MR. BYRON WILLIAMS: Would it be also fair to say that initially it would be responsible -- may be responsible for up to two-thirds (2/3s) of the construction costs?

MR. SCOTT THOMSON: No. Minnesota Power will be responsible for at least 51 -- well, fif -- they will be responsible for 51 percent, and -- and we may be responsible for up to 49. We'll -- we're -- we'll be actively seeking to -- to lay that off and bring other -- other partners in prior to the -- the completion of the line.

MR. BYRON WILLIAMS: So for greater clarity, Minnesota Power is assuming the one-third (1/3) of that cost associated with the 250 megawatt, and then it is kicking in something additional of -- towards the 750 megawatt, sir?

MR. SCOTT THOMSON: Yeah. I'm just hesitating because we're -- we're getting dangerously close to an area that we should be talking about in camera.

MR. BYRON WILLIAMS: The percentage ownership?

MR. SCOTT THOMSON: No, the details around the -- the deal.

MR. BYRON WILLIAMS: Okay. Well...

MR. SCOTT THOMSON: I -- I shared the percentage ownership with you. It's 51 percent.

MR. BYRON WILLIAMS: In terms of the share of the construction costs, is it possible that

Hydro will be responsible for more than 49 percent, sir?

MR. SCOTT THOMSON: No.

MR. BYRON WILLIAMS: Currently, would it be responsible for 49 percent of the construction costs?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: Okay. Thank you. Apart from the NFAT, it would be fair to say that Hydro's been kept fairly busy with other regulatory processes?

MR. SCOTT THOMSON: That's fair.

MR. BYRON WILLIAMS: You spoke this morning of the Keeyask EIS, and you're awaiting recommendations from the Clean Environment Commission?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: And once those recommendations are out, it'll be up to pro -- to the province to decide what to do with them, agreed?

MR. SCOTT THOMSON: That's correct.

MR. BYRON WILLIAMS: And you're anticipating those recommendations in April?

MR. SCOTT THOMSON: Yeah. My understanding is they have ninety (90) days from the close of the proceedings, so that would put it late April.

MR. BYRON WILLIAMS: And then there will be subsequent actions which are required to be taken by the province, presumably --

MR. SCOTT THOMSON: That's correct.

MR. BYRON WILLIAMS: -- one (1) way or the other?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: And in addition to the Keeyask EIS another process that the Corporation is involved with would relate to the regional cumulative effects assessment of the Nelson River watershed --

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: -- sub-watershed?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: And that process was just initiated in the fall of 2013, sir, agreed?

MR. SCOTT THOMSON: I believe that's -- that's accurate.

MR. BYRON WILLIAMS: And the Clean Environment Commission, I think it's fair to say, in its Bipole III recommendations, suggested that that

analysis be completed before any new projects beyond Bipole III were licensed.

Is that your understanding, sir?

MR. SCOTT THOMSON: Yeah. I believe those were the -- were the -- the recommendation that they'd had. The -- the Keeyask project had been initiated before -- before that had -- those recommendations came out. Nonetheless, we're -- we're proceeding with that, and I understand that there'd be a preliminary report out later this spring or around June time-frame.

MR. BYRON WILLIAMS: So the summer of 2014 you're expecting an interim report, sir?

MR. SCOTT THOMSON: That's my understanding.

MR. BYRON WILLIAMS: And while those are going on, of course we've got the NFAT that we're -- you're juggling as well?

MR. SCOTT THOMSON: Yes.

MR. BYRON WILLIAMS: Given all these moving parts including the EIS, the regional cumulative effects assessment, and the NFAT, would it be fair to say that it is unlikely for Keeyask to begin construction in the summer of 2014?

MR. SCOTT THOMSON: No. I think we're

-- we're very hopeful that we're -- we're going to proceed starting in July, subject to the -- the outcome of this proceeding and -- and the determination by the province.

It -- I'll grant you, it's tight -- the -- but if the panel issues its report on or prior to June 20th, if you look at the -- the time-frames around when the Bipole III recommendations came out and the length of time it took for the province to issue a licence, we can -- we can get it all done in -- in the time-frame to allow a summer construction start. And it's -- it's pretty important that we -- we make that happen, because the -- there's -- there's -- you know, there's construction windows and there's only certain times that we can -- we can be operating in the river. It's -- it's particularly important that we start the cofferdamming of the river this summer in order to -- to protect the overall construction schedule 'cause you can't -- you can't do that work in the winter.

MR. BYRON WILLIAMS: And just in -- in terms of that specific issue, the cofferdamming, what is your summer window of opportunity, sir?

MR. SCOTT THOMSON: Sorry, the...?

MR. BYRON WILLIAMS: The summer window of opportunity? You said it's quite short.

MR. SCOTT THOMSON: Yeah. We're -- we're looking by mid-July to be -- to be wet, as -- as they say, and then through early fall before the ice starts forming up.

MR. BYRON WILLIAMS: Okay. So if there's a slippage of two (2) months, construction would be in jeopardy --

MR. SCOTT THOMSON: I --

MR. BYRON WILLIAMS: -- in the summer of 2014?

MR. SCOTT THOMSON: Yeah, I think that's fair to say. If we were -- if we were pushed out past July we'd lose the summer.

MR. BYRON WILLIAMS: Okay. I thank you, Mr. Thomson, and I turn it over to My Learned Friend Mr. Hacault, I believe. I'm not sure who I turn it over to, sorry.

THE CHAIRPERSON: Before -- before you go there, I want to make sure I understand what Mr. Williams first addressed, which is -- or at least addressed, which is the issue of the cost of that transmission line to the US.

Now, I understand completely that the 51/49 split. What I do not understand, I want to make sure I clarify, is who's picking up the cost of the

construction of that line south of the border. I clearly read that Manitoba Hydro at the present time was assuming two-thirds (2/3s) of the cost of that because of the -- the dropping out of the Wisconsin counterparty in the construction of the line.

So I -- I need to understand what the responsibility is for Manitoba Hydro on that southern portion of the kV line.

(BRIEF PAUSE)

MR. SCOTT THOMSON: Mr. Chair, I think that -- that in the original filing under "Pathway 4" there was an assumption made, but in the -- in the time that's past we've -- we've firmed things up with Minnesota Power and they are going to pay -- build -- they're going to be a 51 percent shareholder. They're going to cover 51 percent of the capital costs of the project.

CROSS-EXAMINATION BY MR. ANTOINE HACAULT:

MR. ANTOINE HACAULT: Good afternoon, Mr. Thomson.

MR. SCOTT THOMSON: Good afternoon.

MR. ANTOINE HACAULT: You heard part of

my presentation in the opening statements with respect to whether or not we should proceed with a need-based approach or an opportunity-based approach. And part of my discussion with you this afternoon will be with respect to that subject matter, and taking you to various statements made and various documents either by Manitoba Hydro, yourself, or the province and its documents.

The first document I'd like to draw your attention to is in our book of documents, which I understand has been marked as Exhibit 20, MIPUG-20. It's a Volume I book of documents, and in particular at page 34.

(BRIEF PAUSE)

MR. ANTOINE HACAULT: In that document, there's some highlighting. It should show up on your screens.

MS. PATTI RAMAGE: Mr. Hacault, which tab is that in the...

MR. ANTOINE HACAULT: Sorry, that is the, if you're looking at tabs, Tab 6, and the page numbers are on the bottom. Page 34.

MR. SCOTT THOMSON: Yes.

CONTINUED BY MR. ANTOINE HACAULT:

MR. ANTOINE HACAULT: Yes. My first question is: Is the chair and yourself still meeting with the Minister on a regular basis?

MR. SCOTT THOMSON: Yes, we are.

MR. ANTOINE HACAULT: Okay. And in this document your president indicates that there hasn't been specific direction on any issues with respect to the development plan.

Are there general directives from the Minister with respect to the gen -- the Preferred Development Plan?

MR. SCOTT THOMSON: No, there's -- there's no directives with respect to the Preferred Development Plan. I -- I don't think it's any -- any secret that the -- the province supports the direction that we're taking on this. But we haven't been directed to do one thing or another. I mean, we've been independently preparing the analysis and -- and developing the recommendations that -- that we're bringing forward.

MR. ANTOINE HACAULT: Thank you. Earlier, in answering questions to Mr. Peters, he had asked questions with respect to interim approvals by the government with respect to the generation stations

which were coming up. And I believe your answer was something to the effect that some small portions had been approved.

Did I understand that correctly?

MR. SCOTT THOMSON: The -- we've got licensing and work permits. The -- the Keeyask infrastructure project has -- was separately licensed and approved. And on a -- on an overall basis, our -- our borrowing and capital plans are vetted by a treasury committee. So we -- all -- we've got all the necessary approvals in place to do the work that we've been doing.

MR. ANTOINE HACAULT: Yeah. Are there specific pro -- components though? I -- I think you had talked about the preparation of the site. Did that require specific approval and is -- is that available for public --

MR. SCOTT THOMSON: There's --

MR. ANTOINE HACAULT: -- record?

MR. SCOTT THOMSON: There were work permits issued for that -- that work, yes.

MR. ANTOINE HACAULT: Okay. The reason I was asking the question, counsel for the Public Utilities Board, Mr. Peters, had drawn your attention to approvals required by the Cabinet.

And is there anything available that can be put on the public record with respect to any such approvals?

MR. SCOTT THOMSON: The --

MS. PATTY RAMAGE: Mr. Hacault, if I could interject. The approvals -- having looked at the -- I had a moment to look at the sections that Mr. Peters raised -- those are required when we're dealing with a joint venture, or subsidiary, or partnership, and they don't apply in this case. Manitoba Hydro's borrowing approvals that Mr. Thomson just referred to are -- are all that applies.

CONTINUED BY MR. ANTOINE HACAULT:

MR. ANTOINE HACAULT: Do you agree with that, Mr. Thomson?

MR. SCOTT THOMSON: Yeah. She's the lawyer. But -- but, yeah, my -- my understanding is that we'll ultimately need that -- that order in council when -- when the assets roll into a partnership. We -- we've entered into a partnership arrangement, but the -- the project is -- is not in that. That would happen on the heels of this proceeding, assuming that -- that we're granted the approval to proceed. And then that OGIC -- LGIC

(phonetic) would -- would be forthcoming at that time.

MR. ANTOINE HACAULT: Thank you, sir. Could I ask you to turn to the next page in the book of documents, page 35, at the bottom of the page. There should have been a highlighted portion.

And there was a question asked of you as to whether Keeyask would be built, and whether there was still a debate as to whether that particular structure would be built. And this was, I appreciate, only a couple months into your tenure as the CEO of Manitoba Hydro; your response is recorded, "No, not internally."

So with respect to the Keeyask project and its role in the Preferred Development Plan, am I to take it that, internally, Hydro was convinced, as of April of 2012, that Keeyask was proceeding?

MR. SCOTT THOMSON: That was our intent. And I think, as -- as my statement at the -- at the Standing Committee said -- it went on to say, "No, not internally." I mean, we've -- we've got to go through a review process and get it certificated to build. But based on the information that we had available to us at the time, it was our intent to keep going forward with this process.

MR. ANTOINE HACAULT: Was it the same

conclusion that had been reached internally with respect to Conawapa at that point in time?

MR. SCOTT THOMSON: Yes, although it was much further out on -- on the calendar.

MR. ANTOINE HACAULT: Okay. When you come to the Public Utilities Board and the NFAT, is Manitoba Hydro's approach to present the in -- information in a disinterested way, or is it advocating particular positions?

MR. SCOTT THOMSON: No, I'd -- I'd say it's fair to say we're advocating a position. We've -- we've done the analysis. We -- we believe in what we're promoting and putting forward, and I don't think we're -- we're not bringing this forward and saying, You make -- you know, it's jump ball. We -- we believe that -- that the path that we're on and that we're proposing is the -- the best plan based on the analysis that we've done and -- and our mandate.

MR. ANTOINE HACAULT: And is it fair to say that that view has not changed as a result of any of the filings occurred so far in this hearing?

MR. SCOTT THOMSON: Yes. Certainly for the first phase of the project, I think that -- that the -- the changes to our -- our load forecasts, the changes to -- to our revenue forecasts have -- you

know, they've altered the economic look at this -- at this -- this plan.

It -- it isn't -- and I'm sure we'll hear more about that over the course of the -- the next eight (8) weeks. But it -- it isn't as positive at the corporate level, financial level as it was in -- in our outlook four (4) years ago. But we believe it's realistic. And -- and it hasn't -- it hasn't deteriorated to the point where the next best -- we -- we believe there's another next-best option at this point.

We -- we believe that, certainly as it relates to Keeyask, that there's a compelling case that we should be proceeding with Keeyask and -- and keeping the optionality around Conawapa.

I -- I think it's also fair to say that in our view three (3) or four (4) years ago, there was a compelling case to -- to push forward with Conawapa as long as that -- as long as that -- you know, the planning assumptions built out -- played out.

And we still believe that -- that Conawapa makes sense if -- if the future unfolds as -- as we -- we anticipate today. It's -- again, you know, the forecasts are -- are down somewhat from -- from where they were four (4) years ago.

There's -- there's a crossover point where -- where we might change on our mind on that, and that's why, you know, we'll be thinking about that and the gated decision points that I -- I spoke to in my opening remarks will play a -- a role in that. We're -- we're not -- we're not going all in, to use a card playing terminology, at this point. But -- but the first step down a pathway, we believe -- we believe Keeyask is the right way to go.

MR. ANTOINE HACAULT: Thank you, sir. If the document organizer could -- I had identified MIPUG/MH-1-10A. And there's a figure on the second page, if she can bring that up.

MS. PATTI RAMAGE: Is that in the book of documents, Mr. Hacault?

MR. ANTOINE HACAULT: It -- it isn't in the book of documents. It's something that I'm going to be asking as a result of some of Mr. Thomson's answers this morning. He had, I -- I understood, indicated that for Keeyask, about the longest time we could delay that decision would be for about two (2) years.

And this is a response, as I understand it, provided by Manitoba Hydro in decision dates for new resources.

CONTINUED BY MR. ANTOINE HACAULT:

MR. ANTOINE HACAULT: Do you see that, sir?

MR. SCOTT THOMSON: Yes, I do.

MR. ANTOINE HACAULT: Okay. And in the middle of that table, there is the abbreviation, capital 'K' 22/gas.

Do you see that? There's a heading.

MR. SCOTT THOMSON: Keeyask 20 -- K22/gas, yeah.

MR. ANTOINE HACAULT: Yes. And in that particular table prepared by Manitoba Hydro, there's an indication that there needs to be a decision by 2017.

Do you --

MR. SCOTT THOMSON: Yes, I see that.

MR. ANTOINE HACAULT: Do you have any idea when in 2017 that decision needs to be made, and why, and to what extent it's different than your initial indication that we should have to make a decision by 2016?

MR. SCOTT THOMSON: Yeah, just -- just a sec.

(BRIEF PAUSE)

MR. SCOTT THOMSON: Yeah, the -- the -- this pathway contemplates no -- no export sales. So if we -- if we didn't proceed with the export sales and we'd be looking to put Keeyask into service for 2022, and if we were -- if that was our target date rather than 2019 under the Preferred Development Plan, then we'd have until about 2017 to make that decision --

MR. ANTOINE HACAULT: Okay. So am I correct --

MR. ANTOINE HACAULT: -- in order -- in order to achieve a 2022 date. We wouldn't achieve a 2019 date if -- if we push out the -- by two (2) years, the start date on -- on Keeyask either. But they're -- they're planning for different outcomes.

MR. ANTOINE HACAULT: So am I correct in understanding then that if we're building for Manitoba demand requirements, local consumers, you had indicated that was a 2023 expected date, correct?

MR. SCOTT THOMSON: We need -- yeah, we need -- we -- we now estimate that we need resources by 2023 --

MR. ANTOINE HACAULT: Okay.

MR. SCOTT THOMSON: -- for domestic load.

MR. ANTOINE HACAULT: So that if the

focus was the needs of Manitobans for electricity, am I understanding this table correctly, that if that was the focus, we could delay the decision date until 2017?

MR. SCOTT THOMSON: That would presuppose that we -- we had given up on building an interconnection and -- and any other sales. So there's many -- there's Needs For and Alternatives To. And in exploring the various different options open to us in the alternatives, they have -- they have benefits and costs associated with them.

So we've evaluated the economics of -- of these different pathways, but that's -- and -- and so that will inform where we ultimate land on -- on which one's the best one. This -- this one would -- would have a certain economic outcome, and -- and it's not the preferential outcome. It's -- it's not the highest-value outcome for -- for Manitobans.

So there's benefits from those export sales that -- that make it desirable for us to proceed with -- with building interconnections and -- and having -- having Keeyask in service earlier.

MR. ANTOINE HACAULT: Thank you. My focus was just on when a decision date would need to be made if we were focussing only on Manitoba consumer needs, as far as the load.

Am I right in understanding this table, that if we started out -- and this is new resources, SCGT/C26, would be Conawapa 26.

If we were embarking on a gas route initially, we wouldn't have to make a decision until 2019 with respect to additional hydraulic resources?

MR. SCOTT THOMSON: I believe we... In 20 -- under that scenario, I believe it's 2018 --

MR. ANTOINE HACAULT: 2018.

MR. SCOTT THOMSON: -- for -- for the hydraulic resource. We would have to make a decision on -- on the -- the simple-cycle gas turbine sooner than that.

MR. ANTOINE HACAULT: Okay. Thank you, sir. I'm going to turn back to our book of documents, Exhibit 20, at page 12. That's Tab 3; Tab 3, page 12.

This is an extract from the technical conference that occurred last year. And I'd like to draw your attention, sir, to some of the statements you made on page 12 at line 4, the bottom. It should be page -- in the transcript it's page 7, but the bottom numbering for the document organizers, page 12.

MR. SCOTT THOMSON: Page 12, yeah.

MR. ANTOINE HACAULT: It -- it records you indicating:

"The NFAT business case sets out the best long-term options to meet Manitoba's electricity needs now and into the future."

And then if we continue reading, you talk about what you've found to be most beneficial for the province as a whole.

Do you see that paragraph, sir?

MR. SCOTT THOMSON: What line? I -- I see where -- where you started. And I'm just --

MR. ANTOINE HACAULT: I've finished at lines 10 and 11.

MR. SCOTT THOMSON: Okay, yes, sorry.

MR. ANTOINE HACAULT: So my question to you, sir, is with respect to your vision and the corporate vision, is the focus on Manitoba's electricity needs now and into the future, or is it on what you find most beneficial for the province as a whole?

MR. SCOTT THOMSON: Both. They're not mutually exclusive.

MR. ANTOINE HACAULT: Okay. Would you agree with me, sir, that ratepayers might have a different priority than the province as a whole?

MR. SCOTT THOMSON: Certainly. I -- I

would say that some ratepayers would have a different perspective than -- than the province as a whole.

MR. ANTOINE HACAULT: Okay. And I won't get into that, but some of the scenarios develop substantial revenues and benefits for the province as compared to other scenarios, but not much difference for ratepayers.

MR. SCOTT THOMSON: That's true. I mean, the -- the -- there -- there isn't a great deal of difference in -- in the rate impacts across most of the scenarios, actually. But -- but there are -- there are financial benefits beyond the Corporation, and then there's all of the -- the social benefits associated with -- with the -- the hydro development plan.

MR. ANTOINE HACAULT: Yes. And if I -- if you would flip back, sir, to page -- it's at Tab 6 and it's page 33 in our book of documents, when you were speaking in front of the Crown corporations committee on April 4, 2012. Midway through the page you're quoted as saying, in talking about exports and domestic sales -- and it was at 1,920. You should see some highlighting there.

MR. SCOTT THOMSON: Yes.

MR. ANTOINE HACAULT:

"I mean, we're not building them to

export."

You see that statement, sir?

MR. SCOTT THOMSON: Yes.

MR. ANTOINE HACAULT: My question to you is: Has there been a change in vision or priority for Manitoba Hydro? Are some aspects of this Preferred Development Plan being done to build for exports in advance of Manitoba consumers' needs?

MR. SCOTT THOMSON: No, I -- I wouldn't say that there's a -- there's a change in -- in corporate philosophy. The -- the plants will ultimately all serve the -- the domestic requirements. But there's an expectation -- and -- and it's -- it's been the case -- I -- as I understand it, every time we built -- or -- and I certainly would expect that it would have been the case, that when you bring a big block of capacity on, that you're not going to be able to utilize it all at once.

So we would -- we would look to utilize the -- or make best -- best use of that capacity and extract the most value out of that capacity as we build. So that -- now, in -- in the case of -- of some of the sales contracts, we may be advancing the timing around when the Manitoba need would -- would arise, the -- the domestic load would arise. But that's to take

advantage of -- of other attributes of the -- of the export sales for a short period of time.

So we get our US customer to build a transmission line that we would never get built without them if we -- if we do it now. And they're willing to take the power, so they're -- they're -- we feel that we can -- we can lay that power off, shape it, and sell it short term to help advance payment on these things.

We also get a transmission line out of the arrangement, which is good for the reliability of our supply and security of the supply in the province. And that is very useful to industrial customers, residential customers, having that in -- in -- to -- to serve through drought and -- and through other emergencies.

MR. ANTOINE HACAULT: With respect to the Preferred Development Plan, I think you'd categorized it in two (2) segments. And we had in our opening statement, too, the must make decisions Keeyask, and the transmissions lines and Conawapa.

Would you agree with me, sir, that Conawapa is being advanced with respect to export sales, and not to meet Manitoba needs?

MR. SCOTT THOMSON: We have an opp -- yeah, we have an opportunity to build that and -- and

sell the power as we -- as we grow into the requirement.

MR. ANTOINE HACAULT: And, sir, if we look at the primary focus when we're trying to answer the question: Does Manitoba need a particular project?

Is it ratepayer focussed, or is it focussed on exports which could be achieved such as through Conawapa?

MR. SCOTT THOMSON: I think broadly it's ratepayer focussed because -- and -- and why the plan that we're -- we're advocating is beneficial is it has the lowest long-term rates, and -- and has all the other attributes associated with it.

So over the long haul if it's going to be cheaper to go down this path and utilize the resource that we have here in the province, that's -- that's a ratepayer benefit.

MR. ANTOINE HACAULT: Okay. Let me narrow that question a bit more. When I say, "ratepayer focussed," is it focussed on the needs for power of Manitoba consumers?

MR. SCOTT THOMSON: Yes, ultimately, but if -- I think where you may be -- may be going with this question is: Should we only look at options that satisfy domestic requirements to the exclusion of

looking at anything else?

And -- and I would say, no, not if -- not if that prejudices customers by -- by not being the best economic choice for them.

MR. ANTOINE HACAULT: If I could take you to Tab 2. I'm mindful of the time here. And that's page 10 of our book of documents.

I believe this was taken from your corporate website. The source is at the bottom. And this was part of your presentation to a particular group.

Do you recall which group, sir?

MR. SCOTT THOMSON: Yeah, I believe that would have been the Chamber speech that I did in 2012.

MR. ANTOINE HACAULT: Yes. And why would you chose revenue sources for a ten (10) year time period and categorize them as you did, sir?

MR. SCOTT THOMSON: I think the point I was trying to make at that point in my presentation was export sales deliver value back to -- to ratepayers in the province. The -- the -- absent that -- that revenue source, we would have had to recover those costs from domestic customers. Rates would have been higher.

MR. ANTOINE HACAULT: Okay. Sir, would it also follow that there's been mention of a decade of investment at $20 billion that encomp -- that encompasses not only the Preferred Development Plan, but other aspects, that the industrial and commercial group would be carrying from a revenue perspective about 40 percent of that cost?

MR. SCOTT THOMSON: Well, they -- they bore about 40 percent of our revenues over the period. The decade of investment is prospective.

MR. ANTOINE HACAULT: And do you have any reason to base a conclusion that it would be materially different going forward, that there would be substantially less contribution by the commercial and industrial group?

MR. SCOTT THOMSON: One moment.

(BRIEF PAUSE)

MR. SCOTT THOMSON: My recollection is that I -- I don't think it's going to change dramatically but -- but we can certainly look at -- dig that out. I just don't have the information in front of me.

MR. ANTOINE HACAULT: Thank you, sir.

And...

(BRIEF PAUSE)

MR. SCOTT THOMSON: Do you want it as an undertaking?

MR. ANTOINE HACAULT: We'll ask it of the particular people if we need to. I don't --

MR. SCOTT THOMSON: Thank you.

MR. ANTOINE HACAULT: -- want to waste time on it. Sorry, sir. I've got to try and ask general policy questions and limit my specific questions to specific panel members that you'll have.

It also follows that of this $20 billion of general investment, Manitoba Hydro is trying to seek a 25 percent equity ratio.

Is that correct?

MR. SCOTT THOMSON: That's our -- our long-term target, yes.

MR. ANTOINE HACAULT: Yeah. So if we take 25 percent -- well, maybe start going backwards. If you got $20 billion of capital investments, and the industrial and commercial group are carrying about 40 percent of that, we're in the order of $8 billion of capital investment, which this group is looking to pay

for through the revenue stream.

Are you with me, sir?

MR. SCOTT THOMSON: I understand where you're going. The one (1) -- the one (1) thing that you're -- you're leaving out of the analysis is the cash we generate from -- from operations, which recovery of -- of depreciation; so orders of magnitude over a ten (10) year period. We'd -- we're currently recovering about 5 billion dollars in the -- in the order of $5 billion, based on the current depreciation rates.

MR. ANTOINE HACAULT: Okay. Well, it's a debt that over time, through depreciation -- depreciation otherwise, that category, if nothing changes, we'll be asked to carry, correct?

MR. SCOTT THOMSON: Yeah, there's the -- although the -- they -- the revenue contributions from exports we'll -- we'll have to factor into that, and to the extent that -- that the overall mix shifts.

MR. ANTOINE HACAULT: Yes, understood. And if we then go from the $8 billion, as a general number, to a 25 percent equity, the 25 percent equity is something that you'd seek to attain fairly quickly, is it not, sir?

MR. SCOTT THOMSON: Well, we're --

we're there today. The -- the outlook is that -- that in the early '20s we'll -- we'll -- that -- that the leverage in the -- in the capital structure will go to about 89 to 11 percent equity, and then so will have to come back up from the eleven (11) to the twenty-five (25). I think our current outlook is by about 20 -- about 2035.

MR. ANTOINE HACAULT: So in the next twenty (20) years this group of customers will have to assist the Corporation in putting approximately, if the proportion stands, about $2 billion of equity, to which --

MR. SCOTT THOMSON: No, because you're -- you're assuming that it's about 25 percent of 8 billion and we -- we'd never get down to zero. So it's using that -- that line of thinking, it would be about 14 percent of the -- of the net capital investments.

So if you'd -- if you want to do it that way, 15 billion net after depreciation would be the borrowing requirements that we'd have to -- to fund that -- the growth, 15 percent of $6 billion. So it'd be on the order of 900 million. Subject to -- to running that through a calculator --

MR. ANTOINE HACAULT: But that's -- that's the general order. And those companies and

businesses would have, for your calculations, not too far off, a billion dollars in Manitoba Hydro's coffers, not available for other purposes?

MR. SCOTT THOMSON: Yeah, the -- the cost of power -- that's right, it'll be a cost of it of doing business.

MR. ANTOINE HACAULT: And if those companies have exhausted a particular mine, for example, that's not money that they can say: Well, now we've spent over the next twenty (20) years, so many millions of dollars to put into Hydro's equity. Could you please give it back to us because our mine is finished?

MR. SCOTT THOMSON: Sorry, is -- is there a question there?

MR. ANTOINE HACAULT: It's not -- it's not money that they can ask back if they leave Manitoba or -- or a particular project, like a mining project is finished?

MR. SCOTT THOMSON: Well, no, their -- their power costs are what -- they will have consumed the -- the resource.

MR. ANTOINE HACAULT: But contrary to other -- say my grandchildren, under your plan, you're hoping that they benefit from it so that at least if I

spend, I can say, Well, hopefully my grandchildren would benefit.

But that reasoning does not necessarily apply to a company developing a specific resource?

MR. SCOTT THOMSON: No -- no, I suppose -- suppose that's true if they're just here for a short period of time, then -- but they're -- they're benefiting from the lowest power costs in -- in North America today. And we fully expect that with, even with the Preferred Development Plan, that we're going to be able to help them retain that -- that cost advantage versus other jurisdictions.

MR. ANTOINE HACAULT: I have a couple more questions and then I'll leave it to the next questioner. At page 17 of our book of documents, this relates to the -- the news release last week.

And in the top paragraph of the news release, it's indicated that there is 308 megawatts of firm power for up to ten (10) years. Do you see that?

That's in the first paragraph?

MR. SCOTT THOMSON: Yes.

MR. ANTOINE HACAULT: Are you able to put on the public record why the qualification, "up to ten (10) years"?

Is it ten (10) years, or is it something

less than ten (10) years?

MR. SCOTT THOMSON: It is -- it is ten (10) years, assuming that we have the fourth unit at Conawapa in service by 2026, i.e, if we follow through with the -- the plan as it's currently envisioned. The -- the end date is fixed, so if we're not in a position to deliver power starting in 2026, that -- the way things are -- are structured in the arrangement, that would -- it still terminates in -- in 2036.

MR. ANTOINE HACAULT: Thank you, sir. Further down in this press release, they're indicating or attributing some words to you. There's a quote. It starts in quotation marks:

> "Expert opportunities are fundamental to our Preferred Development Plan [period]. The agreement we are announcing today validates our plan and means all Manitobans will continue to benefit from exports through enhanced reliability and lower rates."

My question to you, sir -- and this is getting back to whether the focus is on the needs of energy for Manitobans or an opportunity-focussed analysis. I can think of a lot of different ways the

first sentence might have been phrased.

Am I understanding correctly that the focus is opportunities based when you're talking about this new deal which would allow for Conawapa to proceed?

MR. SCOTT THOMSON: Well, the sales opportunity is based on proceeding with Conawapa. The -- the Preferred Development Plan doesn't happen without exports, but the Preferred Development is all -- - all -- any development plan scenario is there to meet the needs of -- of Manitobans.

So again, I -- I had said before, they're not mutually exclusive. The -- the -- we're -- we're not -- we didn't pursue a plan so that we would have opportunities. Opportunities exist that we can exploit that -- that make sense to exploit in order to meet the needs of Manitobans.

MR. ANTOINE HACAULT: But I think we've agreed that the plans are being advanced because of these export opportunities?

MR. SCOTT THOMSON: That is -- yeah, that's true.

MR. ANTOINE HACAULT: The last series of questions are a couple with respect to the document found at Tab 5. It's the Manitoba Clean Energy

Strategy. At page 20, sir, the -- there's a message from the Minister, and my question is with respect to one (1) or two (2) sentences, whether this aligns with the vision of Manitoba Hydro or whether Manitoba Hydro has a different vision.

In the first full paragraph under the picture, it starts, "Not only does energy play a critical role," and it continues. And it says:

> "Plans for new hydraulic generation and transmission require a bold capital program of $20 billion over the next decade."

Is Manitoba Hydro ad idem with the message of the Minister thus far?

MR. SCOTT THOMSON: Yes.

MR. ANTOINE HACAULT: Okay. And two (2) paragraphs down, the sentence starts, "Our strategy focusses on building new-generation hydro." Is that consistent with Manitoba Hydro's vision as a primary focus?

MR. SCOTT THOMSON: Yes, it is, in -- because we think that that -- that's the best way to make -- meet the needs of our customers.

MR. ANTOINE HACAULT: Okay. And flipping on to the next page, at the top, there's a

highlight of Manitoba's Clean Energy priority actions, including -- and there's a number of different priority actions, but the first one listed is building new hydro.

Does that figure as a priority for Manitoba Hydro and its vision?

MR. SCOTT THOMSON: Yes; yes, it does.

MR. ANTOINE HACAULT: Okay. And flipping to page 23, so the next page, on the right-hand side, there's a bullet the second paragraph down indicating:

> "Maximize the economic benefits from [full colon]: Constructing and operating energy generation facilities."

My --

MR. SCOTT THOMSON: Sorry, which bullet are you referring to?

MR. ANTOINE HACAULT: On the right-hand side.

MR. SCOTT THOMSON: Under, "Keeping rates low"?

MR. ANTOINE HACAULT: We are maybe under --

MR. SCOTT THOMSON: Those two (2)

columns there?

MR. ANTOINE HACAULT: -- a different page. If you look on your screen in front of you, sir, page 23.

MR. SCOTT THOMSON: Sorry. Okay.

MR. ANTOINE HACAULT: And the person has highlighted it for your convenience. Again, keeping in mind the questions that I asked, is it Hydro focussing on a needs -- that means pure needs as far as demand load -- or is it focussing on opportunities?

There's the statement:

> "Maximize economic benefits from constructing and operating energy generation facilities."

Is that a primary focus for Manitoba Hydro to maximize economic benefits from constructing and operating energy generation facilities, sir?

MR. SCOTT THOMSON: It -- it is one (1) of our -- our overall corporate objectives to -- to continue -- contribute to the development of the economy of the province, and that's part of our -- our strategic plan as well, so it is one (1) of our corporate purposes.

MR. ANTOINE HACAULT: If I had to explain to somebody on the street, What are Manitoba

Hydro's three (3) priority criteria, what would they be in, and in what order would they be?

MR. SCOTT THOMSON: Well, I can take you back to my opening remarks. At least I think I --

MR. ANTOINE HACAULT: Were they set out in a priority?

MR. SCOTT THOMSON: Yes. And -- and I -- I referenced them to our corporate mandate, first being to provide for the continuance of the supply of power adequate for the needs of the province, first and foremost.

MR. ANTOINE HACAULT: Okay. So let's stop there. So the first visioning criteria of this Corporation that you run is to determine whether or not the Manitobans need this from a supply and demand perspective domestically, correct?

MR. SCOTT THOMSON: Yes.

MR. ANTOINE HACAULT: And that is the first in the order of priority?

MR. SCOTT THOMSON: They're all -- they're all important, but -- but, yes, meeting the -- the needs of the province.

MR. ANTOINE HACAULT: Well, I'd like to pin you down to one (1), two (2), three (3), if I could.

MR. SCOTT THOMSON: Yeah.

MR. ANTOINE HACAULT: If you can't give me the order of three (3) in specific order, can you at least give me which three (3) are the most important?

MR. SCOTT THOMSON: Well, I -- I did. I thought I did. Meeting the supply needs, engaging and promoting an economy and efficiency in the development of our system, and -- and the third is -- is marketing power to outside persons on -- on terms and conditions acceptable to the Board.

The legislation doesn't set a priority around those things, so I believe that the approach that we've taken to developing our Preferred Plan is -- is -- considers all of those things and -- and looks at that.

Will we -- will we restrict our -- our view on what's the absolute bare minimum that we need to do in order to ensure that the lights stay on five (5) years from now, ten (10) years and -- from now, and ignore other things that contribute value for the benefit our -- of our customers? No, we won't, and -- and I think we'd be remiss if we -- if we did that.

MR. ANTOINE HACAULT: So taking you back to the statement I just referred you to, sir:

"Maximize the economic benefits from

constructing and operating energy generation facilities."

That doesn't figure in the top three (3) priorities, sir?

MR. SCOTT THOMSON: Well, not as that's framed. I mean, that's one (1) part of the provincial's energy strategy.

MR. ANTOINE HACAULT: And is it fair to say in the top three (3) priorities that it is not also a top three (3) priority to generate cash for the province through water rentals and other benefits?

MR. SCOTT THOMSON: We don't have a whole lot of choice around that one. That's legislated, so we -- that's -- that's a cost of us doing business that we don't control, and that, you know, it's up to the province to -- to administer that.

MR. ANTOINE HACAULT: So, sir, one (1) of the criteria in the terms of reference was to assess the alignment of the plan with respect to the Green Energy Strategy, I believe. I don't have it in front of me right now. It was part of the terms of reference in the book of documents by counsel at page 4 of his book -- book of documents. It was at the bottom of the page.

MR. SCOTT THOMSON: M-hm.

MR. ANTOINE HACAULT: Item 2(b). Has Hydro...

MR. SCOTT THOMSON: Sorry, we're on the wrong page.

MR. ANTOINE HACAULT: Have you loci -- located it now, sir? It's page 4 of the book of documents. It's --

MR. SCOTT THOMSON: Yes.

MR. ANTOINE HACAULT: -- at Tab 1. And in the term of reference, it's para -- on the -- page number 4 of the book of documents, there's paragraph 2, 'B' as in Bob, and the first line says:

> "The alignment of the plan and alternatives to Manitoba's Clean Energy Strategy."

Do you see that?

MR. SCOTT THOMSON: Yes, I do.

MR. ANTOINE HACAULT: And I was asking various priority questions. Sir, how does Manitoba Hydro decide whether or not its plan has aligned with that strategy?

MR. SCOTT THOMSON: Well, looking at it in -- in the fullness of the plan that we put forward, we look at whether it's consistent or inconsistent, and I believe that -- I -- I believe that it -- it is, but

that'll be a matter for the panel to determine whether -- whether you feel it's -- it's consistent with -- with the Clean Energy Strategy.

MR. ANTOINE HACAULT: See, the reason I was bringing you to certain extracts of this strategy is that the strategy seems to be pretty clear, and maybe -- this is the Catholic part in me, Thou shall built. That's part of my strategy.

So any strategy different than building as set out in this plan wouldn't be consistent with that strategy, so what are we here for?

MR. SCOTT THOMSON: Well, I -- I don't think -- I think that's -- that's probably overstating things. Another thing that the energy strategy says is that -- that the -- the province is pursuing a -- a carbon-free economy, but there's -- there's natural gas used in the province. There's petroleum products used in the province. We're shifting away from coal.

So it's -- it's -- again, I don't think that -- that the -- the strategy overrides what we're doing here today. It's not -- it's -- it's on balance. You know, does what we're doing make sense in the context of the province's energy strategy? But I can tell you here today we haven't been directed by the province to -- to build these -- these projects.

MR. ANTOINE HACAULT: Thank you, sir, for being very helpful, and doing your best to answer my questions.

MR. SCOTT THOMSON: Thank you.

THE CHAIRPERSON: I think that we should take a -- a short break, if you don't mind. I know we're going over schedule but I hope you're still available, Mr. Thomson. I think that we'll take advantage of your presence to ask some more questions. So let's take a ten (10) minute break. We'll resume at 3:30.

--- Upon recessing at 3:20 p.m.

--- Upon resuming at 3:33 p.m.

THE CHAIRPERSON: I believe we're ready to resume the proceedings, so unless we have any instructions from -- from counsel, I'll turn it over to Mr. Gange.

CROSS-EXAMINATION BY MR. WILLIAM GANGE:

MR. WILLIAM GANGE: Thank you, Mr. Chair. Mr. Thomson, I'm back here. Just -- you could look right through Ms. Menzies, and she -- she's probably -- well, I won't go there.

To the -- Keeyask is -- is 695 megawatts, sir?

MR. SCOTT THOMSON: That's correct.

MR. WILLIAM GANGE: And in the Preferred Development Plan, there's a listing -- and -- and I think that Mr. Hacault went through some of them, the -- the -- included in the Preferred Development Plan is the Minnesota Power sale of 250 megawatts, the Wisconsin Public Service of 300 megawatts, and the Northern States Power of 125 megawatts.

Doesn't that take up all of the capacity of Keeyask?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Some of the -- the NSP sale is being served today. But as I had -- had referred to with -- with -- we're -- we're largely there in terms of -- of having committed sales to -- to utilize Keeyask, assuming it's built.

MR. WILLIAM GANGE: So -- so the -- and the -- and -- and the evidence that you've given is that somewhere between 2020 and 2022 you expect the Manitoba growth to -- to outstrip the -- the present capacity of the system.

Is that correct, sir?

MR. SCOTT THOMSON: I believe that -- that what we've indicated is bu -- we expect to need a new resource by 2023.

MR. WILLIAM GANGE: Okay. Then the recent power -- or the -- the mem -- memorandums of understanding with SaskPower and Great River Energy of 1,100 megawatts, they can't -- I mean, this just makes mathematical sense -- they can't be serviced under Keeyask?

MR. SCOTT THOMSON: That's correct.

MR. WILLIAM GANGE: And -- and is there any change in terms of Manitoba Hydro's outlook to the domestic load forecast that would allow all of these sales to take place, or is it -- or -- or are you not counting on a slowdown in the Manitoba capacity?

MR. SCOTT THOMSON: Well, our -- our load forecast is -- is continually updated, and -- and certainly we'll speak to that starting tomorrow. When we -- when we enter into memorandums of understanding it's to pursue discussions around sales.

If -- if we are successful in converting, for instance, the full amount of GRE, the 600 megawatts, that would preclude us completing five hundred (500) for -- for SaskPower. Similarly, when we

-- the recently announced sale with -- with Wisconsin Public Services for -- for the 308 megawatts in the -- in the period beyond 2026, now the original term sheet was for up to five hundred (500). We -- we may not get six hundred (600) with GRE. We -- we may not get five hundred (500) with Saskatchewan, but we may get half of both or some other -- other percentage.

And we are -- as I've mentioned, we're -- we're in discussions with a couple of other US utilities that we could serve from Conawapa. So I want a hopper as -- as broad as I can with sales prospects that will pursue, but once it's sold it's sold.

And -- and it's -- I think, in part, one (1) of the reasons why we're -- we're getting some enthusiastic responses from some of these other utilities that are now -- you know, now that we've announced some MOUs, we're broadening and diversifying our customer base. And some of our traditional customers want to ensure that they can continue to do business with us.

So, you know, I -- I think it's a positive thing that we've got -- that we're entering into discussions with people, with -- with -- I -- I'd rather have more sales opportunities than sales capacity, because then I don't have to convert

everything. And, in fact, it -- it helps us to avoid a scenario like we experienced back when -- when we lost the Ontario Power sale and - and Conawapa was -- was shelved. This isn't the first time around for this project.

So having three (3) or four (4) sizeable sales prospects on the go at one (1) time is a good thing.

MR. WILLIAM GANGE: I -- I believe that -- the evidence that the Green Action Centre intends to introduce, both through Mr. Chernick, dealing with fuel switching, and then in conjunction with the Consumers' Association, through Mr. Dunsky, is going to suggest that with an aggressive DSM program and the fut -- and taking into account fuel switching, that the demand -- the domestic demand curve may well flatten out to such an extent that -- that the -- that the -- the time-line that you've suggested of 2023 may not be necessary in terms of using up or exceeding the -- the Manitoba capacity.

So -- and -- and I don't want to get into a debate about that. I'm just saying that that's the evidence that we expect to bring. And -- and obviously it's then going to be up to the Board to listen to that and accept it or reject it, whatever.

But if it were to be that the -- that the Manitoba domestic demand did not require a Keeyask or a Conawapa, in your calculations, sir, has -- has Manitoba Hydro determined whether or not they could turn a profit if these two (2) dams are built solely to supply export contracts like the ones that have been listed?

MR. SCOTT THOMSON: Well, I -- I -- I'm -- I'm pausing. The -- we -- we don't anticipate -- and you're right. I mean, I guess we'll -- we'll have a -- a lengthy discussion in terms of -- of where we think that the load forecasts are going and -- and the ability that we have to -- to utilize DSM. And I -- we -- we'll have to talk in camera about the details of the export contracts.

But if -- if we -- if we built the -- the -- if we built the projects and never needed them domestically and we were selling power under those contracts at the -- at the prices that we've -- we've done in the early stages, and that lasted over the life of the project, I think they'd be wildly successful and profitable.

(BRIEF PAUSE)

MR. WILLIAM GANGE: Thank you, Mr. Thomson. Those are my questions on behalf of Green Action.

MR. SCOTT THOMSON: Thank you.

THE CHAIRPERSON: Before we move on to the next one, I just wanted to explore a statement you made to Me. Hacault, specifically addressing the issue of competitiveness of Manitoba rates in a context where the Preferred Development Plan goes ahead as -- as submitted: 3.95 percent increases per year for eighteen (18) to twenty (20) years, which -- which would mean a double of -- of rates, essentially, over that time frame.

Now, I guess the question I have is: You're in a competitive energy market. You indicated that, despite those increases, we'd still be competitive. And I -- I -- I'm having trouble reconciling that with the fact that, you know, rates in the US are relatively flat -- rates to consumers in the US are relatively flat in -- in some jurisdictions, not all jurisdictions. And I guess -- are you confident that, in the face of these significant rate increases, that we would still be a competitive option for a -- a business or industrial manufacturer wanting to sell in Manitoba?

MR. SCOTT THOMSON: Yeah. Based on -- if -- if our -- if our rates were to double over twenty (20) years, they -- they'd be approaching what people in southern Ontario pay today. And -- and their rates aren't staying flat for twenty (20) years.

Saskatchewan, they're about 50 percent higher than our rates are today, and they have plans to invest $15 billion over the next ten (10) years in their thermal generating stations. Their rates are going up.

BC, over the next three (3) years are raising their rates 9 -- 9 percent, 6 percent, and 3 percent. Saskatchewan's going up 16 percent over the next three (3) years. Quebec just announced -- I believe it's a 5.6 percent rate increase request.

We don't -- we're -- we're all facing pressures. The markets that we sell into in -- in Minnesota and Wisconsin, their residential domestic rates are on the order of twelve (12) cents a kilowatt hour US.

So I -- I believe that -- that, in the fullness of time, they are. I know that -- that BC's got huge expenditures. They're making over $2 billion a year in investments in -- in their infrastructure. That's hydro.

That's the -- you know, Hydro and Quebec -- or BC and Quebec are the -- the most comparable to -- to Manitoba in terms of -- of infrastructure and -- and rate structure, so it would be my expectations as -- as US utilities retire coal and have to build new -- assuming they build thermal generating stations and wind, which they'll need to do both, they'll -- they'll need to firm the wind. They -- they're going to have to make major investments, too.

So I think our rates -- I think we can keep our rates competitive. Certainly in -- in the -- the near term what we're seeing in -- in our neighbouring jurisdictions, the -- the announced rate increases are higher than -- than we're contemplating doing.

THE CHAIRPERSON: In -- in the most recent rate application, we heard from members of MIPUG who appeared before us to indicate that they were concerned about the direction of rates, specifically citing Louisiana as a jurisdiction where they could get lower rates than are currently available in Manitoba.

I'm raising that issue because I -- I mean, I -- I understand your comparisons to Canadian jurisdictions. You know, I understand that our neighbours, and so on, are -- are a good relative

comparison, but I guess the -- the issue that was raised for us as a panel was the fact that these companies see the -- the North American market as their market, and they can move tomorrow to -- some of them can move tomorrow to go to another jurisdiction to take advantage of lower rates.

And I guess the question is: Are you still confident despite the fact that some of these companies are fairly -- fairly mobile, that they wouldn't, you know, in the face of these increases wouldn't be considering going to another jurisdiction where they can enjoy lower rates?

(BRIEF PAUSE)

MR. SCOTT THOMSON: Mr. Chair, the -- obviously, we'll -- we -- we'd be concerned about losing our customer base in -- in the event that someone chose to relocate outside the province, but the -- there are -- there are -- particularly in the United States, there are some jurisdictions that will induce -- they -- they'll cut special deals to induce a customer for economic development purposes, and -- and we are not in that game, or haven't been up until now. That -- that, I suspect, would have to be something

that would be a government policy thing that -- that might evolve over time.

I'm -- I'm not sure that -- that -- you know, if -- if someone wants to give it away below cost, we're -- I'm not going to advocate that we do -- do that. So that's -- that's picking winners and losers, and that's giving preferential treatment to -- to a certain group to induce them into -- and I -- as I understand it that Louisiana situation was -- was a special rate that wasn't available to everybody.

THE CHAIRPERSON: Thank you. I would turn the microphone over to Ms. Saunders on behalf of the Manitoba Metis Federation.

CROSS-EXAMINATION BY MS. JESSICA SAUNDERS:

MS. JESSICA SAUNDERS: Thank you. I do not intend to get into too many of the details regarding technical matters, and I believe that a lot of my questions will endeavour to stay in line with the more higher-level policy comments that you made in your opening remarks.

So, Mr. Thomson, your counsel Ms. Ramage spoke of Hydro's view of the analysis being broken down into Stage 1, relevant to decisions needing to be made immediately, and Stage 2 on decisions of a later date

supplementing options. And you referred to these stages in your open -- in your opening remarks.

So Hydro's ability to come to this Stage 1 and Stage 2 approach to the analysis is the result of Hydro's strategic or high level planning.

Would you agree?

MR. SCOTT THOMSON: Yes, in the detailed analysis that we've done on -- on the economic evaluations.

MS. JESSICA SAUNDERS: Okay. Mr. Peters went over this with you in your -- in his cross-examination, and I would note from your CV, as it's been provided by your counsel, it's been included...

(BRIEF PAUSE)

MS. JESSICA SAUNDERS: I included, as well, in our Tab 1 of our materials your CV. And as I said, Mr. Peters went over this, that prior to becoming the president and CEO of Hydro in 2012, you were the Executive Vice-President of Finance, Regulatory Affairs & Energy Supply and the Chief Financial Officer, FortisBC Holdings, from 2010 to 2011, and that prior to that you were Vice-President, Regulatory Affairs and Chief Financial Officer of Terasen Gas Inc. from 2007

to 2010, correct?

MR. SCOTT THOMSON: Correct.

MS. JESSICA SAUNDERS: In your previous role as -- in your previous role, any of your previous roles that I've -- I've just mentioned, or any that, for that matter, happen to be in your CV, did you have any experience in working with Aboriginal peoples? And to clarify, what I mean particularly by 'Aboriginal', I mean that being First Nation, Metis, or Inuit peoples.

MR. SCOTT THOMSON: Yes, I did.

MS. JESSICA SAUNDERS: Okay. Would you care to elaborate on some of the work that you've done previously in that regard?

MR. SCOTT THOMSON: Well, the most -- the most recent thing that I was doing prior to -- to joining Hydro, Fortis had developed an LNG storage project on Vancouver Island, and there were two (2) -- two (2) bands in the vicinity of the project that we entered into a limited partnership arrangement with to own the -- the facility. So it was a one and a half (1 1/2) bcf LNG storage tank. And so I was -- I was involved in all the negotiations with the bands, putting the arrangement together and -- and bringing it to -- to a conclusion.

MS. JESSICA SAUNDERS: Okay. So you

referenced these projects as being about a storage tank. And so is it fair to say that you had some experience in your previous role, but in reference to projects like Wuskwatim, Keeyask, and Conawapa, you have certainly gained a lot of experience in your role as President and CEO of Manitoba Hydro with large projects that involve Aboriginal people, such as First Nations?

MR. SCOTT THOMSON: That's -- that's very true.

MS. JESSICA SAUNDERS: The plan under review in this NFAT involves three (3) new major project components with associated facilities: Keeyask, Conawapa, and the Manitoba-Minnesota transmission line. And the terms of reference at Tab 4, page 26, near the bottom, the very bottom there, lead -- indicates:

> "Aboriginal consultation is conducted as a separate Crown-Aboriginal consultation process."

And that appears next to the out-of-scope item that says, "Aboriginal consultation pursuant to section 35 is out of scope." And I just want to confirm that -- that that is your understanding, correct?

I can rephrase that. I apologize. That

in the terms of reference in the out-of-scope matter section, in brackets it indicates:

"Aboriginal consultation is conducted as a separate Crown-Aboriginal consultation process."

And I just want to confirm, is that your understanding as well, sir?

MR. SCOTT THOMSON: Yes, it is.

MS. JESSICA SAUNDERS: Thank you. So in your opening remarks you spoke of demand-side management, wind generation, and natural gas generation as alternatives, and particularly natural gas, as the underlying base case comparing all inter -- alternatives to, correct?

MR. SCOTT THOMSON: Yes.

MS. JESSICA SAUNDERS: It may go without saying, but as a result of Hydro's screening of these alternatives, the preferred plan in this review has, of course, taken the front seat with other aspects being considered as alternatives, correct?

MR. SCOTT THOMSON: Well, the preferred plan emerged as the one (1) having the most benefit of the fifteen (15) that we looked at.

MS. JESSICA SAUNDERS: Okay. And to confirm, that goes to the strategic planning on the

part of Hydro, correct?

MR. SCOTT THOMSON: Well, we -- we've evaluated all the plans that -- that we could come up with that -- that would serve the needs of -- of the province, so it's part of the strategy. It's a chicken and an egg thing. But that helps to -- to dri -- confirm and validate the -- the plan.

MS. JESSICA SAUNDERS: Okay. And going back to your opening statement, you underscore that the plan is not without flexibility, that there are decisions that need to be made shortly, but Manitoba Hydro maintains that there is flexibility and future resources is part of the past.

So is it your view that regardless of the, perhaps, sec -- analysis that -- that Hydro completed as part of my questions to you regarding the -- the planning involved, and so that in part of identifying the plan as the preferred plan, that there is still some flexibility in certain decisions with respect to this plan.

Is that fair to say?

MR. SCOTT THOMSON: Yes, there's -- there -- over the course of time, we'll -- we'll evaluate. And -- and some of the things, as I'd mentioned, are out of our control. If -- if there

isn't approval to build, for instance, a 750 megawatt transfer transmission line in the United States, well, it's going to take us down a -- a different pathway.

Similarly, if -- if some of the -- the economic considerations don't pan out, then, as I'd mentioned, we may -- we may want to delay Conawapa, or it -- it may -- may push it off the table and we'd be looking at -- at some other resources at that time.

MS. JESSICA SAUNDERS: Thank you. And that relates to I believe where I wanted to go next. I would refer to you -- to you Tab 5, starting at page 32. This is your presentation to the Second Session, 40th Legislature, of the Legislative Assembly of Manitoba Standing Committee on Crown Corporations, dated October 2nd, 2013.

And on page 42, you are asked -- and I can tell you -- it starts at:

"How is the low price of natural gas in the US affecting Manitoba?"

It's in the second column --

MR. SCOTT THOMSON: Yeah.

MS. JESSICA SAUNDERS: -- below the screen. You might have to move down the screen. So right -- right there, the second last paragraph, you're asked:

"How is the low price of natural gas in the US affecting Manitoba Hydro's plans for the future?"

And in the next paragraph, you indicated:

"It hasn't changed our basic assessment that harnessing the hydro potential on the Nelson River at this point were the two (2) projects we're planning. The economics still favour that."

Do you confirm your comments there?

MR. SCOTT THOMSON: Yes.

MS. JESSICA SAUNDERS: Okay. And then turning to the next page, 43, the third paragraph, you say:

"If gas prices stay at three dollars ($3) five (5) years from now, and the outlook is a lot lower, that's probably going to impact on the decision whether to proceed with Conawapa at that time, defer the project, or shelve it indefinitely. So -- but today, that's the lens we're looking through. It's still

the two (2) hydro projects appear to be the best ones."

You confirm your comments there?

MR. SCOTT THOMSON: Yes.

MS. JESSICA SAUNDERS: Okay.

MR. SCOTT THOMSON: I can confirm all my comments in the document I was --

MS. JESSICA SAUNDERS: I do apologize.

MR. SCOTT THOMSON: -- I was testifying there to.

MS. JESSICA SAUNDERS: Yeah. So I know while these matters are likely to be discussed in -- in panels later on, I just wanted your views, given these comments.

How long (sic) would you say does the gas pricing and related export power pricing relative to the cost of new generation have to go before Manitoba Hydro would defer or cancel Keeyask and/or Conawapa?

MR. SCOTT THOMSON: I -- I'm sorry. You're going to have to repeat that.

MS. JESSICA SAUNDERS: Okay. So how low would you say --

MR. SCOTT THOMSON: Oh, how low. I thought you said "how long".

(BRIEF PAUSE)

MS. JESSICA SAUNDERS: Well, how low and I believe how long are -- are both tied in the question. And I can repeat.

But how low would you say does the gas pricing related to export power pricing relative to the cost of new generation have to go before Manitoba Hydro would defer or cancel Keeyask and/or Conawapa?

MR. SCOTT THOMSON: As we sit here today, we're -- the pricing that -- that's in place today and the outlook that's there is supportive of Keeyask. I can't give you an exact answer on Conawapa. We -- we anticipate an escalation in the natural gas prices in -- in the -- in the next three (3) or four (4) years and beyond.

So I -- I'd prefer to defer the -- the detail on that one to the next panel.

MS. JESSICA SAUNDERS: Thank you. And so moving on to the next area, we heard Hydro identify in its opening remarks again the Stage 1 and Stage 2 on decisions at a later date and supplementing options. I'm wanting to explore with you more some of your comments and -- on what has needed to occur in coming to the decisions stages, the decisions that led

Manitoba Hydro to this point in time when other decisions are needing to occur in short order.

And in his examination of you, Mr. Peters asked you about the costs that have already been associated with Keeyask. You confirmed to him that the cost of Keeyask would be 1 billion in June 2014.

Are you able to confirm the amount to these projects -- the amount of these project costs spent with respect to First Nations involvement in the project?

MR. SCOTT THOMSON: In aggregate, yes, and we can get that information. I don't have -- have it in front of me.

MS. JESSICA SAUNDERS: Okay. Yeah. Yes, would -- would we be able to confirm the undertaking?

MS. PATTI RAMAGE: That can be done by undertaking, or it can be done by the panel with the detailed information. It's...

THE CHAIRPERSON: Let's do it as an undertaking.

MS. JESSICA SAUNDERS: An undertaking as to in -- in Mr. Peters's earlier testimony he was asking the project cost spent with respect to Keeyask, and that it would be around 1 billion in June 2014.

And my question was wanting to confirm the amount of these project costs spent with respect to First Nations involvement in the project.

--- UNDERTAKING NO. 5: Manitoba Hydro to confirm the amount of project costs spent with respect to First Nations involvement in the project

CONTINUED BY MS. JESSICA SAUNDERS:

MS. JESSICA SAUNDERS: I guess my -- my second question would be then: Are you able to confirm the amount of these project costs in Metis involvement in the project?

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Chairman, that undertaking we'll have to accept subject to check, because I'm not sure if we break it out that way or not.

MS. JESSICA SAUNDERS: Those comments are fair. And so in your undertaking the fir -- the undertaking regarding the First Nations involvement,

would it then be possible when you're preparing that information to indicate clearly what costs go towards First Nation?

I -- I am aware that there may be some references to Aboriginal, but just if you're mindful in your cost projections which costs apply particularly to Metis, if you could indicate that, as well, in your undertaking.

Is that possible?

(BRIEF PAUSE)

MS. PATTI RAMAGE: Ms. Saunders, I'm not entirely clear on what the second part was. But to be clear on what I think we have undertaken to provide is how much the project costs have been -- have been spent regarding First Nation involvement, with a tentative undertaking is: Can we split out how much of the project cost has been spent regarding Metis involvement? And it is tentative because my understanding is that we categorized those costs as 'Aboriginal', and the -- I am not sure that they are -- are -- can be further broken down.

Does that cover what you were looking for? So if we can break it down further, we will, but

that's the tentative part.

MS. JESSICA SAUNDERS: Yes, we would agree to that. Thank you.

--- UNDERTAKING NO. 6: Manitoba Hydro to split out how much of the project cost has been spent regarding Metis involvement

CONTINUED BY MS. JESSICA SAUNDERS:

MS. JESSICA SAUNDERS: And, now, this relates to the narrative we spoke of -- of earlier, both in -- in your comments, sir, regarding the various decisions that have --have been made in order to allow for these plans to be presented here today.

One of the projects being reviewed in the NFAT is Keeyask. And in your opening comments you spoke of how Hydro is a partner along with First Nation partners.

You were referring to the Keeyask Hydro Power Limited Partnership in this project, correct?

MR. SCOTT THOMSON: That's correct.

MS. JESSICA SAUNDERS: And in your opening comments, you explained that Hydro's plans for development are not without controversy or challenges.

I want to refer to your speech to the Winnipeg Chamber of Commerce on September 19th, 2012. It's at Tab 2 starting on page 5.

And on -- if we move forth -- further to page 6 you indicate -- further down. Right there:

> "There is no one-size-fits-all template for our future developments. They are not without challenges or controversy, and without doubt require major commitment of time and resources from Manitoba Hydro and key stakeholder groups, including Aboriginal communities and resource users."

So you discuss a no-size-fits-all template for future developments.

Can you explain more what you mean by that?

MR. SCOTT THOMSON: Yeah. What I was -- what I was referring to, I believe, was we entered into an arrangement with Nisichawayasihk Cree Nation on Wuskwatim. As we -- as we look at the Keeyask partnership agreement, and ultimately Conawapa, I wouldn't expect that the business relationship would be identical across the board on those.

They're -- they're a -- a -- they're -- they're much different size. The capacity of the -- of the potential partners in the -- in the bigger projects, the financial capacity to make investments in a project of that size are -- are limited. And their risk tolerance is -- is limited, as well. And that's something that we learned from the -- from the Wuskwatim partnership arrangement.

So we're not expecting that each deal will mirror all aspects of the -- of the prior deals.

MS. JESSICA SAUNDERS: Thanks. I'll also refer to your comments on page 13, you saying:

> "We have a different set of challenges than those of the '60s and '70s."

Do you see that there in the -- the second-last paragraph that's up on the screen?

MR. SCOTT THOMSON: Yes.

MS. JESSICA SAUNDERS:

> "...including increased responsibility for those affected by our projects and greater scrutiny and accountability for both financial and environmental impacts. And we are up to those challenges."

And so you referred to the challenges of the '60s and '70s, considering impacts to those affected by Hydro projects. In your speech you used the wording, "Aboriginal stakeholders."

Is it fair to say that Hydro's approach to these stakeholders today has changed from the '60s and '70s?

MR. SCOTT THOMSON: Very much so.

MS. JESSICA SAUNDERS: Is it fair to say that Hydro takes a more proactive approach with respect to these stakeholders?

MR. SCOTT THOMSON: Yes, I believe we do. The -- the -- that's borne out in the arrangements that we made with -- with NCN on Wuskwatim and with the -- the partnership arrangements that we've -- we've entered into discussions with for Conawapa and, of course, the -- the Keeyask partnership.

MS. JESSICA SAUNDERS: Thank you. And Manitoba Hydro doesn't have to take this approach, of course, given what I've referred to it, and -- and we've confirmed, as being the proactive approach.

But Hydro has decided to, correct?

MR. SCOTT THOMSON: That's right.

MS. JESSICA SAUNDERS: And how was the name for Keeyask chosen for the project?

MR. SCOTT THOMSON: Well, it's -- my understanding is it's the Cree word for 'Gull Rapids'.

MS. JESSICA SAUNDERS: Do you know who would have chosen the name?

(BRIEF PAUSE)

MR. SCOTT THOMSON: The local Cree Nations asked us to use that name.

MS. JESSICA SAUNDERS: Thank you. And so we've discussed this approach, and I -- I just want to discuss with you further, you've confirmed that this approach has -- has been applied in the -- in Wuskwatim, and as well, in the -- the Keeyask project.

And you can agree then that this approach has been important in development of these projects?

MR. SCOTT THOMSON: Yes.

MS. JESSICA SAUNDERS: In your presentation to the Standing Committee on October 2nd, again, at Tab 5, page 37, you say in the fourth -- the left fourth paragraph down:

> "In preparing for Conawapa, we believe we're taking a responsible and respectful approach to working

with First Nations to reduce environmental impacts and ensure local community benefits from the development. This approach refer to Wuskwatim, and Keeyask, as well] results in better projects to supply the province's growing demand for electricity."

And so you can confirm then that this approach is not only beneficial to Hydro and to the First Nations, but also as part of it being beneficial in the end to all Manitobans in the development of these projects?

Is that fair to say?

MR. SCOTT THOMSON: Yes, it is.

(BRIEF PAUSE)

MS. JESSICA SAUNDERS: I'll just take a moment for a second, please.

(BRIEF PAUSE)

MS. JESSICA SAUNDERS: And in continuing your speech again at Tab 5 on page 37, the

second left -- last paragraph in the second column, you begin to discuss the new transmission line from Winnipeg to the -- to the US triggered by the sale to Minnesota Power, or the Manitoba-Minnesota transmission line. And you indicate:

> "We're about to begin seeking public input to help identify and refine the most suitable route, taking into account impacts on people and the environment."

And I will refer you to the map of the Manitoba-Minnesota transmission line at Tab 9, page 74. Oh, it didn't show up as -- okay.

(BRIEF PAUSE)

MS. JESSICA SAUNDERS: It hasn't showed up as -- quite as clear, but this of course, the -- the map of the Manitoba-Minnesota transmission line from -- from your website.

You can confirm that this proposed project, as is seen on the map here, is the same project you were referring to in your comments?

MR. SCOTT THOMSON: The Canadian portions, some alternative routes that are being looked

at, yes. I -- I -- the colour isn't -- it's -- there are a number of different alternatives that were being -- that we're looking at.

MS. JESSICA SAUNDERS: Yes. And I don't intend to refer you to the particular routes such that I -- I should have had colour in any event, but I don't intend to get into those details.

But in the map, you can see that the converter station -- I presume you can see, but it is there. And as you know, it's been named the Riel converter station.

Are you familiar with the name Riel?

MR. SCOTT THOMSON: Yes, I am.

MS. JESSICA SAUNDERS: And do you know how this name was chosen?

MR. SCOTT THOMSON: I -- I'll double-check.

(BRIEF PAUSE)

MR. SCOTT THOMSON: I'll have to -- we'll have to get you the -- the history around that. I know my understanding is it was -- it was out of respect for -- for the Metis leader, and we were actually hoping that President Chartrand would be

available when we commissioned the station.

MS. JESSICA SAUNDERS: However, though, can you confirm as to whether you consulted with President Chartrand on the name of this converter station?

MR. SCOTT THOMSON: I can't. I can't confirm. I -- I -- it was before I arrived here, so I don't know all the details behind that. I can find out.

MS. JESSICA SAUNDERS: Okay. And so I don't know that we want to -- to do an undertaking on that. I -- I do know that you will provide us with those details, and so thank you very much.

THE CHAIRPERSON: Thank you, Ms. Saunders. I -- I have neglected to ask Mr. Orle if you had any questions. I -- I'm sorry. I apologize that I -- I jumped over you.

MR. GEORGE ORLE: No apology needed, Mr. Chairman. I'm the sixth one to cross-examine. I'm like the last speaker at a roast. There's nothing new that can be added, and I'm quite satisfied from Mr. Thomson's answers that whatever I need will be obtained from the panels on behalf of the questions that my -- my client has.

And in regards further cross-

examinations, the fact that we don't cross-examine doesn't mean that we're in agreement with everything that's been said by the witness. But there's been some very good and adequate cross-examination. I'm prepared to rely on that. Thank you. And thank you, Mr. Thomson.

THE CHAIRPERSON: Before I let you go, I have a few -- a few questions I'd like to ask you, Mr. Thomson. And, by the way, I appreciate your coming in today. I -- I think that it's very important that see the CEO, particularly involving a plan of this import. I think it's important that we -- we see -- see into your eyes and be able to answer (sic) questions directly of you.

I do have a question though in relation to the Strategic Plan, and very specifically, gas versus hydro. I mean, you are -- so you are an energy provider to Manitobans. You're doing over two hundred thousand (200,000) gas customers, serving two hundred (200) -- over two hundred thousand (200,000) gus -- gas customers; also serving two hundred thousand (200,000) electricity customers -- I'm sorry, over five hundred thousand (500,000) electricity customers.

And I -- and I guess the question is: Corporately, are you indifferent as to gas versus

hydro?

MR. SCOTT THOMSON: Not indifferent. I -- I think that my view would be that -- that we should be -- we -- we should encourage and educate customers to make the best choices for energy for specific uses.

You know, in -- in areas served by natural gas, I think it's the preferable way to -- to space and water heat. In -- in areas served by electricity only, there's -- there's potential options to -- to use -- use geothermal heating as an alternative to gas.

We've -- we've got a couple of the projects that are -- that are ongoing right now with -- with the First Nations to -- to convert some of their communities. And -- and because we were in a position to do that en masse, it's allowed the cost to be reduced on those projects, so it's making them more economic.

It's -- it's a -- it's a tough sell in a -- in a gas-served area. Just the numbers don't turn. And even -- it's -- it needs that volume buying today, volume capability in order to -- to make it work, and even in an electric-serviced area at the residential level. But in those instances, we -- we think it is.

So not indifferent, no. I think that

natural gas has its place and -- and we -- we -- you know, we own a gas company. I -- I think that -- that that's an asset owned by the -- the people of the province, too, and we -- we ought to get the most out of that asset that we can.

THE CHAIRPERSON: We heard on Thursday last from an individual who indicated that they were advocating for gas service in Pembina Valley. You know, they -- they -- there's parts of that valley that are -- where gas is available but parts where it isn't available. And -- and I understand from his -- his evidence or his testimony that he has approached Manitoba Hydro to talk about that.

So what say you to a region or part of the province where there isn't gas service, and what's your approach there? I mean, do you see that as an opportunity? Do you see that as something that you need to do to give energy options to those Manitobans?

MR. SCOTT THOMSON: It is an opportunity. I think that extension of gas service is subject to a number of board orders on -- on main extensions. We've done considerable -- I think on the order of over 330 kilometres of new gas mains that we've installed over the last three (3) years.

And -- but -- but there's a -- there's

an economic test that governs that that's -- that I understand it's -- it's been put in place by the Board; your Board, not my board.

So the -- you know, subject to it being economic, that's a -- that's a constraint around -- around extending gas service. But certainly it's -- it's got benefits, and -- and, in particular, in areas where there are some of the -- the colonies that are coal users today and are -- are coming off coal that we can serve with natural gas, rather than having them come onto the -- the electric system. I think that's desirable.

It's -- and economics are important. It's -- it's -- we have -- we still have, unfortunately, four (4) communities in the North that -- that we -- we serve with electricity by -- by burning diesel. And it's -- that's, unfortunately, the most economic choice that we have available today, although we're exploring a lot of options around that.

But the cost of extending transmission service to those communities is on the order of four hundred thousand dollars ($400,000) per customer. Clearly, that's not an economic choice and would require a huge subsidization to bring into place. So there's -- there's a tipping point in there somewhere.

But -- but we are looking at -- at the area there. And -- and if -- if we can make the numbers work, I'm -- I'm certainly interested on behalf of the Company in pursuing it.

THE CHAIRPERSON: Now, there are some commentators that voiced very strong concerns about the risks that are associated with the Preferred Development Plan. In other words, you know, they -- they -- there's clearly opportunities, which you have enumerated today, but significant risk associated with interest rates, and gas prices, and so on. I mean, there are very significant risks.

And there's some commentators that suggest that you could take an alternate plan with considerably lower risks and yet achieve some of the same objectives, which is to have power available for Manitobans when it's ultimately needed by Manitobans. So -- so what do you say to that?

I mean, you -- you've indicated that you have a fairly robust Risk Mitigation Plan in place, but how can you protect yourself against massive increases in interest rates, for example?

MR. SCOTT THOMSON: That -- that's one that we can't insulate ourselves from. I -- I guess -- and -- and much has been made about the -- the movement

in -- in the spot market electricity prices and that -- forecasts not being right if you go back a few years. They haven't all gone against us either. Interest rates we had anticipated would have moved up higher sooner, and they haven't.

So -- so there are some things like that. But -- but again that's -- that is the part of this gated process that we're talking about. If -- if interest rates go to 10 percent and all else stays equal, that's going to have a significant impact on whether or not Conawapa gets built.

I -- I haven't tumbled the numbers, but I -- I believe that that would -- that would cause the financials to -- to go in the wrong direction, and it would make other less-capital-intensive choices likely better.

THE CHAIRPERSON: Okay. We -- you -- go ahead.

MR. SVEN HOMBACH: Mr. Chairman, you'll note that IEC counsel is shown on the hearing schedule as well, but M. Monnin advised me during the break that he does not have any questions for Mr. Thomson.

THE CHAIRPERSON: Now, the schedule also provides that we now turn the microphone over to Mr. Wojczynski, and we have a few more minutes. I know

that it's provided for an hour. So obviously we're not going to do the full hour now, but we can stay longer.

And do you need the full hour?

(BRIEF PAUSE)

MS. PATTI RAMAGE: Yes, we need the hour but it would be my vote to stay on track and -- and do it today.

THE CHAIRPERSON: I'm getting the green light from the fellow panel members, so let's proceed.

(BRIEF PAUSE)

THE CHAIRPERSON: I believe we're in a position to start. Are we?

(BRIEF PAUSE)

THE CHAIRPERSON: Good evening, Mr. Wojczynski.

MR. ED WOJCZYNSKI: Good evening. The honourable counsel for -- earlier made mention about being the -- the last cross-examiner and -- and I -- I think he may -- we -- I realize I'm the last one

between you and the rest of the evening. So I will try and be as efficient as I can, but I'm afraid I do have some significant amount of important material, so I hope you'll bear with me. But I will try and -- and keep it as efficient as I can.

MANITOBA HYDRO PANEL 2:

ED WOJCZYNSKI, Unsworn

EXAMINATION-IN-CHIEF BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: And, Mr. Chair, because Mr. Wojczynski will be appearing as a witness for the first time, we have just a couple of questions for the record to -- to establish his role in the NFAT.

So, Mr. Wojczynski, can you please provide the panel with your role at Manitoba Hydro with respect to this NFAT filing?

MR. ED WOJCZYNSKI: I am the division manager who has the overall lead for the NFAT process itself.

MS. PATTI RAMAGE: And your CV has been filed as part of Manitoba Hydro, what I believe is Exhibit 85. Can you briefly run through your qualifications and past experience relevant to this process?

MR. ED WOJCZYNSKI: I have a bachelor's in electrical engineering, U of M. I did my master's in power systems engineering, University of Saskatchewan. I took numer -- various finance and utility courses. I have been -- I'm a professional engineer, a member of the Institute of Electrical and Electronic Engineers.

I have -- was chair of the Canadian Hydropower Association until this fall when I withdrew, so that I could focus on this significant process that we're engaged in here. I'm still on the board, but not as active right now.

I'm also involved with the International Hydro Association, chair of a working group there. I'm a member of Environment Canada's Species at Risk advisory committee. There are ten (10) industry, ten (10) ENGO members.

I've -- I've held various posts on boards at ArcticNet, Wuskwatim Partnership. I was involved at CA. I was involved with the Mid-Continental (sic) Area Power Pool on the reserve requirements task force earlier. DFO National Science Advisory Counsel. So I have some variety of experience.

When I first graduated, I worked --

interesting given we're talking about gas versus hydro to some degree here -- I started my working career in oil and gas exploration and -- but then took my master's courses and joined Hydro in 1982 where I've been since.

I was also a research associate at University of Saskatchewan.

MS. PATTI RAMAGE: Thank you, Mr. Wojczynski. As a matter of housekeeping, Manitoba Hydro has filed a large volume of written materials to date, including the main filing, which is the business case, the appendices thereto, as well as responses to Information Re -- Requests.

Were these materials prepared under your direction?

MR. ED WOJCZYNSKI: Yes.

MS. PATTI RAMAGE: And can you on behalf of the Corporation adopt these mat -- written materials as Manitoba Hydro's evidence?

MR. ED WOJCZYNSKI: Yes.

MS. PATTI RAMAGE: Thank you. And, Mr. Wojczynski, you have a presentation you would like to give the Board?

MR. ED WOJCZYNSKI: Yes, I -- I do. And I'd like to start off by saying that -- that I'd

like to echo what Mr. Thomson said earlier today, Mr. Chair and four (4) panel members, that we, our team and myself, strongly believe that this type of public review process is very important giv -- for what we're undertaking here.

We're looking at something that's going to influence and affect the electrical supply future of Manitoba for decades to come, our children and grandchildren. And as we all know, there's large dollars at stake, and there's a lot of other issues that are at stake.

So we think it's -- it's -- we're pleased and welcomed that we have this review. We're glad it's starting. And I actually -- in the -- in the sake of us dealing with the issues that are on your mind as the panel and the public's mind, I welcome the comments from the Intervenors earlier today. I -- and I -- I'll try and pick up on a couple of them as I go through my -- my overview of what we're going to be presenting to you the next four (4) weeks.

But there's one (1) particular I'd like to start off with, and -- and it's -- and that is Mr. Williams's comment, although I don't -- he's gone. Oh, that's too bad.

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: Well, that's too bad. He -- he raised an issue that is -- been integral to Manitoba Hydro's thinking for the last ten (10) years in -- in working with Wuskwatim itself, what happened with Wuskwatim, and then what -- and our preparations for other activities, including Keeyask and Conawapa. One (1) of the things we have done is learn from what we're doing.

I was involved in the 1990 capital plans hearing plan Conawapa, which is quite a ways back. I was the lead for the Wuskwatim NFAT process. I was the chief planner then. And now I've led this NFAT process.

But in this process, we have -- we have modified what we do as we go along. And the Wuskwatim experience was a major one for us, as it was for other infrastructure developers throughout North America.

So what happened with Wuskwatim? There were two (2) major parameters that struck it and caused the economics to deteriorate, compared to what we were looking at in that NFAT. The first was the capital costs went up significantly. And I think you're quite aware that the cas -- cost of other infrastructure

throughout North America, and particularly in western Canada, went up dramatically. So it wasn't that we were the only ones who misjudged and mis-estimated what was going to happen.

That structural change in capital construction costs, commodity costs, that's something that has been integrated into our planning. And that's one (1) of the reasons, when you saw earlier today one (1) of the presenta -- one (1) of the overheads when -- during the cross of the increase in capital cost -- I think it was perhaps a PUB cross-examination, you saw Keeyask and Conawapa costs increasing significantly. That is because those structural changes are now incorporated into those projects. And -- and we are continuing, of course, to mo -- to update those. But the big shifts we feel have happened on the -- and we have done many things that have caused us to have more confidence in these costs compared to Wuskwatim.

A major element that we did different was we undertook the Keeyask infrastructure project ahead of coming into this process where we are today. We had a lesson learned in Wuskwatim that the First Nation contract -- joint venture contractor didn't have the same cap -- capabilities that a lot of other contractors might have had, and that there were delays

and cost increases due to that. It harmed the ability of the First Nations to benefit. So we've done that early.

Another major difference, if you look at Wuskwatim, when we were in that NFAT process and the -- and there was the completion of it and we had the report, construction didn't start until two (2) years later. We still hadn't yet had a development agreement with the First Nations. We still had to go through that. It took longer than we thought. Plus we had a far dis -- a fair distance to go in the environmental review process.

Where we are different with Keeyask? We have agreements with the four (4) First Nations. We are virtually, we hope, finished the environmental review process. We are on the verge, hopefully, of starting construction, so we're in a much different situation that we were with Wuskwatim.

Mr. Thomson referred to the fact we have 80 percent of the value of the construction contracts already in hand, that we had virtually none with Wuskwatim when were in the NFAT process.

So from -- plus in our contracting approaches we've learnt from Wuskwatim. We do things much differently. We've significantly enhanced our

capital cost estimating process. We're learnt from other projects in Canada, including Pointe du Bois, not just Wuskwatim.

When we did Wuskwatim, there had been not maj -- there had not been very much major hydro construction in Canada since Limestone. We've had a lot of experience in Canada on hydro projects, including in Manitoba, so we -- we've built on all of that.

The other big thing that happened, was the export prices and national gas prices. The shale -- the natural gas prices are going up, export prices are going up. We saw the numbers earlier.

Then the shale revolution hit. It had a big impact, we all know about that. We know that's not going away. But our forecasts and those of all the expert North American consultants we use, already integrate that in. People -- some people claim that we haven't noticed these things, or that we're -- we're playing catch up. If that's true, then that's true for all the -- most of the major consultants and oil and gas companies in North America. We're quite aware of what's going on and that has been integrated in -- already into our analysis.

So -- and I'll just make one (1) or two

(2) other points. Our whole evaluation approach now we are m -- more aware, as others are of the volatility in things like export prices. And so lesson learned from Wuskwatim, we strongly enhanced how we evaluate our projects. And that's why you see us having this probabilistic scenario analysis, which is a significant enhancement than anything we did it with Wuskwatim.

So the last point on the export price side. Wuskwatim, we had no contracts in place for any of the output. As we heard already today, we still have some surplus power to be sold at -- even with the ones we've announced here. But we have a large chunk of our surplus already contracted for and we're engaged with others, which is much different than we were with Wuskwatim.

So I'd better move on to the rest of my presentation. But we thought it was important to -- to highlight that for you as we go along. And we'll go through some of those things in more detail over the next four (4) or five (5) weeks.

I'll just very briefly go through the plan, but you've already seen it. Focus as a -- as a Ms. Ramage did earlier today, and actually our MIPUG colleagues indicated, focus on the major issues and the major decisions. I'll refer to that and then go

through the various perspectives. We were talking earlier today when Mr. Thomson was being crossed, what are the priorities, what -- what are, what is -- what are you focussing on?

Well according to the Manitoba Hydro mandate and the NFAT terms of reference, we have a number of perspectives that we're supposed to utilize. And -- and we utilize them right through the evaluation and through our conclusions. I'll run through that, then try and indicate what the panels will cover, the four (4) different panels, and then just come to the conclusion.

And if I'm talking a bit quickly it's because I know the time-frame. Scott you're suppose to kick me if I go to fast. No, Patti was supposed to.

The preferred plan, I am not going to go through this in detail you've already had it presented to you. I'd like to reinforce what Mr. Thomson said, and that is in our plan DSM will be expanded. And you will hear more about that over the next couple of weeks.

In our plan we -- we didn't seek approval for a particular level of DSM, in our plan, partly because we did not yet have the analysis of the alternative levels. And partly it's 'cause something

that we intend to update and work on as we go along. And as more opportunities arise and the economics become clearer, then we will expand to that level of DSM. It's not something that's going to be staying static.

We've gone through the rest of the plan and that we need to have commitments this summer. We focussed on Conawapa again that we -- that we're not seeking of -- of -- for a -- make a firm construction decision that we'll have to -- early 2018, and we'll consider all the factors that could arise between now and then, including what's going to happen to the DSM capital cost energy prices.

MS. MARILYN KAPITANY: Could I just ask a question before you move off DSM?

MR. ED WOJCZYNSKI: Sure.

MS. MARILYN KAPITANY: We heard this morning that in First Nation communities there are some higher -- Hydro costs. Are the DSM programs available and accessible to First Nation costumers in Manitoba?

MR. ED WOJCZYNSKI: I -- I understand DSM programs are available and accessible to them, but -- but how successful that is and what the details of that, I'm -- I'm not the best person to talk that -- but tomorrow morning and the DSM panel, it's the right

people there.

MS. MARILYN KAPITANY: Thank you, I'll ask them.

MR. ED WOJCZYNSKI: Yes. So what are those decisions that we think we should focus on? And this is a somewhat akin to what you heard earlier today from MIPUG, and -- and although, it's -- I'll, we'll frame it in our own way. And we're looking here at the -- what is -- the long term electrical future of Manitoba. We think this is a major decision point and a major influence in what that will be. And there are many elements to it. DSM, again, will be expanded in all the plans. The -- the fundamental issue we feel is are we going to go ultimately with hydro, or are we going to go with gas, recognizing again wind and solar, other things, will play their part, too.

But -- when you look at the major fundamental options -- if -- in our view, hydro is clearly the better alternative overall compared to gas. If -- if we go with --with hydro, there are associated decisions that perhaps we can view as the opportunities that MIPUG was referring to.

Should we have an internect -- interconnection expansion opportunity should we pursue that? If that's the case, you would have to expand --

accelerate Keeyask development from the late -- the date that would be needed for domestic to meet the Minnesota Power requirements, and move it into 2019, or if there was a delay 2020, and we'd have to have the Minnesota Power sale.

Should that interconnection be 750 megawatts or 250 megawatts. That's another decision that would have to be made.

The 250 megawatt option we have included in our submission. We've evaluated. Increasingly what we've found since the submission in August of last year is that the 250 megawatt option is a -- is a riskier option to get approval than the 750 megawatt option. And you -- you'll hear more about that in -- in the second panel.

We -- the 750 megawatt option per -- has economies of scale that provide more benefits to the entities in the US. There are benefits to having a larger tie-line and more supply for wind integration and for reducing the cost of supply to consumers in the US, which will effect how the regulators there and the utilities and the -- and the MISO itself respond to a 250 megawatt versus a 750 megawatt tie-line.

Min -- Minnesota Power has gone quite far in terms of their process. They'd have to step

back and -- and restart the process. So there -- there are those kind of issues that cause us to think the 250 megawatt option is -- is still a possibility but riskier than the seven fifty (750) in terms of getting approval.

The last one is: Should the 380 megawatt WPS sale, that was recently announced, should it be pursued as part of this approach? And the 750 megawatt interconnection, we -- would be needed for that. The two-fifty (250) megawatt would not work with that.

THE CHAIRPERSON: Can you explain to me -- you just said that the seven fifty (750) is less risky than the two fifty (250), and I -- could you -- could you explain that?

MR. ED WOJCZYNSKI: In -- what I was referring to is that the -- the likelihood of getting approval for the interconnection in the United States, the regulators in the United States will -- would have to approve either one (1) of those transmission line options, and the 750 megawatt transmission line option provides way more benefits to the State of Minnesota and its consumers, to its electricity suppliers, than a 250 megawatt transmission line.

One (1) of the elements I didn't

mention, 'cause I was trying to save some time, but I'll mention it now, is that the transmission planning authorities in Minnesota have strongly indicated that transmission lines should be optimized in terms of use of the right-of-ways. There's a lot of opposition to expanding transmission lines. We've seen it in Manitoba. It's -- certainly see it in Minnesota.

And what they have told all the developers is -- and a goal is to use the available right-of-ways to the max amount out possible. So if Minnesota Power now went back and withdrew the 750 megawatt option and put the 250 megawatt, the smaller option, on the table, which has much less ability and -- and less potential to expand later, the transmission approval people would -- would look probably not very kindly on that.

THE CHAIRPERSON: Now, just since you've raised the issue of DSM -- and I -- I know you're not the expert on DSM -- but there -- there is a strategic element to this because one (1) of the -- one of the experts acting on behalf of GAC and CAC has suggested that DSM should be addressed via integrated resource planning, specifically, that it's not considered an add-on but you -- you use that as one (1) of the potential sources of -- of supply, in essence,

in your decisions around which options should you pursue.

So I guess the question is: Longer term, are you considering integrating DSM into your resource planning given the significance of DSM more generally in North American and in Canada?

MR. ED WOJCZYNSKI: I -- well, thank you for the question. And I was going to touch on that, but I'll -- I'll do that now.

Manitoba Hydro agrees that for us to have a -- a good evaluation and comparison and decision on -- on which pathway we should follow, which -- which of these decisions we should take, we should have a good sense of what would the different DSM options -- how they combine with the different plans, and would your choices change with the -- the different DSM levels or sets of options, and that we should integrate those.

Manitoba Hydro has been looking at DSM on an ongoing basis. There are two (2) ways to do it. You can use what are called the marginal values of how much extra DSM is worth with the current plan you have. And if you're not looking -- and that's what we have been doing for a number of years, and that's because we weren't looking at radically different plans. The

plans were more or less similar, and so the -- the value of additional DSM wouldn't change that much.

But now when we're looking at radically different plans for going forward, then the -- the value of the -- the incremental DSM could be different in those plans and could complement them in different ways. And they should be integrated into that analysis, and that is what we are doing.

And, unfortunately, as was mentioned earlier, we had intended to have that available well before our submission in August last year. The DSM potential study, which is a -- a first step in doing that, took a lot longer, a year and a half longer, than was -- was supposed to happen, and so we weren't able to do that integrated evaluation in our submission. We did a sensitivity to try and see what impacts there may be, but that isn't a -- a full integration.

What you will be getting in the course of the next few weeks will be that integrated evaluation. And we are -- it's still actually a work in progress. We're just doing the final work on that. And -- and it's not even quite ready yet, although we have some preliminary indications, and I was going to talk about that.

Refer to these choices, and in -- in

these -- these fundamental choices, how do we evaluate those in our submission, and how can we present them to you, and how can we -- how do we compare these decisions?

What we prepare -- came up with is five (5) pathways that are the results of those decisions and that implement those decisions. And each one of those pathways has a number of very specific development plans with individual dates for different supply options or -- and sales, or tie-lines, or whatever. And -- and then -- then we evaluate those plans and help decide between the pathways.

There's -- there's the -- the first pathway is you -- you start with gas as your next option. You only do it for domestic load. You can do gas or hydro after that.

Or you could start with Keeyask; no interconnection, no sales. You'd do it with the -- the current information. We have 2023 for Keeyask. That date can move. And later on you'd do gas generation or Conawapa. You can make those choices.

Or you can start with a small interconnection. You'd have to advance Keeyask. You have the Minnesota Power sale, a couple of those other sales. And again, later on, Conawapa or gas. You have

those choices.

The fourth one is you have the 750 megawatt interconnection, and -- but you don't do the 300 megawatt WPS sale. That's the fifth pathway. The fourth pathway probably is not that interesting any more now that we have the 300 megawatt WPS sale confirmed, but it's still there as a possibility.

And as I indicated, the Pathway 3 with the 250 megawatt interconnection is still there as an option, but it's probably not as likely a possibility as the -- the Pathway 5.

MR. RICHARD BEL: Can I ask -- I don't see gas-Keeyask. Was that ever on the table? Because it -- it's one (1) of the gateways on -- it's one (1) of the gateways on the plans, but it doesn't show up.

MR. ED WOJCZYNSKI: We -- we have done work with gas-Keeyask at times, but we -- Keeyask has been an economic option to do first. And we have Keeyask -- we have gas-Conawapa looked at quite significantly, so you -- there -- there -- that kind of information has been available.

The Ma -- Manitoba Hydro mandate starts off with -- with meeting the Manitoba load, but we have to consider a wide range of issues, and the NFAT terms of reference spelled those out in some specificity, and

so our analysis uses those throughout this submission. Our submission was based on -- on that and our conclusions are based on that.

A significant point that we're going to be going through over the next four (4) weeks and the cross-examination, the evidence from others, we'll deal with this to a fair degree as well, is that to deal with the different perspectives, you need to have different tools and methodologies. And it can get confusing when you say -- when we -- why -- why do you do it this way here and this other way over here? And that's because there -- the different perspectives require that, and I'll try and give some indication of that today.

What are these multiple perspectives? And I got two (2) overheads on that. The first is the Market Valuation Economics. This is the standard evaluation methodology used around the world for decades for evaluating projects. It uses a -- a discounted cashflow to get a net present value benefit, in this case, to Manitoba Hydro, of proceeding with the project or projects or that plan compared to other ones.

And -- and this is an absolutely standard technique and it's one we have -- we have used

for all our evaluations going back as far as anybody remembers, and -- and when you provide that analysis to Manitoba Hydro, it in -- the benefits indirectly flow to domestic comer -- customers and the project partners, and -- because it's the benefits from the project.

The -- the second perspective is from the Manitoba Hydro domestic customer specifically, and the -- there's a reliability of supply to them. There's the minimum reliability you need to meet the criteria, but if you have greater reliability than that minimum, that's still a benefit to the customers. And all of our plans meet the minimum criteria, but some of them provide additional benefit by having additional reliability, and we evaluate that.

The same from the point of view of energy security, energy security being -- being able to supply the load if you got a bad drought or an energy shortage of some kind like that. And again, there's a planning criteria that says what the minimum is, but then there -- there's also -- you can have a se -- energy security above that, because we can have things like droughts that are worse than ones on record, and we have to -- and -- and there's a benefit to being able to deal with those, particularly with climate

change coming and happening.

The one, obviously, that's a huge focus here are rate increases, what will happen with the rates to the customers, what will happen to all the financial targets? That is -- that's of interest to customers because at the end, that affects -- can affect rates in one way or another: retained earnings, fixed asset, debt levels, all of those financial ones we deal with in -- quite significantly throughout this submission.

Socioeconomic is more broadly going into now from the provincial societal point of view. There's the economy, employment and income, training and business opportunities, infrastructure, services, personal, family, community life, with a special focus on the Northern and Aboriginal communities. And these fit the definitions of -- from the NFAT terms of reference and what the PUB had defined earlier in this process.

Oh, sorry, I have to -- something happened here. Ah. Okay. They use the macro-environmental impacts and benefits, again, as per the PUB definitions, and I highlight in there the greenhouse gases, which is a -- a major differentiating element. Manitoba government is very much a part of

the -- of the terms of reference and importance in Manitoba. The -- the financial transfers to the province have been discussed earlier today, capital tax, water rental, debt guarantee fee, and those are a -- a cost to Manitoba Hydro.

When we do the market valuation, when we do the financial evaluation, those are costs, and they decrease the benefits to Manitoba Hydro, but they -- those transfers go to the provincial government and either reduce taxes or increase services. They be -- do become a benefit to Manitobans.

So if you're looking at the borders of Manitoba or Manitoba as an entity, either -- those financial transfers will get added to the benefits to Manitoba Hydro because they're a benefit to the province as a whole.

Alignment to the Manitoba Hydro Act and the various other Acts and risk. We have to deal with uncertainty, and -- and we do that quite extensively in our -- our submission.

We talked about different perspectives and different methodologies. One of the confusing elements, it's already come up in the -- in the IR process, it's beginning to come up in the evidence presented by others, is discount rate. In the market

valuation, a standard approach is to use the weighted average cost to capital, which we have calculated for our Company.

It's the -- the cost of our -- our capital with an imputed equity, and in -- right now using 5.4 percent. We update it every year. Last year -- the -- the submission started with 5.05 percent because it was based on 2012. That's a real discount rate. That's with inflation taken out. That's equivalent to a 7.65 percent nominal discount rate, which is what we normally think about as -- as day-to-day consumers.

If you go to the provincial societal perspective and do a social benefit-cost evaluation, which is what's in Chapter 13, then you move to not the cost of capital for Manitoba Hydro, but you go to a -- what's called a social discount rate, and -- and that, in our analysis, is 6 percent real.

Then if you go to the third perspective, and that is we've got customer bills that vary over time, and we've got the intergenerational equity of the customers paying bills today and tomorrow and ten (10) years from now, and I believe it was MKO -- it might have been MMF -- referring to seventy (70) years from now, and how that's important to them and not that far

off.

How do you balance when people paying their bills then and now, one (1) being low -- higher, one (1) being lower? So what we use is something called the social time preference. It is -- it's called a solid body of -- of why that is the appropriate rate. It's based on the interest rate that is from risk-free savings, and that's 1.86 percent real, which is nearly 4 percent nominal, and this will all be discussed in more detail later, but it's giving you a head's up as to what you're going to be hearing.

So we have our four (4) panels. I'll go through each one of them. Tomorrow is the load and DSM panel. We're going to be having the consultants who did the market -- the DSM potential study present their methodology, their market potential, the -- the achievable potential. That was the -- the starting point for dealing -- developing the new DSM levels.

Then we'll explain the DS -- Manitoba Hydro's DSM philosophy and approach, the 2013 DSM plan, which is the current plan, but additional programs have already started being delivered. And that program -- that plan is already been expanded through on-the-ground activity by Manitoba Hydro staff.

We have -- the 2014 DSM options are the

ones that were being referred to earlier. And -- and what I was saying, that we need to have those and to evaluate them. Well, we -- we have a -- have a -- a first cut at those, and we are of finishing the evaluation of those, and we will present those next -- not -- yeah, next week, and I'll explain a little bit more about that right away.

Then the panel will go into the current load forecast, how historic and future load forecast compares, what's -- and compare it to other jurisdictions, as well. The lar -- probably the largest panel in terms of amount of material and the amount of time will be the second panel, which is the heart of the NFAT process, and it's the need, alternatives, and economic evaluation panel.

Their -- the third panel is the financial panel, and it takes the output of this and then does the financials, but it starts with this. And the first thing this panel deals with, when are new -- new resources needed? This is the 'need' question.

Very much a part of what identifies that for us is the generation planning criteria, and that was reviewed by the independent consultants. And there wasn't much debate on them except for the one on energy import limits, and you'll be hearing about why Manitoba

Hydro thinks our -- our energy import limits are reasonable.

We already count on a large amount of imports in a drought. We're -- if you take in 2020, for example, and we're in a -- in a drought of record, that's like the worst drought we had in -- on our record, Manitoba is -- is a -- a net importer, and we import 20 percent of the Manitoba load requirement, either import or run our thermal generation in Manitoba. So it's already a significant amount of imports, which is around over half of that, and then our own thermal.

And we'll explain why we think it's reasonable for the cri -- the criteria we have that limit that. With a larger line, we would expand that, and we will, but there are limits.

Talking about the tie-line, another issue that was raised in the last few months was, well, we -- if the -- the interconnection brings benefits. There's no question of that. It brings export and import benefits.

Why don't we import -- build this tie-line, Manitoba Hydro build it, don't have any export contracts? Build it itself. Don't have a counterparty in the States, and then get all the import benefits so

you don't have to build anything in Manitoba.

We don't believe that that is a viable alternative, that the -- the processes in the States are not ones which would enable that to happen. And we'll have testimony as to why that is the case.

Resource options. We'll se -- we'll go through all the options we looked at and the short list of them, then we'll go into the window of opportunity that has been mentioned earlier, and I -- I'm going to give a bit of a different explanation, perhaps, of what that window of opportunity for the interconnection is.

Building interconnections across the US border, or even across the pro -- provincial borders, is a -- a -- requires a confluence of critical conditions that do not happen very often, and we have that confluence of conditions today.

And we think it's important for Manitoba to seize upon that opportunity, because the likelihood is, if we don't seize it now or in the next year or whatever, that that opportu -- that confluence of circumstances won't arise likely in the near future.

And we can go into more detail later, but that confluence is there's a -- a structural change happening in the US market south of us. They want to get off coal. They want to have low-emitting

resources, ones that aren't exposed to greenhouse gas, clim -- CO2 taxes or anything like that. They -- it's -- they want resources that fit in the renewable portfolio standard.

So they're at a point where they have a massive change in their structure, and we have secondly a counterparty who is good at building transmission, and -- and is willing to champion.

And third, we have resource options, new generation, that are ready to go or nearly ready to go that meet their portfolio standards, say, in -- in Wisconsin for new hydro, and -- and we've got support from our Aboriginal partners. And so this is a confluence event -- events that are just coming together in a nexus that's quite advantageous right now.

Finally, we'll get to our development plans, and then how do we evaluate those? What are the discount rates? We'll have a -- a discussion on those, or begin to have a discussion there.

Then we're going to go into the Keeyask and Conawapa capital cost estimates. We'll have a detailed explanation of how we developed those cost estimates. There was a discussion in the technical conference, the pre-hearing conferences.

We'll have more of that, but in addition, we're going to have what Mr. Thomson referenced earlier today, that we've just finishing the -- the general civil contract process. It's the single biggest contract Manitoba Hydro will ever have awarded. It takes many months to evaluate the alternatives.

And we are just now doing the final landing, and -- and we'll be updating the estimates based on those. And as Mr. Thomson indicated, they are being -- the estimates are being reviewed tomorrow and we'll be presenting next week in our panel that deals with these issues. And we'll also present some preliminary results of evaluations with those.

And we'll also talk about capital costs for the other resources, for the transmission. We'll go into the export prices and the -- and gas prices. We'll go through the various contracts, and specifically not just the one that was signed, but Great River Energy MOU and the SaskPower MOU that Mr. Thomson referred to.

Uncertainty, risk. There was a lot of discussion of that earlier. We have enhanced how we deal with that. We'll give a good explanation of -- of how we do that.

And then finally we get into the

results. The re -- the submission was based on the 2012 information with some update on 2013, and we'll provide some preliminary update with some preliminary cost information from these new cost estimates that are just -- just being finalized now.

We will provide an evaluation of the DSM alternatives, the -- the new options, and then finish off with a discussion of our flexibility and the pathways, and then present the reli -- the comparisons on reliability and energy security.

Coming back to the issue of what are the things to focus on in -- when there's such a huge amount of information and a large number of issues. What -- what are the main things to focus on?

We did -- with external consultants, expert consultants assisting us, we went through the process a couple of years ago and have updated that, and determined that the single most important elements that affect the comparison of results are these first three (3). And -- and intuitively, it's actually not a surprise.

Energy price is our export and natural prices, the capital cost of the projects, and what are the interest and discount rates? Those are the three (3) big drivers, and those are the ones we focus on in

our uncertainty analysis with twenty-seven (27) probabilistic scenarios.

Other issues are important, as well, but not as critical. What will our load growth be? How much DSM will we do? What happens with climate change? What happens with droughts? And those have all -- are being evaluated, as well. And I -- I already mentioned the probabilistic scenarios.

Okay, so our DSM options. We know there's a lot of interest in these, and we've been working feverishly to have as much early -- as much available as early as possible, and the work isn't even finished yet as I speak here.

In this table we just summarize the -- there's four (4) options, essentially, and on the left column we sort of label them and indicate how much energy would these options save, how much load reduction would there be in the year 2027? We just picked that year somewhat arbitrarily as a metric.

The current DSM program is the base DSM, and that -- and that's the 2013 program, would reduce load by 773 gigawatt hours in that time frame. That's what has been in the plan for the whole last year and been in the -- in the submission. We're referring to that simplistically as one (1) times DSM.

Then we have the new 2014 Option 1, and what we did with that is we expand the energy efficiency measures and roughly -- actually, a little bit more than double the amount of DSM for this Option 1.

Option 2, we took all the stuff that was in option 1 and we added in rate programs, fuel switching, fuel switching from electricity to natural gas, and load displacement by customers by using other forms of electricity generation. And we -- and that roughly doubles the -- the DSM again, so we call that four (4) times DSM.

The last option, Option 3, takes all the stuff that was in Option 2, and then goes to those energy efficiency programs and expands those and pushes them harder, increasing their cost, as well, but testing that -- that higher level of DSM.

And we evaluated those levels of DSM. The little 'X's on here are studies that we have done and -- or are in the process of finishing, and you see two (2) of them say March 10th or later. We're trying to have those ones available for next week and we're doing everything we can to have them available, and we think we will, but we're -- we're not sure.

And what we've done is evaluate all of

these with the 2013 load forecast and updated information. And then for Options 2 and 3, when you're evaluating the higher level of DSM, we are expecting our load growth will increase if -- if the pipeline proposals that are being actively pursued right now, the oil pipelines that take oil from Western Canada to Eastern Canada, that there's two (2) major pipelines being pursued right now, that if those happen, we could see load growth increase around 2019, but up to something that's over 1 1/2 thousand gigawatt hours. We used a 13 gigawatt hour pipeline sensitivity, and we repeated those there, and that way, you -- you don't underestimate the value of the DSM, because as the load grows faster, the -- then the DSM becomes more valued, and so those results will be provided next week.

We're also using the same runs to compare the Preferred Plan against the keeyask-gas plan with the seven fifty (750) tie-line versus an all-gas plan. With the -- the two (2) levels of DSM to get a -- a sense of the optimization between those. And we'll be presenting information on that next week, as well.

Then we go to the finance panel, dealing with the targets, how they do their evaluation, all the metrics that you'd expect to see from the financial evaluation. We'll deal again with the

intergenerational equity, and some consideration of provincial credit ratings. And I won't go through any explanation of those, I think, just to save some time here.

Briefly, particularly for people who haven't been as involved in this NFAT process for the last while, we've got the two (2) different evaluations: the economic and the financial. And what's the difference between them? The economic evaluation only thinks about the costs and revenues that are related to that project proceeding or not. It's an incremental analysis.

The financial analysis looks at the -- all the reve -- the rev -- costs and revenues from the Company, whether they're reallocated or overhead or sunk costs, or whatever. There's -- the economic evaluation concerns itself only with the project or things that are affected by the project. The financial evaluation is the whole company, and very similar to the IFF and the CEF, it -- it's really repeating those, but as almost to sensitivities.

The economics measure the end pre -- net present value that I mentioned. It's for the -- for the project, or for the plan. The financial evaluation doesn't come up with a single metric. It has hundreds

of measures, rate increases, and all the financial targets and objectives, and on a year-by-year basis.

Economics is done in the real terms; that is, inflation removed. Financial evaluation, we do it in current dollars we -- we -- and leave inflation in. Depreciation. In -- it came up from -- with one (1) of the independent consultants, My goodness, your economic evaluation doesn't have a depreciation or -- or a revenue requirement. Well, we don't do -- that isn't done in the economic evaluation. That's done in the financial evaluation.

When you do -- in standard approach in economic benefit cost benefit cost evaluation, you do it for the life of the asset you're evaluating. Now, we don't pretend we can do a seventy (70) year study and have excellent forecasts all the way through. We have a thirty-five (35) year detailed study period and forecast for that, and then we have an extension beyond that with some assumptions that we'll explain later in another panel where we calculate the -- what's called the residual value, or the -- the value of the asset at the end of the thirty-five (35) years. And -- and you can do that in different ways, and the -- the way we done it we think is the best way, and we'll certainly discuss that.

In the financial evaluations, you don't have to do a residual value because you do it year by -- - you calculate year-by-year, and that's another big difference between the two (2) evaluations. It's come up in -- with the independent consultants is that in our economic evaluation, we don't look at the economic evaluations every ten (10) years or for different periods of time.

That's because standard approach with economic evaluations, it's for the project over its asset life. What Manitoba Hydro has always done is look at the year-by-year impacts. That's the financial evaluations.

Then we move onto the Societal Panel, and this is where we deal on a screening level with the environmental and socioeconomic, partnership and Aboriginal benefits, and I emphasise macro-environmental and screening. This is not to be a repeat of the environmental assessments being done -- having been done for Keeyask, going to be done for Conawapa, going to be done for the transmission, or any other resource that's going to be built.

The terms of reference are very explicit on that. We're not to repeat the environmental assessment. So we presented the -- these issues on a -

- on a screening or a macro level. We deal with the al -- alignment of the Manitoba legislation or strategies, then we provide what's called an economics im -- impacts analysis, and that can be kind of confusing because we just talked about economic evaluations. What this is about is if you do these projects, or -- how much employment will be increased? What happens to the GDP, income in the province as a whole, tax revenue as a whole? And so that -- that's from a provincial point of view.

Then we go to what's called a multiple accounts societal benefit-cost analysis. That's something that takes all of these various elements and brings them together and evaluates them from a provincial societal point of view. Not from a Manitoba Hydro point of view, and that's very much in keeping with the NFAT terms of reference and looking at the -- the long-term best interest of Manitobans.

I don't think I'll spend much time on the benefit costs; we're running rather late tonight. I think I've indicated it from a provincial-societal point of view. The one (1) point I'll make is that one (1) of the things it does is that, where there are benefits that are Manitoba Hydro benefits evaluation and the rates benefit -- rates evaluations don't take

into account there are benefits that are not accounted for there. This analysis tries to monetize those or put a dollar value on.

And an example of that: You've got high unemployment and you reduce that employment, then that's a benefit, and the -- the -- in that you -- you adjust the -- the cost of the labour and you reduce the cost of the labour for that. So that's -- that's one (1) example of that.

But not all things can be monetized, and those are dealt with in that in a qualitative fashion.

These accounts are the same ones I mentioned earlier. It brings them all together. I won't go through those again.

This is something that we're going to spend the next three (3) hours on. Seriously, this is just up to depict that -- what Mr. Thomson was talking about: the gateways.

This is out of chapter 13. I'm not going to go through this. You have the -- the five (5) pathways, and -- and there are literally hundreds of decision points you could point to. This is a simplified version of, over time, the kind of decisions and gateways we'd be talking about and the different plans and the flexibility we have. And we will be

talking about that at the end of the four (4) panels.

And my last overhead is really just a summary again of why Manitoba Hydro -- we conclude that the preferred plan is in the best long-term interests to Manitobans and is needed. We have our load growth. Even with expanded DSM, we are going to need new supply. The interconnections are always beneficial, and if we develop more hydro, the new exports will further increase their benefits.

The rates we've -- we conclude will be the lowest rates in the long term. We recognize there will be in the medium time -- term some slightly higher rates, but we feel it's a fair tradeoff from an inter-generational point of view. The plan supports our long-term fiscal health with higher levels of fixed assets and retained earnings. We're in better shape to deal with things like droughts or other contingencies.

We get the most improvement and load reliability and energy security of all the plans, certainly for over the first twenty (20) years. It's robust, larger financial transfers, benefits socio-economic, major reduction in greenhouse gasses.

Climate change as been identified as one (1) of the most, if not the most, severe environmental issue in the world today and a threat to bio-diversity,

whether it's caribou in northern Manitoba, whether it's people in the deserts, whether it's the Arctic which is experiencing climate change faster than anywhere on the earth. Polar bears. So that's a major component of our plan is that consideration.

And lastly, the hydro is a renewable energy, gas is not.

Thank you.

THE CHAIRPERSON: Thank you very much for your presentation, and we look forward to drilling down into these topic areas as we proceed over the next few weeks.

Now, I don't know if there's any additional business to conclude tonight. If not, we will adjourn the proceed -- oh, go ahead, Ms. Ramage.

MS. PATTI RAMAGE: One (1) small matter of business is that Mr. Wojczynski's presentation should be assigned an exhibit number and entered into the record. I believe, subject to check, it'll be Manitoba Hydro Exhibit 86. But maybe we can just confirm that in the morning.

--- EXHIBIT NO. MH-86: Copy of presentation by Ed Wojczynski

THE CHAIRPERSON: Okay. There being no other business to conclude, I will adjourn the proceedings, and we'll see each other again tomorrow morning at nine o'clock. Thank you very much.

--- Upon adjourning at 5:19 p.m.

Certified Correct,

_____

Cheryl Lavigne, Ms.

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May 25, 2011

$4 BILLION IN POWER SALES TO U.S. FOR MANITOBA HYDRO: SELINGER

Premier Greg Selinger announced today that Manitoba Hydro has signed agreements for a 250-megawatt (MW) sale of electricity to Minnesota Power and a 100-MW sale to Wisconsin Public Service. Combined with a previously completed 125 MW sale to Northern States Power, these sales total 475 MW with an estimated value of $4 billion, Selinger said.

The premier said these sales will require the construction of new hydroelectric generating capacity in Manitoba. They will trigger the development of the 695-MW Keeyask (Cree for gull) Generating Station located on the lower Nelson River 175 km northeast of Thompson in the Split Lake Resource Management Area. Keeyask is to be developed by a partnership consisting of Manitoba Hydro and the Keeyask Cree Nations-Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation, and York Factory First Nation. The $5.6-billion project will provide some 4,500 person-years of construction employment, said Selinger.

"I am very pleased that Manitoba Hydro is moving forward with these power sales which will significantly increase our exports and lead to further development of Manitoba's renewable hydro power resources," stated Selinger. "These sales will add to Manitoba's reputation as a sustainable energy leader and help reduce global greenhouse-gas emissions by reducing the need for thermal generation in the United States. At the same time, the development of Keeyask will deliver jobs, training and business opportunities to the Keeyask Cree Nations, the north and all of Manitoba."

"Today's announcement demonstrates there is strong interest in Manitoba hydro power in U.S. markets, resulting in the need to advance construction of new generation and a new interconnection with the U.S. that will broaden and diversify our customer base, increase our revenues and contribute to reliable, cost-effective future electricity supply for Manitobans," said Bob Brennan, president and CEO, Manitoba Hydro.

The 250-MW power sale to Minnesota Power over a 15-year period from 2020 to 2035 requires an additional interconnection between Manitoba and the United States which will provide increased export capability and reliability benefits for Manitoba, said Selinger.

The 100-MW power sale agreement to Wisconsin Public Service covers the 2021-2027 period. Negotiations are continuing to expand the Wisconsin sale to 500 MW which would require construction of the Conawapa Generating Station, the premier said, adding with these sales, Manitoba Hydro and its partners are reviewing scheduling and other requirements for moving forward with Keeyask.

Manitoba Hydro's construction program also includes the Bipole III transmission line, being developed for a 2017 in-service date to provide reliability for Manitoba customers. Bipole III will also be utilized to transmit power from Keeyask and the 1,485-MW Conawapa Generating Station, supporting expanded electricity export sales outside of Manitoba's borders. The Conawapa site is located in the Fox Lake Cree Nation Resource Management Area.

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Justice Minister Cliff Cullen to discuss Support for Manitoba Corrections during COVID.
Watch it live at
youtu.be/A4s5ldU_dos.

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Quick Links

Manitoba Ombudsman
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Manitoba Public Insurance
Manitoba Hydro
Manitoba Liquor and Lotteries
Elections Manitoba

Sale agreements with Minnesota Power and Wisconsin Public Service will require regulatory approval in Canada and the United States.

- 30 -

For more information:

- Public information, contact Manitoba Government Inquiry: 1-866-626-4862 or 204-945-3744.
- Media requests for general information, contact Communications Services Manitoba: 204-945-3765.
- Media requests for ministerial comment, contact Communications and Stakeholder Relations: 204-794-0732.

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ABOUT WUSKWATIM

- Powerhouse, Main Dam and Spillway
- Transmission
- Maps

About The Wuskwatim Generating Station



Wuskwatim is a 200-megawatt, run-of-river hydroelectric generating station on the Burntwood River at Taskinigup Falls. It is located in the Nelson House Resource Management Area about 45 kilometres southwest of Thompson and 35 kilometres southeast of Nelson House. **(Enlarge Map)**.

Primary Wuskwatim components include the generating station and dam, a transmission line to the provincial power grid and an access road. Construction of the generating station was completed in late 2012 at a cost of $1.3 billion. The transmission line was a separate Manitoba Hydro project constructed at a cost of $300 million.

The generating station is the result of nearly a decade of planning and studies, negotiations between Manitoba Hydro and Nisichawayasihk Cree Nation and an intensive environmental assessment which incorporated NCN traditional knowledge to minimize project impacts. The dam was designed to cause less than one-half of one square kilometre of flooding, the least amount of flooding of any Manitoba Hydro project in the province.

Power produced by the dam is designated for export until Manitoba needs the energy for domestic use.

Benefits

Clean, Renewable Energy

The Wuskwatim Generating Station produces clean, renewable energy that earns revenues from the export market and assists in supplying domestic load in Manitoba.

Jobs

The Wuskwatim Generating Station was one of the province's largest construction projects and provided hundreds of jobs over six years. Qualified workers from Aboriginal communities close to the site and people from Northern Manitoba communities were given first consideration for employment during construction and during operation of the station.

Training

REPORTS & UPDATES

- A New Way Forward (Video)
- See the Station (Photos)
- Monthly Water Level Reports
- Access Road Restrictions
- Year in Review Reports
- Monitoring Overview Reports

Targeted training opportunities were in place beginning in 2003 to ensure NCN Citizens and other Aboriginal people had the skills they needed to take advantage of project opportunities.

Contracts

Manitoba Hydro provided management and construction services to Wuskwatim Power Limited Partnership (WPLP) that jointly owns the generating station. It provided Manitoba businesses with opportunities to bid on contracts consistent with its commitment to work with suppliers through the Buy Manitoba and Northern Purchasing programs.

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7 Screening of Manitoba Resource Options

7.0 Chapter Overview

Previously***, Chapter 4 – The Need for New Resources*** described how Manitoba Hydro establishes the need for new supply resources in order to meet the electricity demands of Manitoba Hydro's domestic and firm export customers. As part of the resource planning process, Manitoba Hydro monitors a wide range of resource supply options and maintains an inventory of options which are potentially available to meet future Manitoba needs. ***Chapter 7 – Screening of Manitoba Resource Options*** describes the process of screening resource technologies and options and establishes the portfolio of resource options that is used by Manitoba Hydro in determining development plans.

This chapter considers those technologies that are available for utility-scale generation. Detailed information on resource technologies is available in ***Appendix 7.1 Emerging Energy Technology Review*** and ***Appendix 7.2 – Range of Resource Options.***

7.1 Resource Technology Screening

Screening of different resource technologies begins with a high-level review that identifies the resource technologies most suitable for further evaluation. Sixteen resource technologies potentially suitable for utility-scale generation are considered and discussed in this section.

7.1.1 Resource Technology Characteristics

This section provides a general description of 15 characteristics associated with each resource technology.

These characteristics form the basis for the criteria used in screening the full range of resource technologies to a select number for further consideration. A comparative summary of

descriptive characteristics for the resource technologies is provided in Table 7.1: Screening Characteristics of Resource Technologies. The characteristics are grouped into the following conventional categories:

- technical
- environmental
- social and policy
- economic.

Table 7.1 SCREENING CHARACTERISTICS OF RESOURCE TECHNOLOGIES

SCREENING CHARACTERISTICS OF RESOURCE TECHNOLOGIES

Screened Out | **Some Concern** | **Minimal Concern or Positive**

Utility Scale Resource Technologies		Characteristics															Screening Summary
		Technical					Environmental					Social & Policy			Economic		
		Maturity of Technology	Technical Challenges in Manitoba	Ease of Integration into System	Intermittency	Seasonality	Water Quality Impacts	Hazardous Air Pollutants	Greenhouse Gas Emissions	Land Use Impacts	Wildlife Species of Interest	Proximity to Load Center	Regulatory Constraints	Social Acceptability	Manitoba Delivered Fuel Costs	Forecast USA Unit Costs ($/MW.h)	
DSM	Additional DSM	increasingly customer dependant	uncertainty in market potential	unknown	unknown	unknown	program specific	program specific	none	none	none	reduction at load centre	none	not polled	no fuel cost	not included in AEO 2013	✓
Hydro	Hydro with Storage	>100 years of experience	long construction schedule	no issues	none	reservoir storage management	shoreline erosion	none	minimal reservoir GHG	flooded area	sturgeon caribou	northern generation southern load	lengthy approval process	strongly support	stable water rentals	use AEO 2013 Hydro plant type	✓
Hydro	Run-of-River Hydro	>100 years of experience	long construction schedule	no issues	lack of reservoir	flow dependent	shoreline erosion	none	virtually no GHG	limited flooding	sturgeon caribou	northern generation southern load	lengthy approval process	strongly support	stable water rentals	use AEO 2013 Hydro plant type	✓
Wind	On-Shore Wind	newly mature	blade icing & cold weather operation	forecast challenges & costs	highly variable wind speeds	moderate seasonality	none	none	virtually no GHG	set backs & land use limitations	birds & bats	southern generation potential	land use setbacks	strongly support	no fuel cost	use AEO 2013 Wind plant type	✓
Wind	In-Lake Wind	lack of experience	no experience with lake ice	forecast challenges & costs	highly variable wind speeds	moderate seasonality	construction phase impacts	none	virtually no GHG	resource user impacts	birds & fish	large lakes preferred	migratory birds & fisheries	not polled	no fuel cost	use AEO 2013 Wind - Offshore plant type	✗ - Very High Unit Costs
Solar	Photovoltaic (Utility Plant Scale)	potential efficiency improvements	unproven in Manitoba	forecast challenges & costs	cloud cover creates rapid power drop off	winter energy is 1/2 of summer	none	none	virtually no GHG	large footprint	habitat loss	best resource in SW corner of Manitoba	none	strongly support	no fuel cost	use AEO 2013 Solar PV plant type	✗ - High Unit Cost & Intermittency
Solar	Solar Thermal	potential efficiency improvements	unproven in Manitoba	forecast challenges & costs	weather dependant	winter energy is 1/2 of summer	potential thermal oil leaks	none	virtually no GHG	large footprint	habitat loss	best resource in SW corner of Manitoba	none	strongly support	no fuel cost	use AEO 2013 Solar THermal plant type	✗ - Very High Unit Costs
Geo.	Enhanced Geothermal System	lack of experience in Manitoba	low grade resource requiring deep drilling	no issues	none	winter peaking	potential fracking impacts	none	virtually no GHG	small surface footprint	not significant	best resource in SW corner of Manitoba	groundwater quality concerns	not polled	no fuel cost	use AEO 2013 Geothermal plant type	✗ - Deep Low Grade Resource
Natural Gas	Simple Cycle Gas Turbine	>70 years of experience	not significant	no issues	none	lower summer capacity	none	easily mitigated with NOx controls	hydrocarbon combustion	small footprint	not significant	near southern pipelines	air emissions	somewhat support	2001 to 2009 price volatility	use AEO 2013 Advanced CT plant type	✓
Natural Gas	Combined Cycle Gas Turbine	>60 years of experience	not significant	no issues	none	lower summer capacity	boiler treatment chemicals	easily mitigated with NOx controls	efficient hydrocarbon combustion	small footprint	not significant	near southern pipelines	air emissions	somewhat support	2001 to 2009 price volatility	use AEO 2013 Advanced CC plant type	✓
Coal	Conventional Pulverized Coal Generation	>100 years of experience	emissions & waste management	cold start ramp times	none	not significant	mercury arsenic selenium	mercury & air toxics	restricted by legislation	fuel storage & ash disposal	deleterious substances to fish or fish habitat	likely located in southern Manitoba	restricted operations	strongly oppose	transportation costs	use AEO 2013 Conventional Coal plant type	✗ - Regulatory Constraints
Coal	Integrated Gasification Combined Cycle	only 2 plants in North America	complex chemical systems	cold start ramp times	none	lower summer capacity	mercury arsenic selenium	easily mitigated with NOx controls	syngas combustion	fuel storage & waste disposal	deleterious substances to fish or fish habitat	likely located in southern Manitoba	restricted operations	not polled	transportation costs	use AEO 2013 Advanced Coal with CCS	✗ - Regulatory Constraints
Nu.	Nuclear Power Plant	>60 years of experience	fuel & waste management	huge individual units	none	not significant	radioactive wastes	none	virtually no GHG	1 kilometer exclusion zone	not significant	southern generation potential	complex & lengthy approval process	strongly oppose	limited supply market	use AEO 2013 Advanced Nuclear plant type	✗ - Difficult Integration into System
Biomass	Agricultural Crop Residue	mature Rankine technology	long-term biomass fuel storage	cold start ramp times	none	limited by annual crop harvest	combustion ash & boiler chemicals	NOx & air toxics	fuel collection & transport	fuel storage & ash disposal	deleterious substances to fish or fish habitat	southern generation potential	air emissions	not polled	collection & transportation costs	use AEO 2013 Biomass plant type	✗ - High Collection & Transportation Costs
Biomass	Wood Based Fuel	mature Rankine technology	long-term biomass fuel storage	cold start ramp times	none	limited by annual forest harvest	combustion ash & boiler chemicals	NOx & air toxics	fuel collection & transport	fuel storage & ash disposal	deleterious substances to fish or fish habitat	located adjacent to boreal forest	air emissions & allowable cut limits	not polled	collection & transportation costs	use AEO 2013 Biomass plant type	✗ - High Collection & Transportation Costs
Imp.	Imports	large well established market	tie line limits	no issues	not significant	not significant	regional impacts outside of Manitoba	regional impacts outside of Manitoba	regional impacts outside of Manitoba	new transmission right-of-ways	not significant	non-Manitoba generation	transmission right-of-way approvals	not polled	no fuel cost	projected market prices	✓

7.1.1.1 Technical Characteristics

Maturity of Technology

For this analysis, maturity of technology is represented as the extent of industry experience with the implementation and operation of a particular technology. The higher the level of industry experience the lower the level of risk and concern with implementing the technology.

Technical Challenges in Manitoba

For this analysis, technical challenges are defined in the context of project development in Manitoba. Technical challenges include the availability of the resource, physical environment conditions including Manitoba's northern climate, level of technical experience in Manitoba, length of implementation time and waste stream management.

Ease of Integration into System

This characteristic measures the complexity of integrating a specific resource technology into Manitoba Hydro's existing system. The factors considered include intermittency, size and dispatchability. Most available technologies pose no significant integration issues.

For example, the intermittency of wind only becomes an issue when the amount of wind variability exceeds the amount of load variability that occurs moment by moment. When wind variability significantly exceeds that amount, additional reserves are required, increasing the cost of integrating those additional wind resources.

Technologies that employ large individual units that are designed for base load operation over long periods of time pose an economic challenge. Such units are difficult to integrate into the current hydraulic system since they lack the dispatchability needed to complement the variability in water flows and loads. Integration of large units is possible as long as additional interconnection capability is provided to manage the increased amounts of surplus energy generated. In addition, a large unit may require Manitoba Hydro to increase the amount of

contingency reserves available to it. Adding six 100 megawatt (MW) hydro units would require one-sixth the reserves as one 600 MW unit.

Intermittency

An intermittent resource technology is one that is not continuously available and cannot be dispatched to meet the demand of a power system.

Seasonality

"Seasonality" refers to those factors that affect the production capability on a season-by-season basis. Seasonality may impact production efficiencies as well as have an effect on a technology's fuel availability.

7.1.1.2 Environmental Characteristics

Water Quality Impacts

This characteristic captures a range of potential environmental effects impacting either surface or groundwater. Adverse surface water impacts may include increased turbidity due to erosion, thermal plumes or the discharge of combustion by-products such as mercury, arsenic or selenium. Adverse impacts to groundwater are typically associated with uncontrolled spills or leaks of process chemicals or by-products.

Hazardous Air Pollutants

Hazardous air pollutants are the by-products of combustion. Contaminants of concern for an individual resource technology may include nitrogen oxides, sulfur oxides, carbon monoxide, particulate matter (including respirable particles), mercury, arsenic and lead.

Greenhouse Gas Emissions

This characteristic represents the greenhouse gases (GHG) emissions associated with the life cycle of a particular electric generation technology from construction, operation and

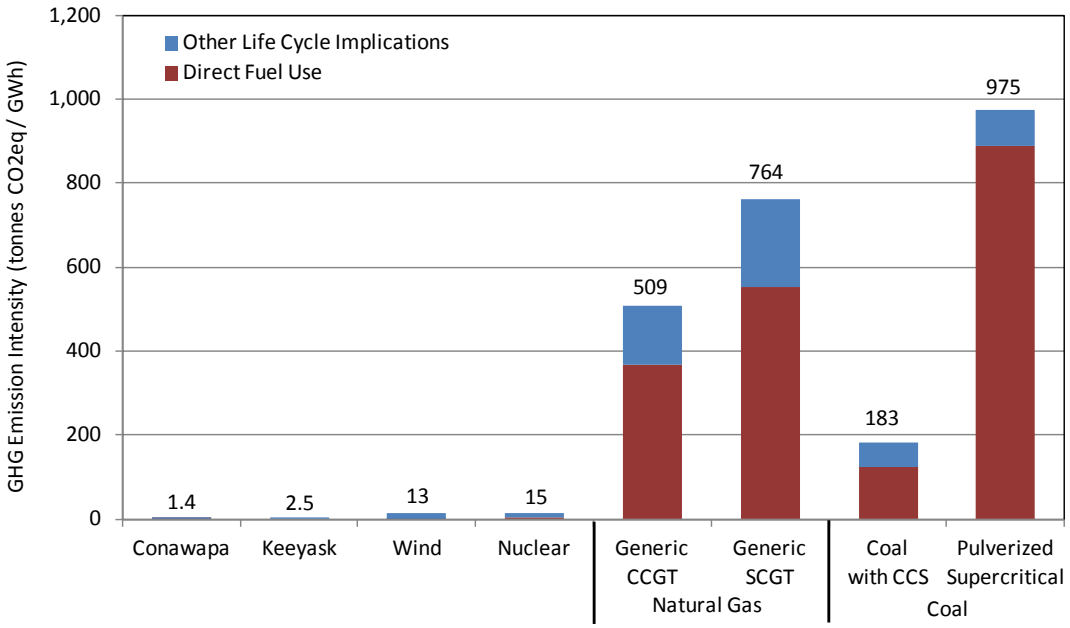
decommissioning. Renewable resource options produce minimal GHG emissions, typically during construction phase, while all forms of conventional thermal generation, with the exception of nuclear, produce GHGs.

Error! Reference source not found. Figure 7.1 provides a comparison of the life-cycle GHG emissions for several generation technologies and uses the Keeyask Generating Station (G.S.) and Conawapa G.S. as examples for the hydro technology. The source document for this figure is appended as ***Appendix 7.3 – Life Cycle Greenhouse Gas Assessment Overview.***

One of the key results of a life-cycle GHG assessment is to show a levelized GHG comparison including all life-cycle components between different technologies. The life-cycle assessment encompasses cradle-to-grave calculations of activities for a project inclusive of:

- construction components – raw material extraction, production and transportation
- construction activities – primarily vehicle fuel
- site-specific land-use changes including reservoir emissions
- operation and maintenance activities
- decommissioning GHG emission implications.

Figure 7.1 COMPARISON OF LIFE CYCLE GHG EMISSIONS FOR ELECTRICITY GENERATION



The life-cycle GHG emission intensity for thermal generation options is dominated by the use of direct fuel (coal and natural gas), while the life-cycle GHG footprint for renewable options is dominated by construction and land-use change GHG emissions. As shown in **Error! Reference source not found.**Figure 7.1, the GHG emission intensity from the 100-year life of the Keeyask G.S. is 2.5 CO_{2e} (carbon dioxide equivalent) tonnes/GWh (gigawatt-hour); while a conventional pulverized coal generating station has a GHG emission intensity approaching 1,000 CO_{2e} tonnes/GWh and a Combined Cycle Gas Turbine (CCGT) generating station has a GHG emission intensity of 509 CO_{2e} tonnes/GWh. This means that a conventional pulverized coal generating station operating for less than 100 days would have the equivalent GHG emissions from the entire 100-year life of the Keeyask G.S. Similarly, a highly efficient CCGT generating station would emit an equivalent amount of GHG emissions in less than one year compared to the 100-year values from the Keeyask G.S.

Land-Use Impacts

Land-use impacts represent the physical footprint of a resource option as well as other associated land-use limitations such as flooded areas, buffer or set-back limits, adjacent land use restrictions and lands impacted by disposal of waste such as ash from coal plants. A small physical footprint having no post-decommissioning land-use restrictions would have the least land-use impacts. For example, a small, natural gas-fired combustion turbine with a small physical footprint will have no perpetual land use restrictions following its decommissioning.

Wildlife Species of Interest

This characteristic represents specific at-risk species—or other regionally important wildlife species noted in either Canada's *Species at Risk Act* or Manitoba's *The Endangered Species Act*—that could potentially be affected by the development of a resource technology at a specific location. Broader groupings of species that may be adversely impacted by significant habitat loss or alteration are also considered.

7.1.1.3 Social and Policy Characteristics

Proximity to Load Centre

This characteristic is a proxy for a combination of different issues such as associated right-of-way issues, construction challenges encountered in isolated areas as well as post-construction line losses. Distances to potential new facilities are estimated from the Dorsey Converter Station and are grouped into five categories: 0 to 100 kilometers (km); 100 to 250 km; 250 to 500 km; 500 to 900 km; and greater than 900 km. Shorter distances are of less concern.

Regulatory Constraints

Regulatory constraints can severely restrict or prohibit the development of a technology based on federal or provincial governments' policy perspectives or enacted laws and regulations. In some cases, the regulatory approval process itself can become an impediment to development. Policy areas such as land use, environmental emissions and impacts on wildlife may become a

regulatory constraint requiring mitigation or compensation for any individual resource technology within the planning horizon.

Social Acceptability

Two public opinion polls conducted by Ipsos and the Innovative Research Group in April 2011 were used to gauge Canadian public opinion regarding six methods of producing electricity (solar, wind, hydro-electric, natural gas, nuclear and coal). Polling results plus inferences drawn from the data are used to populate this characteristic. The degree of respondent support corresponds to the level of acceptance of individual resource technologies.

7.1.1.4 Economic Characteristics

Manitoba Delivered Fuel Costs

Delivered fuel costs refers to the current and future cost of fuel and associated transportation for each technology. This characteristic includes the effect of the recent fuel-price volatility experienced by natural gas as well as rising transportation costs for fuel that have been impacted by petroleum prices. Natural gas and coal fuels require additional management of the fuel delivery system. Transportation services—either by rail for coal or pipeline service for natural gas—need to be addressed in a manner that both maximizes flexibility but also guarantees service.

Forecast U.S. Unit Cost

With the exception of demand side management (DSM) and imports, unit cost is represented by levelized cost. The unit cost of DSM varies by program; information on the cost of additional DSM is not available at this time. The unit cost of imports varies by market and by product and is based on Manitoba Hydro's consensus electricity export price forecast.

Levelized cost is a standard measure of the cost of constructing and operating a generating resource over its life. While it is a useful measure for screening of technologies, it should be

noted that levelized cost does not indicate the value of the generation but is a relative measure of the cost associated with a unit of energy. For the purpose of high-level screening, levelized costs for new generation obtained from the U.S. Energy Information Administration (EIA) 2013 Annual Energy Outlook Early Release (AEO) were sorted into three categories as follows:

- less than $100/megawatt-hour (MWh),
- $100 - $130/MWh, and
- greater than $130/MWh.

Figure 7.2 TYPICAL LEVELIZED COST OF NEW GENERATION BY RESOURCE

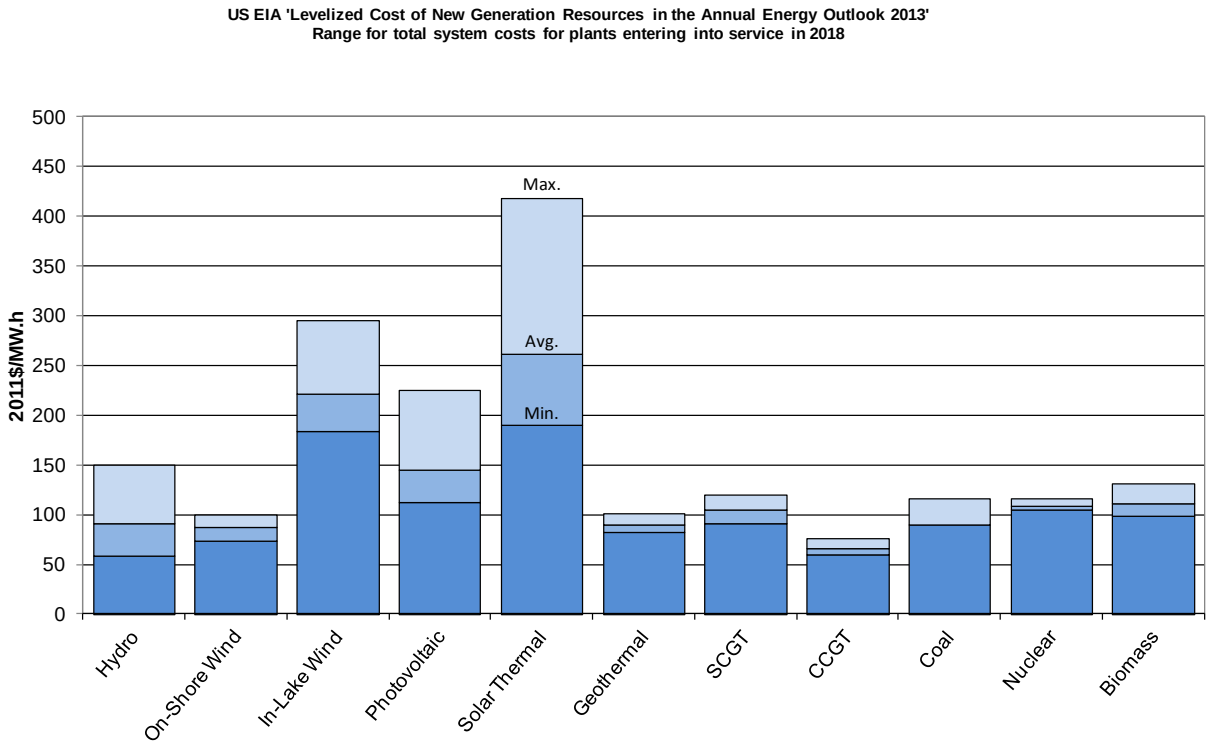
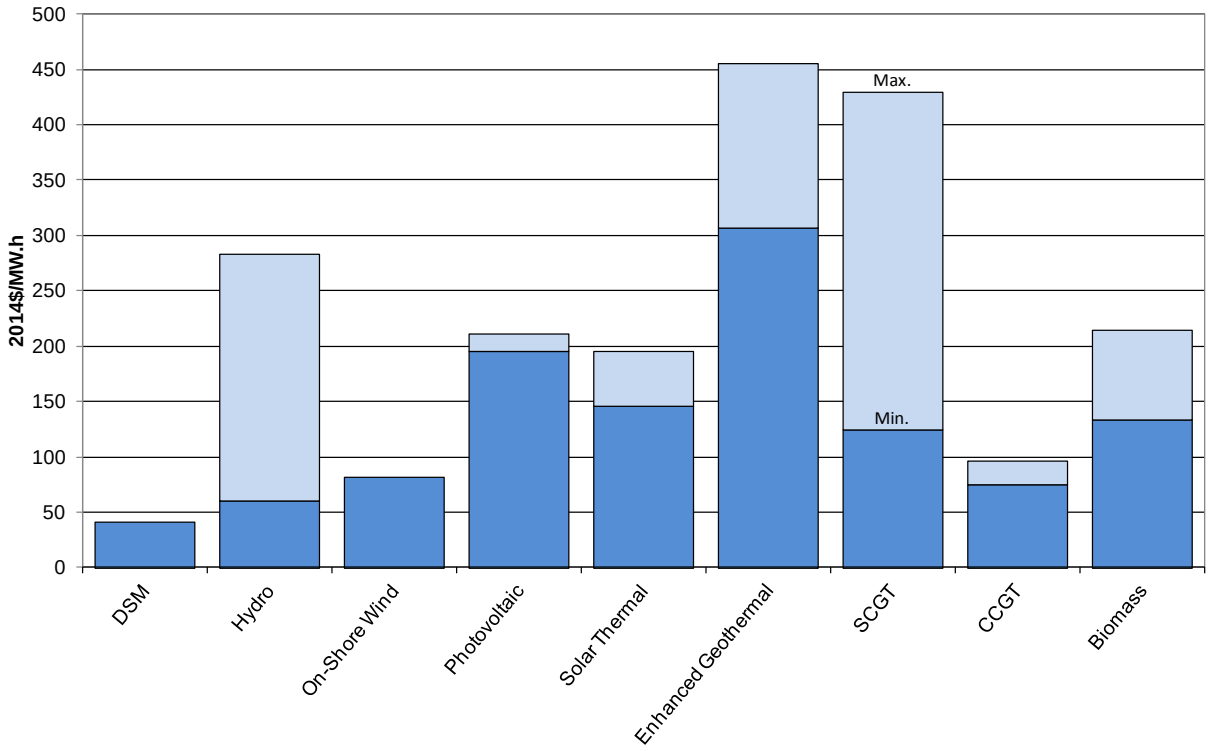


Figure 7.2 above shows the levelized cost ranges for resource technologies as provided in the EIA Annual Energy Outlook 2013. Additional information on resource technologies that have the potential to be developed in Manitoba is provided in ***Appendix 7.2 Range of Resource Options*** and further information on emerging technologies is provided in ***Appendix 7.1 Emerging Energy Technology Review***.

Figure 7.3 shows the levelized cost ranges based on potential development of resource technologies in Manitoba.

Figure 7.3 LEVELIZED COST OF RESOURCE TECHNOLOGIES DEVELOPED IN MANITOBA



Note: Values reflect losses to bring energy to market.

7.1.2 Screening Process

The high-level screening of technologies uses a general characterization to determine whether a technology will proceed to the next stage of evaluation. As shown in Table 7.1, there are three possible outcomes from screening: screened out (red), some concern (yellow), minimal concern or positive (green). If a characteristic for a particular technology receives a "screened out" outcome, that technology does not advance to the next stage and is depicted by an "X" in the Screening Summary column of Table 7.1. A technology will otherwise advance to the next stage of evaluation.

7.1.2.1 Selected Resource Technologies

The screening process resulted in the following resource technologies advancing to the next stage of evaluation:

- additional DSM
- hydro – with Storage and Run-of-River
- wind – On-Shore
- natural Gas-Fired – Simple Cycle and Combined Cycle Gas Turbines
- imports.

The following is a summary of the key characteristics of the selected resource technologies.

Additional Demand Side Management

Manitoba Hydro's DSM initiative, Power Smart, consists of energy conservation and load management activities designed to capture energy efficiency and economic opportunities in an effort to meet the energy needs of Manitoba in a more sustainable manner while assisting customers in using energy more efficiently and reducing their energy bills. DSM encompasses a range of market-based conservation programs and activities.

As indicated in ***Chapter 4 –The Need for New Resources***, the 2012 Load Forecast reflects the expected load reductions as a result of past DSM programs. By the end of 2012/13, Power Smart is estimated to have achieved an annual load reduction of 1,990 GWh and 586 MW (at generation)[1]. Manitoba's net load is determined by subtracting the DSM energy savings from the corporation's electric load forecast.

Compared to other generation technologies in Table 7.1, DSM results in no flooding, no air emissions and has a positive global environmental impact. In the latter regard, energy

[1] Interim estimate as of March 31, 2013.

conserved in Manitoba as a result of DSM efforts can be sold to export market customers, thus displacing the use of fossil-fuel based generation in those regions. DSM may also have a net positive impact on the environment by deferring the need for new electricity infrastructure in Manitoba. However, this deferral may increase overall GHG if the deferred generation is hydro.

One of the main considerations with DSM is that, without regulation or legislation, achieving energy reduction targets is strongly dependent upon market acceptance and voluntary action. Also, in addition to market availability and adoption forecasts, the savings potential is estimated based on a variety of assumptions that include natural technological development, anticipated customer energy usage/savings and market cost projections. As a result, expected energy savings from DSM do not have the same future certainty of supply as would the development of a physical resource.

In the screening process, additional DSM did not receive a "screened out" outcome for any of the 15 characteristics as shown in Table 7.1.

Hydro – with Storage and Run-of-River

From a technical perspective, hydro-electric generation is a mature, dependable technology that easily integrates into Manitoba Hydro's existing system. Approximately 4,700 MW of developable hydro-electric potential remains within the province including the proposed Keeyask and Conawapa projects.

From an environmental perspective, hydro-electric generation is a renewable resource that has virtually no hazardous air pollutants or GHG emissions. Specific hydro developments do have the potential to impact aquatic and terrestrial species. Hydro with storage can typically result in a significant amount of flooding, while run-of-river hydro results in comparatively less flooding. From a social and policy perspective, hydro-electric generation is a long lead-time resource that has a lengthy approval process. Major hydro-electric resources are located in northern

Manitoba which is distant from the load centre. According to Canadian public opinion, hydro-electric generation is generally viewed favourably.

From an economic perspective, hydro-electric generation is a long-lived resource with high upfront investment but very low and stable operating costs over the long-term, resulting in a levelized cost that falls within the range of other technologies selected for the next stage of evaluation.

In the screening process, hydro with storage and run-of-river hydro did not receive a "screened out" outcome for any of the 15 characteristics as shown in Table 7.1.

Wind – On-Shore

From a technical perspective, traditional on-shore wind is an established technology and a good-quality wind resource exists within Manitoba. Wind is an intermittent resource that is highly variable, is challenging to accurately forecast and can result in system integration issues. The integration issues become more significant with higher proportions of wind in a system, resulting in the requirement for additional dispatchable capacity resources.

From an environmental perspective, wind generation is a renewable resource that has virtually no hazardous air pollution and no GHG emissions. However, there are potential negative impacts on various avian species.

From a social and policy perspective, wind generation is a short lead-time resource that has typically experienced short regulatory approval processes. According to Canadian public opinion, wind is generally viewed favourably.

From an economic perspective, wind generation has significant upfront investment costs but low operating costs over its approximate 20-year operating life. The unit cost of wind

generation falls within the range of other technologies selected for the next stage of evaluation. The unit cost for wind generation does not include costs required to compensate for the intermittency.

In the screening process, On-shore wind did not receive a "screened out" outcome for any of the 15 characteristics as shown in Table 7.1.

Natural Gas-Fired – Simple Cycle and Combined Cycle Gas Turbines

From a technical perspective, natural gas-fired generation (simple cycle and combined cycle gas turbines) uses modular, low capital cost technologies that are mature and well established. Natural gas-fired generation is a short lead-time resource that is relatively easy to install and integrate into the existing Manitoba Hydro system, provided that natural gas supply is readily available.

From an environmental perspective, simple cycle gas turbine (SCGT) units emit minor amounts of hazardous air emissions and produce approximately half as much carbon dioxide (CO_2) as coal-based generation. The dual-stage combined cycle gas turbine (CCGT) units require a higher capital investment compared to simple cycle gas turbines but are larger and more efficient, resulting in a lower unit cost of energy. CCGT emit no meaningful amount of hazardous air emissions and produce approximately one-third of the CO_2 of coal-based generation.

From a social and policy perspective, natural gas-fired generation is a shorter lead-time resource that has typically experienced modest regulatory approval processes. According to Canadian public opinion, natural gas-fired generation is generally viewed favourably. There is ongoing concern with respect to GHG emissions, affecting the social acceptance and potential cost of this technology.

From an economic perspective, the majority of the cost of natural gas-fired generation is a result of the cost of fuel, which in recent years has been highly volatile as discussed in ***Chapter 3 – Trends and Factors Influencing North American Electricity Supply***. Recently, as a result of the adoption of innovative technological advancements in natural gas exploration and extraction, the current and forecast price of natural gas is very low, resulting in a highly competitive operating cost for natural gas-fired generation. However, there is general expectation that the price of natural gas will increase.

In the screening process, SCGT and CCGT did not receive a "screened out" outcome for any of the 15 characteristics as shown in Table 7.1.

Imports

Given Manitoba's predominantly hydro system, resource diversity can be achieved by building resources in Manitoba or through the purchase of imports from a non-hydro based region or a combination of both. For planning purposes, under low flow or dependable flow conditions, imports in the 2020 timeframe represent in the order of 10% of Manitoba Hydro's total supply. The primary source of imports to Manitoba is the Midcontinent Independent System Operator, Inc.(MISO) market.

From a technical perspective, imports, utilizing existing or new transmission lines, are a flexible resource option that can be called upon whenever required and on short notice. Imports provide Manitoba Hydro with supply diversity by drawing from the MISO market, consisting primarily of coal-fired, natural gas-fired, nuclear and wind generation.

From an environmental, social and policy perspective, generation from the MISO market—on average across all generation types—results in significant amounts of CO_2 and other hazardous air emissions on a per-unit (MWh) basis. Imports are also dependent on transmission

interconnections; new interconnections require both a willing counterparty as well as approvals from U.S. and Canadian regulatory bodies.

From an economic perspective, the cost of market-based energy can vary by time of day and by season. Manitoba Hydro is not committed to purchase any quantity of imports at any specific time of day or year, and therefore has the flexibility to import when most effective for Manitoba Hydro's overall system operations.

In the screening process, imports did not receive a "screened out" outcome for any of the 15 characteristics as shown in Table 7.1.

7.1.2.2 Resource Technologies Not Selected

The screening process resulted in eliminating the remaining resource technologies that were considered in Table 7.1. The technologies not selected were:

- Wind - In-Lake Wind
- Solar – Solar Photovoltaic and Solar Thermal
- Enhanced Geothermal Systems
- Coal – Conventional Pulverized Coal and Integrated Gasification Combined Cycle
- Nuclear Power Plants
- Biomass – Agricultural Crop Residue and Wood Based Fuel Biomass.

The following is a brief summary of the key characteristics of the resource technologies that were not selected.

In-Lake Wind

In-lake wind shares common attributes with on-shore wind. This resource technology was screened out primarily due to energy costs. In-lake wind costs are significantly higher than land-based alternatives.

Development of in-lake wind resources in Manitoba is significantly more technically challenging than on-shore wind due to issues such as winter ice floes. Additional issues include potential adverse impacts affecting existing commercial and recreational lake users. As well, there is a lack of experience within North America in developing in-lake wind resources.

Solar Photovoltaic

Solar photovoltaic is an established technology with significant opportunity for potential technological improvement. A good-quality potential solar resource exists within southern Manitoba. This resource technology was screened out because:

- energy costs for solar photovoltaic were significantly higher than other resource options costs (although costs have recently been trending downwards)
- solar photovoltaic is an intermittent resource that is highly variable and, as a result of its reliance on direct sunlight, there is potential for significant instantaneous drops in power output due to the unpredictable nature of localized cloud cover.

Solar Thermal

Solar thermal is in advanced stages of development and still has a high cost of energy production relative to other resource options. Solar thermal is considered an intermittent resource as it is dependent upon daily weather. It is less intermittent than solar photovoltaic since it is not impacted instantaneously by cloud cover.

From a technical perspective, Manitoba peak load occurs in the winter when solar intensity is weak. In addition, peak load can occur after sunset.

This resource technology was screened out due to the energy costs for solar thermal being significantly higher than other resource options.

Enhanced Geothermal Systems

An enhanced geothermal system is a proven technology but suitable geothermal heat gradients required for these systems remain unproven in Manitoba. As a result, this technology did not advance to the next stage of evaluation. The production of geothermal-based energy utilizes conventional steam-based generation technology but there remain significant technological and economic challenges in drilling to the 2-10 km depth required.

Conventional Pulverized Coal

Environment Canada's *Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations* (2012) established a performance standard for new coal-fired generating units after 2015 of an annual average intensity of 375 tonnes of CO_{2e} per GWh. The Province of Manitoba, under *The Climate Change and Emissions Reductions Act,* is phasing out the use of coal for generation except to support emergency operations. As a result, coal-fired generation as a technology has been eliminated from consideration for the next stage of evaluation.

Coal - Integrated Gasification Combined Cycle

Integrated gasification combined cycle is an evolving technology that is technically complex with only a few utility-scale examples constructed in North America. While combustion of coal-derived synthetic gas produces a significantly cleaner air emissions profile, the Province of Manitoba, under the *Climate Change and Emissions Reductions Act,* is phasing out the use of coal for generation except to support emergency operations. As a result, this technology has been eliminated from consideration for the next stage of evaluation.

Nuclear Power Plants

Nuclear power plants require high up-front capital investment. The limited operational flexibility and large individual unit-size of nuclear power plants together with their baseload mode of operation, would not integrate well with the relatively small size of Manitoba Hydro's existing system. Nuclear power plant development, based on proven technology, has large

individual units typically sized between 600 and 1,200 MW. Nuclear power plants have little operational flexibility resulting in high capacity factors, meaning that there is little opportunity to vary the level of production to suit the needs of the Manitoba system. Although the nuclear industry is addressing this through the development of advanced small sized reactors (less than 300 MW unit capacities in size) they have not yet been commercially deployed in North America and will not be for a number of years.

In addition, *The Manitoba High-Level Radioactive Waste Act* prohibits the long-term storage of high level radioactive waste in Manitoba. As a result, nuclear power plants have been eliminated from further evaluation on the basis of system integration issues and on the basis of the provincial legislation related to the storage of radioactive waste in Manitoba.

Agricultural Crop Residue Biomass & Wood-Based Fuel Biomass

Agricultural crop residue biomass and wood-based fuel biomass are adaptations of conventional steam-based generation. Currently, the cost of energy produced from these forms of technology are not yet competitive with other forms of generation and are highly dependent upon the uncertain price of transportation fuels. On this basis, these technologies have been eliminated from consideration for the next stage of evaluation.

7.2 Resource Options Screening

The next step in the screening process is the selection of specific resource options from each of the resource technologies identified in Section 7.1.2.1. The process for selecting resource options involves comparing the characteristics of the resource technologies—the results of this comparison identifies the resource options for the next stage of analysis.

7.2.1 Additional DSM Screening

Manitoba Hydro's strategy for DSM involves a continued long-term commitment to pursuing all cost-effective energy efficiency opportunities and to continually monitoring the market for

emerging trends and opportunities which may become economically viable. As new opportunities are identified as being economic, these opportunities are included into Manitoba Hydro's DSM plan (e.g. the recently announced Power Smart Community Geothermal program, which will be added to the next update of Manitoba Hydro's DSM plan).

To assist in identifying the available DSM potential in Manitoba, the corporation recently engaged a consultant to undertake a DSM potential study. As the results of this study were not available in time to be incorporated into the 2012 main NFAT analysis, a DSM sensitivity and a DSM stress test are included, based on 2013 planning assumptions and preliminary projections from the DSM Potential Study, in ***Chapter 12 – Economic Evaluations - 2013 Update on Selected Development Plans***

As noted in ***Chapter 4 – The Need for New Resources***, Section 4.2.2 and provided in ***Appendix 4.3 – Demand Side Management Potential Study***, the DSM Potential Study examines the "market potential" and "achievable potential" of existing energy-efficient technologies which are economic in Manitoba and for those technologies that may be on the horizon. The preliminary high-level projections from the study were used to frame threshold levels of additional DSM over and above the 2012 base DSM forecast. These preliminary thresholds are incorporated into the analysis in ***Chapter 12 – Economic Evaluations - 2013 Update on Selected Development Plans*** as a sensitivity of 1.5 times the base DSM plan, and as a stress test of 4 times the DSM base forecast. Table 7.2 shows a comparison of the current approved Power Smart Plan and the final findings of the DSM Potential Study. As shown by Table 7.2 the thresholds incorporated into the analysis presented in ***Chapter 12 – Economic Evaluations - 2013 Update on Selected Development Plans*** remain reasonable.

Table 7.2 THRESHOLDS FOR POTENTIAL ADDITIONAL DSM

	Comparison at Forecast Year 2027/28 (at Meter)			
	GWh	% of Power Smart Plan	MW	% of Power Smart Plan
2013-16 Power Smart Plan (2012/13 – 2027/28)	713	100%	154	100%
DSM Potential Study				
Achievable	1135	159%	255	166%
Market	2915	409%	671	436%

Caution must be exercised in interpreting the results of a DSM potential study. The projections represent a high-level assessment of the achievable and market potential with market potential representing absolute level of energy and demand savings that are technically feasible, economically attractive assuming the ideal market conditions. These conditions could be characterized by the presence of a focused and coordinated effort across organizations/governments (federal, provincial and utilities) eliminating all material market barriers to adoption, such as product availability and market capacity, product awareness and knowledge, price differentials, etc.—i.e., the probability of these ideal market conditions being present in combination is doubtful and therefore represents a theoretical limit.

The setting of specific Power Smart targets involves more detailed and market-specific analysis which was beyond the scope of this study. The study does not involve a detailed assessment of each potential energy efficiency opportunity and does not account for the investment or specific strategies required to support the market intervention.

Insights gathered through the study will need to be further investigated to more specifically define the market and potential associated opportunities, determine the feasibility of the opportunities and the most effective and cost-efficient market intervention strategies to create an effective market change over time. As such, caution must be exercised in using the results of the market potential study for planning purposes: the results of the study should only be used for developing a refined DSM plan.

It is recognized that DSM savings are contingent on program participation and do not carry the same degree of certainty that a generation resource provides. While Manitoba Hydro has relied upon DSM to date at the same level of certainty as new generation, this is reasonable provided realistic DSM programming is underlying the targets associated with DSM. It is reasonable to consider this factor in determining the degree to which Manitoba Hydro will rely on DSM targets which may be arbitrary and not based on sound DSM programming.

7.2.2 Hydro Resource Options Screening

Manitoba Hydro has identified a total of 8,200 MW of undeveloped renewable hydro-electric potential of varying sizes and technical difficulties remaining within the province. Many of the smaller sites are uneconomic in comparison to other sites as a result of their relative small size and remoteness from the existing transmission system. Manitoba Hydro's cooperation with two major government initiatives has eliminated many other potential hydro-electric sites from further consideration.

Under the Treaty Land Entitlement Framework Agreement, Manitoba Hydro agreed to restrict its interest to a total of 16 sites along the Nelson, Burntwood and Churchill rivers including three sites on the Hayes River and Wuskwatim, thereby releasing lands around other sites for selection by First Nations toward fulfillment of their treaty entitlements.

Under the Canadian Heritage Rivers System, which recognizes and conserves rivers of outstanding natural, cultural and recreational heritage, Manitoba Hydro agreed not to pursue development of the three sites on the Hayes River. The 12 remaining sites on the Nelson, Burntwood and Churchill rivers have a hydroelectric potential of 4,700 MW—these sites have been identified as having the highest potential for future development and are listed in Table 7.3.

Hydro-electric generating resources are highly site specific in terms of design, capacity, energy, construction and cost. These factors, as well as a number of other regulatory, technical and environmental considerations, limit the number and location of practical hydro-electric developments within Manitoba. Hydro-electric plants are considered to have high up-front capital costs, low operating costs, require long lead times for development, and can achieve economies of scale if large in size. Hydro-electric plants also tend to provide more significant economic stimulus to Manitoba than many other technologies.

While all sites included in Table 7.3 contain favourable characteristics for development, not all have been investigated to the same degree. The stage of preparation shown in the table represents the level of investigation and study for individual sites from inventory, feasibility, and conceptual design to pre-investment. Inherent in the individual design concepts and overall range of stages—as defined in ***Appendix 7.2 – Range of Resource Options***—are a number of other issues such as environmental concerns, social concerns, economics and system integration.

The stage of development for a particular resource option is driven by the attractiveness of its characteristics, which includes unit cost. Levelized cost is a significant factor at this stage of the screening process.

As demonstrated in ***Chapter 4 – The Need for New Resources***, new resources are required in 2022/23 according to the 2012 planning assumptions. In order to fully approve and develop a resource in time to meet needs and opportunities, only sites suitable in terms of characteristics and stage of preparation are considered for potential use in development plans. Keeyask G.S and Conawapa G.S. are the only two potential hydro-electric sites with suitable characteristics and at a sufficiently advanced stage of preparation.

Table 7.3 HYDRO RESOURCE OPTION CHARACTERISTICS

		Resource Timing	Stage of Preparation	Resource Lead Time (Years)	Technical Characteristics	Nominal Capacity (MW)	Dependable Energy (GW.h)	Environmental Characteristics	Flooded Area (km^2)	Wildlife Species of Interest	Economic Characteristics	Base Cost (2014$ Billion)	Levelized Cost (2014$/MW.h)	Considered for Further Evaluation
Hydro Resource Options	Keeyask GS		V	7		695	3000		45	Yes		3.5	60	✓
	Conawapa GS		IV	13		1485	4650		5	Yes		5.7	67	✓
	Notigi GS*		IV	10		120	650		0	No		1.0	88	✗
	Gillam Island GS		II	19		1080	3800		12	Yes		7.2	113	✗
	First Rapids GS		II	14		210	1000		55	Yes		2.1	127	✗
	Manasan GS		II	14		270	1200		150	Yes		2.9	134	✗
	Whitemud GS		II	14		310	1000		11	Yes		3.1	146	✗
	Birthday GS		II	14		380	1100		70	Yes		3.8	161	✗
	Red Rock GS		II	14		250	800		35	Yes		3.0	170	✗
	Granville GS		II	14		120	300		11	Yes		1.8	196	✗
	Early Morning GS		II	14		80	400		12	Yes		1.5	224	✗
	Bonald GS		I	16		110	300		80	Yes		2.3	289	✗

Stage I - Inventory Stage II - Feasibility Stage III - Concept Stage IV - Pre-Investment
Stage V - Final Design, Construction & Commissioning

Notes:
Levelized costs are calculated using a real discount rate of 5.05%.
Levelized costs are based on remaining estimated capital costs going forward from June 2014. All costs (incurred or estimated) prior to June 2014 are considered as sunk.
Descriptions of the stages of preparation are included in ***Appendix 7.2- Range of Resource Options***
*Although Notigi is identified at a Stage IV— Preparation level, studies were suspended in 2002.
Energy values do not require transmission loss adjustment for supply & demand tables.

The following is a summary of the main positive and negative characteristics for the two selected hydro-electric options along with a brief summary of why other sites were not selected for further evaluation at this time.

Keeyask Generating Station

At 695 MW, Keeyask G.S. is the only medium-sized hydro-electric plant available for consideration, and is significantly larger than most other plants but is smaller than Conawapa and Gillam Island. This medium size makes it attractive for balancing the economies of scale with the large increments of new capacity added by very large hydro developments. Developing the site requires a moderate amount of flooding at 45 km^2 and is located in known sturgeon habitat.

The Keeyask Project is at an advanced Stage V— Final Design, Construction and Commissioning level of development. For a more detailed project description for Keeyask, see ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities***.

Conawapa Generating Station

At 1,485 MW, Conawapa is considered a large generating station and would be the largest generating station within the province if developed. Its large size provides a large amount of excess capacity and would require a more significant upfront investment than other hydro generation alternatives. From a levelized-cost perspective, economies of scale result in Conawapa having the second lowest levelized cost of the hydro options.

The development of this station results in the flooding of 5.1 km^2 within the flood plain of its riverbank, but the location is a known sturgeon habitat. At the time of this analysis and based on a 13 year lead time, Conawapa could be in service as early as 2025.

The Conawapa Project is at an advanced Stage IV—Pre-Investment level of development. For a more detailed project description for Conawapa, see ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities***.

Hydro Resource Options Not Selected

After considering the characteristics of resource timing, environmental impact, capacity and energy and economic information, nine of the 12 hydro-electric resource options have been screened out on the basis of their higher levelized cost and on the basis of their state of development being at the Stage II– Feasibility level or less.

The small size of Notigi, combined with a higher levelized cost than that for Keeyask G.S. and Conawapa G.S., results in Notigi receiving no further consideration in this submission.

At 120 MW, Notigi is considered a small generating station located at the site of the existing Notigi control structure. The primary function of this control structure is to regulate water flows into the Burntwood River. As a result, in the winter the capacity of the plant would be significantly reduced due to declining forebay water levels. The capacity of the plant would also be reduced as tailrace water levels rise due to river ice staging. The combined effect is a reduction of approximately 20 MW or 16% of the plant generating capacity. The resulting capacity provided by Notigi would represent less than two years of load growth.

The development of the Notigi site, as a project, would have minimal environmental effects as the forebay, transmission access, the road, and all of the civil structures, with the exception of the powerhouse, are already established. As Notigi would retain its primary function as a control structure, there is no expected change to existing operation and therefore no expected environmental effects.

Stage IV engineering studies for Notigi were initiated as far back as 1999 but were suspended in 2002 in order to concentrate efforts on the Wuskwatim, Keeyask, and Pointe du Bois projects. As a result of the engineering and related planning studies being at an early Stage IV level, there is greater uncertainty in the levelized cost estimate for Notigi. The minimum time identified to the earliest in-service date for Notigi is ten years. Given the vintage of the available project

information and engineering studies, it is likely that longer than ten years would be required for Notigi's earliest in-service date.

In future studies, Notigi G.S.— along with other plants on the Burntwood River such as First Rapids and Manasan G.S. — will be evaluated in a development plan which would allow for economies of scale in construction.

7.2.3 Natural Gas-Fired Resource Option Screening

In Section 7.1.2 Manitoba Hydro determined that the natural gas-fired generation options suitable for further consideration are SCGT and CCGT.

Natural gas-fired turbines are flexible, modular units that come in a variety of configurations from a number of manufacturers and there is a large fleet of natural gas turbines world-wide. Their prevalence ensures predictable operating and environmental performance characteristics. Units range in size from very small (less than 1 MW) to very large (more than 400 MW). As fossil fuel-based resources, natural gas-fired turbines emit carbon dioxide and minor amounts of nitrous oxide. Considerations for siting include accessibility to gas supply, water supply and transmission interconnections. Natural gas-fired generation is considered to be a shorter lead time-resource option with lower capital costs, with the majority of the cost related to high fuel-based operating costs.

Noteworthy decreases in future costs for combustion turbines are not anticipated; however, innovation in the field of combustion turbine generation will lead to more efficient machines that operate at lower heat rates. These efficiency improvements will be achieved through higher cycle pressure ratios, improved turbo-machinery component efficiencies and higher turbine inlet temperatures.

For planning purposes Manitoba Hydro considered the following gas turbine configurations, representative of the different types of units that are available, for integration into the existing system:

- heavy duty SCGT
- heavy duty CCGT
- aeroderivative SCGT.

The following is a summary of the characteristics for each natural gas-fired resource option and how each option would be utilized.

Heavy Duty Simple-Cycle Gas Turbine

A heavy duty SCGT would be best suited as an addition to Manitoba Hydro's system when there is a requirement for a capacity increment larger than 200 MW and when the resource is intended to operate infrequently. Typically, heavy duty SCGTs are large units with short lead times (3-5 years), low capital costs and high operational costs. Consequently, an SCGT is best used as a capacity resource when operation is intended to be infrequent, typically less than 20% of the total time.

The heavy duty SCGT specified for planning purposes is the General Electric (GE) 7FA. The GE 7FA has a capacity of 209 MW and a mid-efficiency heat rate of 9,906 Btu/kWh (British thermal units/kilowatt-hour). The GE 7FA has been in operation since 1994 and has 740 individual units in operation in both simple and combined cycle configurations, lending confidence to its operation, reliability and maintenance. In the event that development is pursued, actual turbine selection would be based upon its intended operation, design requirements, cost, and availability at the time of purchase.

Heavy Duty Combined Cycle Gas Turbine

A heavy duty CCGT is best suited as an addition to Manitoba Hydro's system when there is a requirement for a large increment of energy and capacity and when the resource is intended to operate more frequently than a SCGT (typically more than 40% of total time). Typically, CCGTs are large units with short lead times (3-5 years) and have higher capital costs and lower operational costs than SCGTs.

The heavy duty CCGT specified for planning purposes is the GE 7FA CCGT. The GE 7FA CCGT has a capacity of 308 MW and a high-efficiency heat rate of 6,652 Btu/kWh. In the event that development is pursued, actual turbine selection would be based upon its intended operation, design requirements, cost and availability at the time of purchase.

Aeroderivative Simple Cycle Gas Turbine

An aeroderivative gas turbine is best suited as an addition to Manitoba Hydro's system when there is a requirement for a small increment of capacity and is intended to operate infrequently. Typically, aeroderivative gas turbines are available as small units with short lead times (approximately three years), higher capital costs and higher operational costs than both the simple cycle and combined cycle GE 7FA units. Thus, an aeroderivative SCGT is best used as a capacity resource when the operation is intended to be infrequent or for quick-start and black-start capabilities.

The aeroderivative SCGT specified for planning purposes is the GE LM6000PH. The GE LM6000PH is based on the CF6 aircraft engine which powers the Boeing 747 aircraft among others. The LM6000PH has a capacity of 47 MW and a mid-efficiency heat rate of 9,475 Btu/kWh. The engine has been in industrial operation since 1992 with a current fleet size of 1,025 units, lending confidence to its operation, reliability and maintenance. In the event that development is pursued, actual turbine selection would be based upon its intended operation, design requirements, cost, and availability at the time of purchase.

Table 7.4 summarizes the characteristics of the natural gas-fired resource options used for planning purposes.

Table 7.4 NATURAL GAS-FIRED RESOURCE OPTION CHARACTERISTICS

		Resource Timing	Resource Lead Time (Years)	Technical Characteristics	Nominal Capacity (MW)	Dependable Energy (GW.h)	Heat Rate (mmBTU/MW.h)	Fleet History	Quick Start	Environmental Characteristics	GHG Emissions (CO2e/MW.h)	Economic Characteristics	Base Costs (million 2014$)	Levelized Costs (2014$/MW.h)	Considered for Further Evaluation
Natural Gas	GE 7FA Heavy Duty CCGT		3-5		308	2460	6652	Yes	No		342		399	75 - 97 [1]	✓
	GE 7FA Heavy Duty SCGT		3-5		209	1688	9906	Yes	No		506		161	125 - 266 [2]	✓
	GE LM6000PH Aeroderivative SCGT		3		47	387	9475	Yes	Yes		506		71	163 - 430 [2]	✓

1 Based on 70% to 35% capacity factor range.
2 Based on 20% to 5% capacity factor range.

Energy values require 10% transmission loss adjustment for supply & demand tables.

7.2.4 Wind Resource Option Screening

In Section 7.1.2 Manitoba Hydro determined through resource technologies screening, that on-shore wind generation is a short lead-time resource option suitable for further consideration. Large areas in southern Manitoba are both environmentally and technologically suitable for several thousand MWs of wind farm development.

Wind resource options are modular and are made up of multiple units that can be installed to closely match energy resource requirements. In the Manitoba Hydro system, a wind resource option is suitable when there is a requirement for energy only, and not capacity, as Manitoba experiences peak demand in winter. Wind generation is assumed to have a zero winter peak capacity due to the intermittent nature of the resource and the fact that the wind generators cannot be expected to operate reliably at temperatures below -30°C, the kind of temperatures which produce Manitoba peak winter load. This subject is further discussed in ***Appendix 7.4 - Capacity Value of Wind Resources.*** Wind turbine manufacturers have considered operations in extreme temperatures and have defined a cold climate as less than -20°C for more than one hour in nine days per year. Manufacturers' cold weather packages have been developed and

can extend the operational range of a turbine typically down to normal ambient temperatures of -30°C.

Wind power cannot be reliably controlled due to fluctuations in wind speed; because of its intermittency wind power alone cannot be relied upon to produce electricity when needed. Other issues typically associated with a wind resource include extremes of wind speed (too low or too high), extreme wind gusts, extreme wind shear, and extreme wind turbulence, as well as lack of wind for periods of time. To accommodate a wind resource, other dispatchable resources that have fast energy ramp-up times such as hydro-electric and natural gas-fired generation are required to back-up wind generation when wind energy production is reduced or not available.

In North America, recent on-shore wind development projects under construction have predominantly utilized wind turbines ranging from 1.5 to 3.0 MW in size with hub heights ranging from 80 to 120 metres. The trend over the past decade has seen the increased use of taller wind towers and turbine units with larger capacity ratings, resulting in improved performance as measured by increases in capacity factor. Evolving trends and factors make it difficult to accurately predict which individual wind turbine unit sizes and types may be utilized in the future. In addition, industry forecasts to 2030 anticipate a 45% increase in energy output from wind turbines, assuming that material costs decrease by 10% in real terms from current levels.

Wind speed is the most important factor affecting the production of wind energy. Therefore, it is desirable to locate a wind project where the average annual wind speed is as high as possible. It is assumed that the best wind resource locations would be developed first, proceeding to progressively less windy locations as the number of developments increase over time. For planning purposes, annual energy projections are estimated through statistical wind resource assessments and operating history. An average annual capacity factor of 40% is assumed for all

future wind farm developments in southern Manitoba and 85% of the 40% is assumed to be dependable wind energy.

Manitoba Hydro adopted the 85% factor for determining dependable wind generation based on statistical analysis of wind records for extended periods of time in other jurisdictions. The standard that was adopted required that the dependable energy could be achieved in 19 years out of 20. It is estimated that each year there is a 5% chance that actual annual generation will be less than the 85% level. The five percentile probability is the industry standard for determining the dependable energy of wind generation.

Southern Manitoba's wind resource characteristics are well understood and, for the purposes of modeling and evaluating wind farm developments, can be applied to a generic wind farm. Thus, a generic 65 MW wind farm was created for use in future assessments and evaluations without the need for defining the location, the make, the number or the size of individual towers required. A 65 MW capacity development is a reasonably sized wind farm that can benefit from economies of scale and is also approximately equal to the estimated provincial annual load growth for energy. In order to simplify modeling and evaluations at this stage of planning, it was assumed that all additional wind developments would be owned and operated by Manitoba Hydro.

Table 7.5 summarizes the characteristics of the wind resource option used for planning purposes.

Table 7.5 ON-SHORE WIND RESOURCE OPTION CHARACTERISTICS

		Resource Timing	Technical Characteristics					Environmental Characteristic	Economic Characteristics			Considered for Further Evaluation
		Resource Lead Time (Years)	Nominal Capacity (MW)	Winter Capacity (MW)	Dependable Energy (GW.h)	Capacity Factor		Wildlife Species of Interest	Base Costs (million 2014$)	Levelized Costs (2014$/MW.h)		
Wind	Generic Wind Farm	3-5	65	0	194	40%		Yes	163	82		✓

Note: Energy values require 10% transmission loss adjustment for supply & demand tables.

7.2.5 Imports

For planning purposes, imports are an option to meet either capacity or energy needs. Given Manitoba Hydro's strong connection to the large U.S. market, imports for both capacity and energy needs are available with short lead times and are available for various durations to meet short-term and long-term requirements.

When considering imports for capacity purposes, a critical consideration is that Manitoba experiences a winter peak demand while most U.S. utilities have their peak demand during the summer season. This means that there is likely to be a large pool of surplus U.S. capacity available to Manitoba Hydro in the winter season if suitable transmission arrangements can be made on a firm basis for the delivery of energy associated with the capacity.

Generally Manitoba Hydro has entered into capacity exchange arrangements with U.S. suppliers to acquire winter capacity at no cost. In exchange for the rights to winter capacity, Manitoba Hydro agrees to supply an equivalent amount of capacity to the supplying utility during the summer season: i.e., a seasonal diversity arrangement. If existing firm import and export transmission exists between Manitoba Hydro and the U.S. utility, both companies can meet their capacity needs with no capital expenditures. If there is insufficient firm transmission,

then it would be cost-effective to build or buy the necessary transmission service when the cost of the transmission service is less than the cost of acquiring a capacity resource.

When considering imports for dependable energy requirements, a critical consideration is whether the supplying region has surplus energy available during the period when Manitoba Hydro is experiencing dependable flow conditions. For example, because Saskatchewan and northwestern Ontario share the same watersheds and have significant hydro resources on the same river systems as Manitoba Hydro it is extremely likely that these regions will be short of energy during dependable flow conditions. Conversely, because hydro is a very small component of the generation fleet in the region of the U.S. from which Manitoba Hydro purchases energy (1% of total annual generation), shared drought conditions in Manitoba Hydro's watersheds and those of the U.S. Midwest will not noticeably reduce the supply of energy available for purchase by Manitoba Hydro. Even severe drought conditions extending beyond Manitoba and into the U.S. Midwest that potentially impact the supply of energy by affecting cooling or boiler makeup water requirements of U.S. Midwest thermal generating stations would not be expected to have a material impact in the overall availability of energy for purchase.

Manitoba Hydro can access the supply of surplus energy through market purchases and energy and/or capacity contracts. Firm transmission service is required to ensure the energy can be delivered to Manitoba on a firm basis.

Under seasonal diversity agreements, the supplier not only agrees to provide winter capacity but also agrees to provide winter energy and may provide summer energy if it is available during off-peak periods. If an energy agreement is not associated with capacity, energy is not guaranteed for any particular hour because it may be required to serve the supplier's firm load obligations. To the extent that the supplier has surplus energy, the agreement makes the energy available to the other party. Manitoba Hydro has a 500 MW import agreement with

Northern States Power which provides access to energy from the MISO market throughout the year on firm transmission service.

Although Manitoba Hydro has access to large quantities of energy under contract, there are limitations to the amount of imports that can be relied upon for planning purposes. As described in more detail in ***Appendix 4.1 – Manitoba Hydro Generation Planning Criteria***, Manitoba Hydro's long-term firm import limit on the existing transmission lines from the U.S. is 700 MW. This import limit will not change until new transmission interconnections are built or existing transmission interconnections are upgraded. Manitoba Hydro's Preferred Development Plan includes a new interconnection with additional import capability of 750 MW.

Generation from the MISO market, on average across all generation types, results in significant amounts of CO_2 and other hazardous air emissions on a per unit (MWh) basis. As explained in ***Chapter 3 – Trends and Factors Influencing North American Electricity Supply***, the MISO region is coal-dominated, generating 75% of its electrical energy from coal in 2011, while natural gas-fired and oil generation represents 5%, wind generation 5%, and nuclear generation 13%. The share of energy generated using coal in the U.S. is on the decline. Coal-fired generation last provided a 50% share across the U.S. in 2005 and is expected to be 40% in 2013 according to the U.S. Department of Energy's Energy Information Administration (DOE EIA). In the absence of additional stringent coal regulations or very high carbon prices, the EIA is still projecting coal to generate a significant proportion of electricity within U.S. and particularly in the Midwest through 2030.

As discussed in ***Chapter 5 – The Manitoba Hydro System, Interconnections and Export Markets***, Manitoba Hydro's imports (and exports) have implications on the dispatch of resources in the MISO region. Based on MISO Independent Market Monitor's 2011 annual report, coal was on the margin 93% of all hours in the year. Natural gas was the only other

significant marginal fuel, on the margin 23% of the time. (Due to transmission constraints it is possible for more than one fuel to be on the margin in any particular hour).

Coal generation GHG emissions are typically on the order of 0.9 to 1.1 tonnes CO_2 /MWh while natural gas can range from about 0.3 to 0.8 tonnes CO_2/MWh depending on the specific technology and its efficiency. Manitoba Hydro currently assumes that its exports displace and its imports result in 0.75 tonnes CO_2/MWh.

This reflects a marginal generation mix of various fossil-fuels and technologies. Given that the current marginal generation remains primarily coal (at an emission rate of about 1 tonne CO_2/MWh) the 0.75 tonnes CO_2/MWh factor used by Manitoba Hydro is considered to underestimate both the emissions displaced by exports and the emissions caused by imports. Since Manitoba Hydro is typically a large net exporter, this assumption is considered conservative in that it underestimates the emission displacement benefit. While Manitoba Hydro does not forecast the annual marginal export displacements, it expects that as coal units retire and more natural gas generation is built, the marginal emission factor should decrease over time.

Manitoba Hydro does not have firm import transmission with either Ontario or Saskatchewan and, as such, does not plan on firm imports from these markets to address the resource diversity issue discussed above.

As mentioned previously, for planning purposes, imports have to date represented in the order of 10% of Manitoba Hydro's total supply under low flow or dependable flow conditions. The approximate proportion of imports associated with Manitoba Hydro's Preferred Development Plan is expected to remain generally the same.

Since Manitoba Hydro generally has surplus energy available and cannot predict when it may need to purchase energy, Manitoba Hydro does not contract for fixed blocks of fixed-price electricity imports. Rather, the arrangements made with suppliers provide Manitoba Hydro with the assurance that the energy will be there when needed but also with the flexibility to buy it when most economical, utilizing the storage capability of the hydraulic system to reshape the supply to serve load requirements. When Manitoba Hydro enters a drought period, in which purchased power and a fixed price and delivery schedule are desired, those arrangements can be made at that time.

7.3 Summary of Selected Resource Options

Table 7.6 presents an overview of the key technical, environmental, socio-economic/provincial and economic characteristics of the resource options selected in Section 7.2. These resource options are incorporated into the development plans which are presented in ***Chapter 8 – Determination and Description of Development Plans***.

Table 7.6 SELECTED RESOURCE OPTIONS CHARACTERISTICS

Resource			DSM	Keeyask	Conawapa	Wind	GE 7FA Heavy Duty CCGT	GE 7FA Heavy Duty SCGT	GE LM 6000PH Aeroderivative SCGT	Imports
Technical		Fuel Type	-	Water	Water	Air	Natural Gas	Natural Gas	Natural Gas	Predominantly Thermal
		Renewable	Yes	Yes	Yes	Yes	No	No	No	No
		Dispatchability	No	Yes	Yes	No	Yes	Yes	Yes	Yes
		Mode of Operation	Must Take	Baseload & Peaking	Modified Run-of-River	Must Take	Intermediate & Peaking (70-35% capacity factor)	Peaking (20-5% capacity factor)	Peaking (20-5% capacity factor)	Flexible
		Asset Life	Variable	67 years	67 years	20 years	30 years	30 years	30 years	Not Applicable
		Resource Lead Time	Variable	7 years	13 years	3 years	3 - 5 years	3 - 5 years	3 years	Not Applicable
		Transmission Length	-	38 Km	7 Km	Avg. 29 Km	0 Km (First Plant)	0 Km (First Plant)	0 Km (First Plant)	0 Km
	Capacity at Plant	Nominal	-	695 MW	1485 MW	65 MW	308 MW	209 MW	47 MW	Up to Transmission Interconnection Limits
		Net Winter Peak	-	630 MW	1300 MW	0 MW	325 MW	223 MW	50 MW	Up to Transmission Interconnection Limits
Environmental	Air Impacts	GHG Emission Intensity Plant Operations	None	Negligible	Negligible	Negligible	342 t CO2e/GW.h	506 t CO2e/GW.h	506 t CO2e/GW.h	≈ 750 t CO2e/GW.h
		Regional GHG Disp. Intensity Potential	≈ 750 t CO2e/GW.h	≈ 750 t CO2e/GW.h	≈ 750 t CO2e/GW.h	≈ 750 t CO2e/GW.h	≈ 408 t CO2e/GW.h	≈ 244 t CO2e/GW.h	≈ 244 t CO2e/GW.h	-
		NOx Emissions Intensity	-	-	-	-	100 kg NOx/GW.h	150 kg NOx/GW.h	230 kg NOx/GW.h	Not Determined
	Land Impacts	GS Footprint	0 ha	214 ha	164 ha	≈ 10 - 20 ha	≈ 3 ha	≈ 2 ha	≈ 1 ha	0 ha
		Flooded Area	0 ha	4,463 ha	507 ha	0 ha	0 ha	0 ha	0 ha	0 ha
		Additional Impacted Area	0 ha	9,302 ha	1,381 ha	≈ 990 - 2,980 ha	0 ha	0 ha	0 ha	0 ha
		Total Impacted Area	0 ha	13,979 ha	2,052 ha	≈ 1,000 - 3,000 ha	≈ 3 ha	≈ 2 ha	≈ 1 ha	0 ha
	Water Impacts	Water Consumption	-	Domestic Needs Only	Domestic Needs Only	Domestic Needs Only	≈ 900 m³/GW.h	Domestic Needs Only	Domestic Needs Only	-
		Water Quality	-	Erosion & Mercury	Negligible	None	Negligible	None	None	-
		Water Regime	-	Regulated Operating Range	Regulated Operating Range	None	Negligible	None	None	-
	Wildlife Species of Interest	Aquatic	-	Lake Sturgeon Habitat	Lake Sturgeon Habitat	None	Negligible	None	None	-
		Terrestrial	-	Caribou Habitat	Caribou Habitat	Negligible	Negligible	Negligible	Negligible	
		Avian	-	Nesting Habitat	Negligible	Bird & Bat Collisions	Negligible	Negligible	Negligible	
Socio-Economic/Provincial	Generic Tech. Rating	Health Concerns	-	Very Low	Very Low	Low	Low	Low	Low	-
		Safety Concerns	-	Medium	Medium	Very Low	High	High	High	-
	MB Business Opportunities (% of capital spent in MB)		100%	53%	46%	18%	30%	17%	17%	-
	Employment	Direct Construction	Program Dependent	4480 Person-Years	6650 Person-Years	35 to 80 Person-Years	329 Person-Years	116 Person-Years	65 Person-Years	-
		At Northern Work Sites	Program Dependent	94%	94%	0%	0%	0%	0%	-
		Permanent O&M	Minimal	58 FTE	61 FTE	4 to 8 FTE	94 FTE (for 1 to 2 plants at site)	52 FTE (for 1 to 4 plants at site)	52 FTE (for 1 to 4 plants at site)	-
		At Northern Work Sites	0%	100%	100%	0%	0%	0%	0%	-
	Royalties / Taxes (2014$)	Water Rentals	-	$9.0 M/year	$12.8 M/year	-	-	-	-	-
		Capital Taxes	Program Dependent	$17.3 M/year	$28.6 M/year	$0.8 M/year	$2.0 M/year	$0.8 M/year	$0.4 M/year	-
		Guarantee Fees	Program Dependent	$27.7 M/year	$45.8 M/year	Potential for $1.3 M/year	$3.2 M/year	$1.3 M/year	$0.6 M/year	-
		Other	-	-	Grants-in-lieu of taxes	Land Rentals, Grants-in-lieu of taxes	Grants-in-lieu of taxes	Grants-in-lieu of taxes	Grants-in-lieu of taxes	-
	Nearby Population Centers		-	Fox Lake CN, Gillam, Tataskweyak CN, Thompson, War Lake FN, York Factory FN	Fox Lake CN, Gillam, Shamattawa FN, Tataskweyak CN, War Lake FN, York Factory FN	Southwest & South-central Manitoba	Brandon, Southern centre near pipeline	Brandon, Southern centre near pipeline	Brandon, Southern centre near pipeline	-
Economic	Levelized Cost (2014$)		Program Dependent	$60/MW.h	$67/MW.h	$86/MW.h	$75 - 97/MW.h	$125 - 266/MW.h	$163 - 430/MW.h	Projected Market Prices

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8 Determination and Description of Development Plans

8.0 Chapter Overview

This chapter explains the strategies and components of the various development plans that Manitoba Hydro has chosen to evaluate in this submission.

Development plans are formulated using the resource options selected in ***Chapter 7 – Screening of Manitoba Resource Options*** and consider economic, financial, environmental, and socio-economic/provincial characteristics. All development plans must be able to meet Manitoba Hydro's expected domestic load and existing firm export commitments which are described in ***Chapter 4 – The Need for New Resources***. Further to this requirement, plans are determined in consideration of various strategic business opportunities and, in subsequent chapters, are comparatively evaluated to identify the optimal plan for Manitobans. For example, the development plans with a new transmission interconnection incorporate opportunities to serve export market customers and increase U.S. transmission interconnection capability. Alternatively, a development plan that provides the opportunity to minimize capital investment uses natural gas-based generation resources sufficient to meet only Manitoba Hydro's expected domestic load and existing firm export commitments.

The Preferred Development Plan together with the alternative development plans defined in this chapter provide the basis for all further evaluation in this submission.

8.1 Introduction

The Manitoba Hydro Act and *The Sustainable Development Act* provide the context for the formulation of Manitoba Hydro's development plans. *The Manitoba Hydro Act* Section 2 mandates that Manitoba Hydro "provide for the continuance of a supply of power adequate for

the needs of the province, and to engage in and to promote economy and efficiency in the development, generation, transmission, distribution, supply and end-use of power". *The Sustainable Development Act* Schedule A section 1(1) sets out the framework for sustainable development which includes the principle that "economic decisions should adequately reflect environmental, human health and social effects".

The direction provided in these Acts is reflected in the determination of development plans and their analysis through the consideration of economic, financial, environmental, and socio-economic impacts as well as through multiple-account benefit-cost analysis.

As described in ***Chapter 4 – The Need for New Resources***, the 2012 Load Forecast indicates that new resources are required in the year 2022/23 to ensure Manitoba electricity users continue to have adequate power for their future needs. The formulation of each development plan is based on this need for new resources and the requirement to achieve a reliable and dependable supply for the bulk power system in Manitoba through the application of Manitoba Hydro's Generation Planning Criteria. All development plans meet or exceed these criteria.

The plans must also provide sufficient dependable energy and winter peak capacity to meet the projected requirements for the entire 35-year study period. Further to this requirement, Manitoba Hydro formulates development plans that will incorporate opportunities such as building new transmission interconnections, pursuing other renewable resources or pursuing export sales for the overall benefit of Manitoba.

8.2 Formulation of Development Plans

Chapter 7 – Screening of Manitoba Resource Options identified the following resource options to be used in the determination of development plans:

- demand-side management programs
- Keeyask Generating Station (G.S.)
- Conawapa Generating Station (G.S.)
- on-shore wind generation
- natural gas-fired generation
- imports.

For a description of the characteristics of the selected resource options see ***Chapter 7 – Screening of Manitoba Resource Options***.

Development plans are comprised of a sufficient number and size of resources to meet requirements or address opportunities over a 35-year planning horizon. A long-term perspective is required due to the long lead time and the long life of the resource options under consideration.

8.2.1 Resource Option Descriptions

The differing characteristics of resource options are taken into consideration when formulating development plans. Based on 2012 planning assumptions, the following resource options have been considered.

Keeyask Generating Station

The earliest in-service date (ISD) by which Keeyask G.S. can be developed is 2019/20. Keeyask is therefore an option to meet the persistent deficits in energy supply which begin in 2022/23

based on the 2012 Load Forecast. Plans that include Keeyask G.S. as the first resource in 2022/23 will satisfy Manitoba's energy and capacity needs until 2029/30, at which time another resource is required.

Also under consideration is the opportunity to advance Keeyask G.S. to 2019/20 to serve a 250 MW (megawatt) sale to Minnesota Power (MP) starting in 2020, which would facilitate the construction of a new transmission interconnection to the U.S., as described in ***Chapter 6 – The Window of Opportunity***.

Conawapa Generating Station

The earliest ISD by which Conawapa G.S. can be developed—if it is developed together with Keeyask G.S. is assumed to be 2025/26 in these analyses. If Keeyask G.S. does *not* precede Conawapa G.S. then an additional year will be required to finalize the Conawapa aboriginal community arrangement, resulting in 2026/27 as the earliest ISD for Conawapa G.S. In the latter case, in order to meet Manitoba domestic load and firm export commitments starting in 2022/23, other supply options would be needed in advance of Conawapa G.S. Wind and natural gas-fired turbines are the other resource options being considered for this purpose.

Also under consideration is the opportunity to advance Keeyask G.S. to 2019/20 and Conawapa G.S. to 2025/26 to serve sales to both MP and Wisconsin Public Service (WPS) totaling 550 MW. A new transmission interconnection with a transfer capability of 750 MW to the U.S. would be facilitated by such sales, as described in ***Chapter 6 – The Window of Opportunity***.

Keeyask and Conawapa Generating Stations – Manitoba Transmission

For those plans in which Keeyask G.S. and Conawapa G.S. are both constructed, it is expected that transmission improvements will be required in the Manitoba Hydro system, once the final few units of the second plant comes into service, to be able to transmit all the firm power to

southern Manitoba (see North-South Transmission System Upgrade project description in ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities***). As the additional north-south transmission would not be required for over 10 years, the final determination of the design will be made nearer to that time.

Wind Resources

Wind generation is available as a long-term resource option and is considered for inclusion in development plans on that basis. Wind generation is also considered as a short lead time resource option (approximate three year lead time) in the event that, from an energy perspective, the load grows at a higher rate than forecasted.

In its long-term resource planning evaluations, Manitoba Hydro considers a development plan that combines wind generation with natural gas-fired generation; such a combination provides the firm winter peak capacity component that wind generation alone does not provide. Manitoba Hydro also includes wind generation as a resource option in the circumstance where there would be significant delays or deferral of large hydro or if large hydro cannot be built due to environmental or regulatory restrictions and when the supply requirement is for dependable energy and not for capacity. For purposes of the Needs For and Alternatives To (NFAT) evaluations, additional new wind generation is assumed to be owned by Manitoba Hydro.

Natural Gas-Fired Resources

Natural gas-fired generation can serve a variety of functions in development plans, including as:

- a low-capital cost resource option
- a bridging resource option to meet load requirements prior to construction of new large hydro-electric generation

- a capacity support resource option for wind generation
- a short lead-time resource option.

8.2.2 New U.S. Interconnection

In addition to resource options, a major consideration in the formulation of development plans is the opportunity to develop a new transmission interconnection to the U.S.[1]

As identified in ***Chapter 5 – The Manitoba Hydro System, Interconnections and Export Markets***, a new U.S. interconnection would support Manitoba Hydro's mandate to provide a reliable and dependable supply of electricity and would increase import capability during times of drought, peak demand and emergency situations. As well, additional export capability expands Manitoba Hydro's market access and provides an outlet for surplus power from the Manitoba Hydro system.

Pursuant to the executed power agreement with MP for 250 MW of system power, a new transmission interconnection with a minimum export capability of 250 MW is required as well as an import capability of up to 250 MW (50 MW import capability has been assumed for NFAT analysis purposes). In addition, Manitoba Hydro and WPS have a signed term sheet that provides for a sale by Manitoba Hydro of up to 500 MW of system power of which 400 MW would require the construction of a new transmission interconnection. An interconnection with a transfer capability of more than 250 MW would be required to accommodate both a 250 MW sale to MP and a sale greater than 100 MW to WPS.

[1] It should be noted that the transmission lines can be described by voltage size (kV) or by transfer capability (MW). As the focus of this chapter is the usage of interconnections, transfer capability in MWs will be used as the reference, i.e. 250 MW and 50 MW, associated with a 230 kV line, and 750 MW, associated with a 500 kV line.

For the purposes of NFAT analysis, it is assumed that a new interconnection to the U.S. can be in-service for 2020/21. Two interconnection projects are considered in the analysis: a larger interconnection with 750 MW of import and export capability, and a smaller interconnection with 50 MW of import and 250 MW of export capability. Irrespective of its size, a new interconnection will consist of two parts: a portion constructed in Manitoba and a portion constructed in the U.S.

Manitoba Hydro is responsible for the cost and all phases of development of the interconnection facilities in Manitoba; U.S. counterparties are responsible for all phases of development of the U.S. portion of the interconnection projects. For development plans that include a new 750 MW interconnection, the cost of the interconnection facilities in the U.S. is assumed to be shared to varying degrees by U.S. counterparties and Manitoba Hydro. In order to avoid becoming a majority owner in a U.S. transmission line, Manitoba Hydro will only enter into an arrangement where it will not own more than 49% of the interconnection facilities in the U.S. In return for investing in the U.S. portion of the transmission interconnection, Manitoba Hydro will benefit by having the right to use and/or sell its proportionate share of the U.S. transmission service associated with the new interconnection.

8.2.3 Description of Development Plans

Fifteen development plans have been identified and described in this section and are based on three main groupings:

- plans with a U.S. interconnection with 750 MW of import and export capability – five plans
- plans with a U.S. interconnection with 250 MW of export capability and 50 MW of import capability – three plans
- plans that meet Manitoba Hydro's domestic load and existing firm export commitments starting in 2022/23 with no new U.S. interconnection – seven plans.

The specifics of the development plans identified in the next section have been incorporated into the supply-demand tables which can be found in ***Appendix 4.2 – Manitoba Hydro Supply and Demand Tables***. The cost assumptions used in NFAT analysis can be found in ***Appendix 9.3 – Economic Evaluation Documentation, Appendix 11.1 – Net Capital Expenditures*** and in ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities.*** Table 8.1, found at the end of this chapter, provides a listing of new resources by development plan and ISD. Table 8.2, also found at the end of this chapter, identifies the sales agreements associated with each of the development plans. Table 9.3, found in ***Chapter 9 – Economic Evaluation – Reference Scenario***, provides a summary of the 15 development plans, described in this section, listed in order of lowest incremental capital investment.

8.2.3.1 Plans with a U.S. Interconnection with 750MW of Import and Export Capability – Five Plans

There are five development plans identified which include a U.S. interconnection with 750 MW of import and export capability. They are described as follows:

Preferred Development Plan

K19/C25/750MW (WPS Sale & Inv[2]) – Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation Starting in 2041/42, 750 MW Import/Export Interconnection 2020/21

This development plan consists of the Keeyask G.S. with an ISD of 2019/20, the Conawapa G.S. with an ISD of 2025/26, and a transmission interconnection to the U.S. with import and export capability of 750 MW with an ISD of 2020/21. Both the 250 MW MP sale and the 300 MW WPS sale described in ***Appendix 6.1 - Summary of Terms and Conditions of Export Contracts*** are evaluated as part of this plan. The 250 MW MP sale will require 250 MW of new transmission service and the 300 MW WPS sale will require 200 MW of new transmission service. To meet these commitments, Manitoba Hydro must build new hydro-electric generation which, in this plan, consists of the Keeyask G.S. and Conawapa G.S. developed by their earliest ISDs. Other firm export sale commitments that would be served by this plan include the 108 MW and subsequent 100 MW WPS sales and the 125 MW Northern States Power (NSP) sale; this development plan is also one of two plans that could serve the 300 MW WPS sale.

According to this plan, it is assumed that Manitoba Hydro will be responsible for 40% of the capital cost and ongoing operating costs associated with the U.S. portion of the 750 MW interconnection facilities. In addition, Manitoba Hydro will be responsible for the entire cost of the Manitoba portion of the new interconnection. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are summarized in Table 8.2.

[2] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities.

K19/C25/750MW – Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation Starting in 2041/42, 750 MW Import/Export Interconnection 2020/21

This development plan consists of the same resources as those evaluated in the Preferred Development Plan described above, includes the 250 MW MP sale, but does *not* include the potential WPS sale agreements of up to 300 MW as described in ***Chapter 6 – The Window of Opportunity*** Section 6.5.2. The signed 100 MW WPS sale is included as it is contingent on the Keeyask G.S. and would be served using existing transmission service.

Since the potential agreements with WPS continue to be under discussion, this development plan allows for comparison to the Preferred Development Plan should the potential sale to WPS not materialize and should WPS not invest in the U.S. portion of the 750 MW interconnection facilities.

For the purposes of NFAT evaluation, while Manitoba Hydro will not enter into an arrangement in which it owns more than 49% of the proposed U.S. interconnection, a conservative assumption has been used whereby Manitoba Hydro will be responsible for approximately two-thirds of the capital and ongoing operating costs associated with the U.S. portion of the 750 MW interconnection facilities. In addition, Manitoba Hydro will be responsible for the entire cost of the Manitoba portion of the new interconnection. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are summarized in Table 8.2.

K19/Gas25/750MW (WPS Sale & Inv[3]) – Keeyask 2019/20, Natural Gas-Fired Generation starting in 2025/26, 750 MW Import/Export Interconnection 2020/21

Manitoba Hydro has identified an alternative plan which allows for the comparison of the option of building natural gas-fired generation as an alternative to building Conawapa G.S. in 2025/26. This plan consists of the construction of Keeyask with an ISD of 2019/20, the addition of natural gas-fired generation starting in 2025/26, and a 750 MW U.S. interconnection with an ISD of 2020/21. For the export sales requiring new hydro generation, power from the Keeyask G.S. has been determined to be sufficient to meet the MP and WPS contract requirements. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are summarized in Table 8.2.

K19/C31/750MW – Keeyask 2019/20, Imports, Conawapa 2031/32, Natural Gas-Fired Generation Starting in 2041/42, 750 MW Import/Export Interconnection 2020/21

This development plan enables the construction of a new U.S. interconnection with 750 MW of import and export capability and is facilitated by the 250 MW MP sale; to meet the commitments of this sale, Manitoba Hydro must build the Keeyask G.S. This plan specifically does not include the commitments associated with the 300 MW WPS sale. The plan accommodates, in this case, a six-year deferral of the Conawapa G.S. The additional import capability provided by the new interconnection can be used to meet Manitoba domestic load and firm export commitments until 2031/32. Under the plan, Conawapa G.S. is assumed to be placed in-service in 2031/32 to meet load and firm export commitments; and the new interconnection would provide an outlet for surplus power. Other firm export sale commitments that would be served by this plan include the 100 MW WPS sale and the 125 MW NSP sale.

[3] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities.

For the purposes of NFAT analysis, while Manitoba Hydro will not enter into an arrangement in which it owns more than 49% of the proposed U.S. interconnection, a conservative assumption has been used where Manitoba Hydro will be responsible for approximately two-thirds of the capital and ongoing operating costs associated with the U.S. portion of the 750 MW interconnection facilities. In addition, Manitoba Hydro will be responsible for the entire cost of the Manitoba portion of the new interconnection. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements summarized in Table 8.2.

K19/Gas31/750MW – Keeyask 2019/20, Imports, Natural Gas-Fired Generation starting in 2031/32, 750 MW Import/Export Interconnection 2020/21

This development plan is the same as K19/C31/750 MW, described directly above, with the exception of natural gas-fired generation starting in 2031/32 as an alternative to building Conawapa G.S. for that date. This plan specifically does not include the commitments associated with the 300 MW WPS sale. This plan allows for the comparison of the option of building natural gas-fired generation as an alternative to building Conawapa G.S. starting in 2031/32. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are summarized in Table 8.2.

8.2.3.2 Plans with a U.S Interconnection with 250MW of Export Capability and 50 MW of Import Capability – Three Plans

There are three development plans identified which include a U.S. interconnection with 50 MW of import and 250 MW of export capability. Manitoba Hydro will be responsible for the capital and on-going operating costs associated with the Canadian portion of the 250 MW interconnection facilities. U.S. counterparties are responsible for all capital and operating costs for the U.S. portion of the interconnection. The development plans are described as follows:

K19/C25/250MW – Keeyask 2019/20, Conawapa in 2025/26, Natural Gas-Fired Generation Starting in 2040/41, 250 MW Export/50 MW Import Interconnection 2020/21

This plan enables the construction of a new U.S. interconnection with 250 MW of export and 50 MW of import capability and is facilitated by the 250 MW MP sale. To meet the commitments of this sale, Manitoba Hydro must build the Keeyask G.S. As the earliest ISD for the Conawapa G.S. is assumed to be 2025/26, a one-year on-peak import contract is included for planning purposes in 2024/25 to meet domestic load and firm export commitments and Manitoba Hydro Generation Planning Criteria. This import contract would not be required in plans where a 750 MW interconnection is assumed as the import capability of the larger line provides significantly more off-peak import capability. Other firm export sale commitments that would be served by this plan include the 100 MW WPS sale and the 125 MW NSP sale. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are outlined in Table 8.2.

K19/Gas24/250MW – Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, 250 MW Export/50 MW Import Interconnection 2020/21

This plan enables the construction of a new U.S. interconnection with 250 MW of export and 50 MW of import capability and is facilitated by the 250 MW MP sale. To meet the commitments of this sale, Manitoba Hydro must build the Keeyask G.S. This plan allows for the comparison of the option of building natural gas-fired generation starting as an alternative to building Conawapa G.S. Natural gas-fired generation is required starting in 2024/25 to meet Manitoba domestic load and firm export commitments which include the 100 MW WPS sale and the 125 MW NSP sale. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are outlined in Table 8.2.

K19/C31/250MW – Keeyask 2019/20, Imports, Natural Gas-Fired Generation starting in 2024/25, Conawapa 2031/32, 250 MW Export/50 MW Import Interconnection 2020/21

This plan allows for the comparison of a transmission interconnection with 750 MW of export and import capability compared to a transmission interconnection with 250 MW of export and 50 MW of import capability. This development plan is facilitated by the 250 MW MP sale; to meet the commitments of this sale, Manitoba Hydro must build the Keeyask G.S. The plan accommodates a six-year deferral of the Conawapa G.S. which is placed in-service in 2031/32 to meet load and firm export commitments. Without the significant additional import capability provided by the 750 MW interconnection, 490 MW of natural gas-fired generation is used to meet domestic load and firm export commitments to accommodate the six-year deferral of the Conawapa G.S. Other firm export sale commitments that would be served by this plan include the 100 MW WPS sale and the 125 MW NSP sale.

8.2.3.3 Plans that Meet Manitoba Hydro's Domestic Load and Firm Export Commitments Starting in 2022/23 with No New U.S. Interconnection – Seven Plans

This section describes development plans with new resource additions starting in 2022/23 in order to meet Manitoba domestic load and firm export commitments. No opportunities for new U.S. transmission interconnections or for new long-term export sales are contemplated in these alternative development plans. The development plans in this section that include Keeyask G.S. in 2022/23 will provide sufficient surplus energy to serve the 100 MW WPS sale. The generation resources for this plan are illustrated in Figure 8.1 and the sale agreements are summarized in Table 8.2.

All Gas – Natural Gas-Fired Generation Starting in 2022/23

This development plan represents the lowest-capital cost alternative available to Manitoba Hydro. In this plan simple-cycle gas turbines (SCGTs) are installed as peaking resources until

demand for energy and capacity is sufficient to justify a more efficient but higher-capital cost combined-cycle gas turbine (CCGT).

Wind/Gas - Wind Generation Starting in 2022/23 Supported by Natural Gas-Fired Generation Starting in 2025/26

This development plan represents an alternative in which wind is the primary resource supported by natural gas-fired generation. Wind generation is not assigned a winter peak capacity value due to its intermittent nature and physical limitations; as such, it can only be relied upon as an energy resource. Therefore, in this development plan wind generation is developed to provide energy and SCGTs are used mainly as a capacity resource. For purposes of the NFAT analysis, additional new wind generation is assumed to be owned by Manitoba Hydro.

K22/Gas – Keeyask 2022/23, Natural Gas-Fired Generation Starting in 2029/30

In order to meet Manitoba domestic load and firm export commitments, this development plan assumes Keeyask G.S. is constructed in 2022/23 followed by a combination of combined-cycle and simple-cycle natural gas-fired units starting in 2029/30. SCGTs would be installed as peaking resources until demand for energy and capacity is sufficient to justify a more efficient but higher-capital cost CCGT.

K22/C29 – Keeyask 2022/23, Conawapa 2029/30, Natural Gas-Fired Generation Starting in 2040/41

This development plan considers building both Keeyask G.S. and Conawapa G.S. to meet Manitoba load and firm export commitments without a new U.S. interconnection. Natural gas-fired generation is included as a low-capital cost resource to meet energy and capacity needs starting in 2040/41. This development plan provides a basis to assess the value of a U.S. interconnection when both Keeyask G.S. and Conawapa G.S. are constructed; the plan also

allows for the comparison of the option of building Conawapa G.S. in 2029/30 as an alternative to building natural gas-fired generation at that time.

SCGT/C26 – Simple Cycle Gas Turbines in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation Starting in 2038/39

This development plan assumes SCGTs are developed starting in 2022/23 followed by Conawapa G.S. in 2026/27, the earliest ISD for Conawapa G.S. when it is not preceded by Keeyask G.S. In this development plan, an SCGT represents the lowest-capital cost resource option prior to the 2026/27 ISD of Conawapa G.S. Subsequent to Conawapa G.S., SCGTs are included as a low-capital cost resource to meet energy and capacity needs with a starting date of 2038/39.

CCGT/C26 – Combined Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation Starting in 2039/40

This development plan is similar to SCGT/C26, as described directly above, except that it assumes a CCGT is developed starting in 2022/23 followed by Conawapa G.S. in 2026/27. This plan allows for the comparison of the option of building a CCGT as an alternative to building a SCGT in 2022/23 prior to the 2026/27 ISD of Conawapa G.S. Subsequent to Conawapa G.S., SCGTs are included as a low-capital cost resource to meet energy and capacity needs with a starting date of 2039/40.

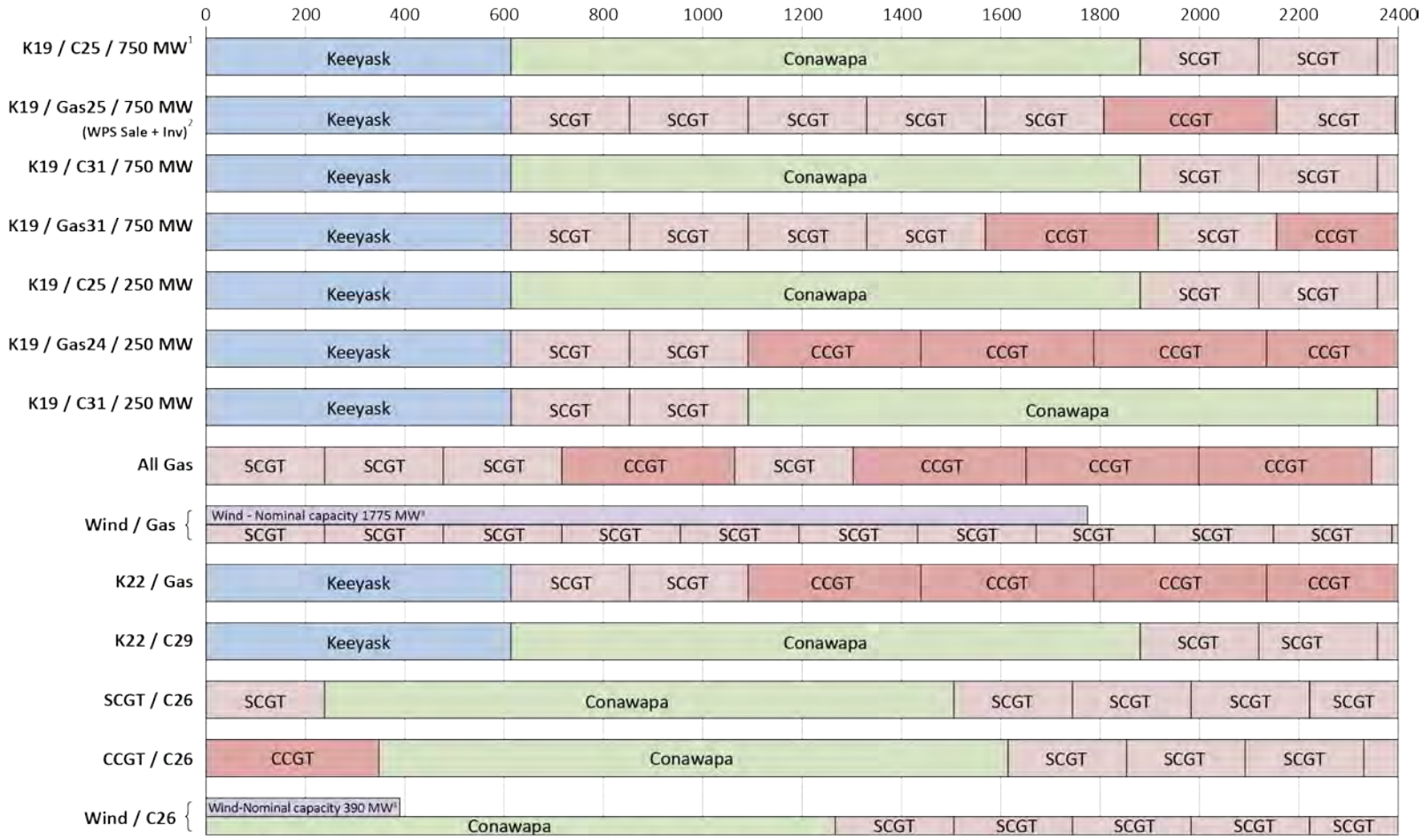
Wind/C26 – Wind in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation Starting in 2036/37

This development plan is similar to SCGT/C26 and CCGT/C26, as described directly above, except it assumes wind generation is developed starting in 2022/23 followed by Conawapa G.S. in 2026/27. This plan allows for the comparison of the option of building wind generation as an

alternative to building a natural gas-fired generation in 2022/23 prior to the 2026/27 ISD of Conawapa G.S. Subsequent to Conawapa G.S., SCGTs are included as a low-capital cost resource to meet energy and capacity needs with a starting date of 2036/37. For purposes of the NFAT evaluation additional new wind generation is assumed to be owned by Manitoba Hydro.

Figure 8.1 provides an illustration of the quantity of winter peak capacity for each development plan.

Figure 8.1 WINTER PEAK CAPACITY BY RESOURCE TYPE FOR EACH DEVELOPMENT PLAN FOR THE 35 YEAR PLANNING CYCLE



[1] K19 / C25 / 750 MW represents capacity resources for two plans; one with the proposed 300 MW WPS sale and investment and one without.
[2] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities.
[3] Wind shown as nominal capacity since wind generation does not provide winter peak capacity.

Table 8.1 LISTING OF NEW RESOURCES BY DEVELOPMENT PLAN AND IN-SERVICE DATE

Development Plan	New Resources and Dates				New US Interconnection Capability
	Hydro	SCGT	CCGT	Wind	
K19/C25/750MW **WPS Sale & Inv**[4]	2019 - Keeyask 2025 - Conawapa	2041 - 1 x 7FA 2044 - 1 x 7FA 2046 - 1 x 7FA	None	None	750 MW import/ 750 MW export
K19/C25/750MW no WPS (resources same as above)	2019 - Keeyask 2025 - Conawapa	2041 - 1 x 7FA 2044 - 1 x 7FA 2046 - 1 x 7FA	None	None	750 MW import/ 750 MW export
K19/Gas25/750MW **WPS Sale & Inv**[4]	2019 - Keeyask	2025 - 1 x 7FA 2026 - 1 x 7FA 2028 - 1 x 7FA 2031 - 1 x 7 FA 2033 - 1 x 7 FA 2045 - 1 x 7 FA 2047 - 1 x LM6000	2042 - 1 x 7 FA	None	750 MW import/ 750 MW export
K19/C31/750MW	2019 - Keeyask 2031 - Conawapa	2041 - 1 x 7FA 2044 - 1 x 7FA 2046 - 1 x 7FA	None	None	750 MW import/ 750 MW export
K19/Gas31/750MW	2019 - Keeyask	2031 - 2 x 7FA 2032 - 1 x 7FA 2034 - 1 x 7FA 2043 - 1 x 7FA	2039 - 1 x 7 FA 2045 - 1 x 7 FA	None	750 MW import/ 750 MW export
K19/C25/250MW	2019 - Keeyask 2025 - Conawapa	2040 - 1 x 7FA 2044 - 1 x 7FA 2046 - 1 x 7FA	None	None	250 MW export / 50 MW import
K19/Gas24/250MW	2019 - Keeyask	2024 - 1 x 7FA 2029 - 1 x 7FA	2032 - 1 x 7 FA 2038 - 1 x 7 FA 2041 - 1 x 7 FA 2045 - 1 x 7 FA	None	250 MW export / 50 MW import
K19/C31/250MW	2019 - Keeyask 2031 - Conawapa	2024 - 1 x 7FA 2029 - 1 x 7FA 2046 - 1 x 7FA	None	None	250 MW export / 50 MW import

[4] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities.

Development Plan	New Resources and Dates				New US Interconnection
	Hydro	SCGT	CCGT	Wind	
All Gas		2022 - 1 x 7FA 2025 - 1 x 7FA 2028 - 1 x 7FA 2034 - 1 x 7FA 2047 - 1 x LM6000	2031 - 1 x 7 FA 2037 - 1 x 7 FA 2040 - 1 x 7 FA 2044 - 1 x 7 FA	None	None
Wind/Gas		2025 - 2 x 7FA 2028 - 1 x 7FA 2031 - 1 x 7FA 2033 - 1 x 7FA 2036 - 1 x 7FA 2038 - 1 x 7FA 2040 - 1 x 7FA 2043 - 1 x 7FA 2045 - 1 x 7FA 2047 - 1 x LM6000	None	2022 - 2 x 65 MW 2023 - 2 x 65 MW 2024 - 2 x 65 MW 2027 - 1 x 65 MW 2028 - 1 x 65 MW 2029 - 1 x 65 MW 2030 - 1 x 65 MW 2031 - 1 x 65 MW 2032 - 1 x 65 MW 2033 - 1 x 65 MW 2034 - 1 x 65 MW 2035 - 1 x 65 MW 2036 - 1 x 65 MW 2037 - 1 x 65 MW 2038 - 1 x 65 MW 2039 - 1 x 65 MW 2040 - 1 x 65 MW 2041 - 1 x 65 MW 2042 - 1 x 65 MW 2043 - 1 x 65 MW 2044 - 1 x 65 MW 2045 - 1 x 65 MW 2046 - 1 x 65 MW 2047 - 1 x 65 MW	None
K22/Gas	2022 - Keeyask	2029 - 1 x 7FA 2032 - 1 x 7FA	2034 - 1 x 7 FA 2038 - 1 x 7 FA 2041 - 1 x 7 FA 2045 - 1 x 7 FA	None	None
K22/C29	2022 - Keeyask 2029 - Conawapa	2040 - 1 x 7FA 2044 - 1 x 7FA 2046 - 1 x 7FA	None	None	None

Development Plan	New Resources and Dates				New US Interconnection
	Hydro	SCGT	CCGT	Wind	
SCGT/C26	2026 - Conawapa	2022 - 1 x 7FA 2038 - 1 x 7FA 2041 - 1 x 7FA 2043 - 1 x 7FA 2045 - 1 x 7FA	None	None	None
CCGT/C26	2026 - Conawapa	2039 - 1 x 7FA 2042 - 1 x 7FA 2044 - 1 x 7FA 2047 - 1 x 7FA	2022 - 1 x 7FA	None	None
Wind/C26	2026 - Conawapa	2036 - 1 x 7FA 2038 - 1 x 7FA 2041 - 1 x 7FA 2043 - 1 x 7FA 2045 - 1 x 7FA	None	2 x 65 MW - 2022 2 x 65 MW - 2023 2 x 65 MW - 2024	None

Table 8.2 provides a summary of the sale agreements included in each development plan.

Table 8.2 SALE AGREEMENTS ASSOCIATED WITH EACH DEVELOPMENT PLAN

Development Plans	Sales Agreements					New US Interconnection Capability
	250 MW MP	300 MW WPS	108 MW WPS	100 MW WPS	125 MW NSP	
K19/C25/750MW WPS Sale & Inv[5]	June 2020 to May 2035	June 2026 to May 2036	June 2014 to May 2021	June 2021 to May 2027	May 2021 to Apr 2025	750 MW import/ 750 MW export
K19/C25/750MW	June 2020 to May 2035	No	No	June 2021 to May 2027	May 2021 to Apr 2025	750 MW import/ 750 MW export
K19/Gas25/750MW WPS Sale & Inv[5]	June 2020 to May 2035	June 2026 to May 2036	June 2014 to May 2021	June 2021 to May 2027	May 2021 to Apr 2025	750 MW import/ 750 MW export
K19/C31/750MW	June 2020 to May 2035	No	No	June 2021 to May 2027	May 2021 to Apr 2025	750 MW import/ 750 MW export
K19/Gas31/750MW	June 2020 to May 2035	No	No	June 2021 to May 2027	May 2021 to Apr 2025	750 MW import/ 750 MW export
K19/C25/250MW	June 2020 to May 2035	No	No	June 2021 to May 2027	May 2021 to Apr 2025	250 MW export/ 50 MW import
K19/Gas24/250MW	June 2020 to May 2035	No	No	June 2021 to May 2027	May 2021 to Apr 2025	250 MW export/ 50 MW import
K19/C31/250MW	June 2020 to May 2035	No	No	June 2021 to May 2027	May 2021 to Apr 2025	250 MW export/ 50 MW import
All Gas	No	No	No	No	No	None
Wind/Gas	No	No	No	No	No	None
K22/Gas	No	No	No	June 2023 to May 2027	No	None
K22/C29	No	No	No	June 2023 to May 2027	No	None
SCGT/C26	No	No	No	No	No	None
CCGT/C26	No	No	No	No	No	None
Wind/C26	No	No	No	No	No	None

[5] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities.

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9 Economic Evaluations – Reference Scenario

9.0 Overview

This chapter presents an evaluation of the economics of the 15 development plans described in ***Chapter 8 – Determination and Description of Development Plans*** based on inputs and assumptions associated with the reference scenario. The 15 plans are reduced to 12 plans which will be further tested through probabilistic analysis as described in ***Chapter 10 – Economic Uncertainty Analysis - Probabilistic Analysis and Sensitivities***.

The reference scenario represents the "most likely" outcomes for the factors affecting Manitoba Hydro's future. For the purpose of the main analysis in the NFAT submission, assumptions and forecasts for the reference scenario were based on 2012 resource planning assumptions with the exception of adjustments, primarily downwards, to the electricity export prices, as described in ***Appendix 9.3 – Economic Evaluation Documentation***. Economic comparisons are presented using the measure of incremental net present value (NPV). Section 9.3.2 provides the incremental NPVs to Manitoba Hydro for the reference scenario. Section 9.3.3 provides the incremental NPVs for the reference scenario including the incremental NPVs of the potential cash transfers to the Province for water rentals, capital taxes and provincial guarantee fee.

Appendix 9.1 – High Level Development Plan Comparison Table provides a summary of the key technical, socio-economic/provincial, environmental and economic characteristics and provides an indicative measure of the impact of each on the 15 development plans.

9.1 Methodology for Economic Evaluation

Economic evaluation is integral to resource decisions. Economic comparisons of alternatives are used to assist in making decisions regarding which resources to pursue and when. When evaluating and choosing among alternative development plans, the

appropriate measure is the incremental costs and benefits associated with one plan relative to another. This means that costs and benefits that are common to all development plans are not included in the analysis as these values are the same in each development plan. Likewise, sunk costs are not included in the economic evaluations as these represent money already spent or commitments that cannot be changed relative to the decision point when choosing among plans. While these costs could be included in the evaluations for all the development plans, the comparison of plans would yield the same result as not including the sunk costs in the evaluations. For the purpose of this submission, as appropriate for each development plan, all costs (incurred or estimated) prior to June 2014 will be considered as sunk and having been made to protect in-service dates for Keeyask and Conawapa generating stations as well as the option of a new U.S. interconnection and new export sale agreements. June 2014 was chosen because, according to the Needs For and Alternative To (NFAT) schedule, the NFAT panel report will have been made public and the Government of Manitoba will have made decisions on the development plans.

The economic evaluations present the incremental economic impact for a specific development plan relative to another development plan from the overall project perspective, without accounting for any aboriginal income-sharing. In effect, these evaluations are from the perspective of Manitoba Hydro with the income-sharing considered to be a relatively small proportion of the benefits Manitoba Hydro provides directly to Manitobans. Aboriginal income-sharing for Keeyask and Conawapa generating stations is accounted for in the financial analysis.

From an economic analysis perspective, a “do nothing” option is typically the basis for comparing alternatives. As shown in ***Chapter 4 – The Need for New Resources***, the need for new resources is being driven by persistent dependable energy deficits which begin in the year 2022/23. These persistent deficits mean that Manitoba Hydro is required to

make an investment in order to continue to provide a dependable and reliable supply of power for the needs of the province, and therefore Manitoba Hydro does not have a "do nothing" option. In the case of Manitoba Hydro's analysis, the closest representation of a "do nothing" option is the least-capital cost investment alternative.

9.1.1 Net Present Value

Manitoba Hydro uses standard economic analysis for project evaluation, known as NPV. NPV is calculated by discounting the annual costs and annual revenues to a common point in time and allows for alternatives with different streams of costs and revenues occurring at different times to be compared on an equivalent basis at a single point in time.

The present value of the costs is the amount of money that would need to be invested today, at a stated discount rate, to pay for all of the costs of the project over its life. The present value of the revenues is the amount of money that would need to be invested today, at a stated discount rate, to provide the annual revenue of the project over its life. The NPV is the difference between the present value of the revenue and the present value of the cost. It is the amount of money, if invested today at a stated discount rate, that would grow to an amount sufficient to finance and to provide a return on the investment over the life of the project. When comparing alternatives, the incremental NPV represents the incremental net benefits (or net costs) associated with the increment of investment made for a higher cost investment option, e.g. the additional investment for the higher-cost option becomes the investment in the NPV calculation, the additional benefits (revenue) from the higher-cost option becomes the revenue in the NPV calculation. The higher-cost option is in fact economically preferable if it provides a positive incremental NPV.

The standard economic analysis approach is based on real dollars (constant dollars). For consistency, the discount rate applied to a real dollar cash flow excludes inflationary effects and is referred to as a real discount rate.

Another metric used in investment analysis is the internal rate of return (IRR)[1] which is the expected rate of return on a capital investment. IRR is more common when analyzing venture capital and private equity investment opportunities—IRR is not typically used to compare alternatives in a particular investment context such as selecting between technology options, but rather to compare/rank investments in a financial portfolio.

Traditionally, the incremental IRR associated with the difference in investment costs between alternatives has been determined based on the difference in the expected revenue and cost streams. Although the costs of alternatives may be similar, the composition and associated risks can be quite different. With a small difference in capital cost between alternatives, the resulting incremental IRR can be large or small, but does not reflect the relative risk associated with each of the alternatives. Conversely, with a large difference in capital cost, the incremental IRR can be small yet the total value may be significant. The use of NPV is a more informative measure in that it shows the net value of the incremental investment and allows the associated risk or opportunity to be evaluated separately using extensive sensitivities or probabilistic analysis.

9.2 Manitoba Hydro's Economic Evaluation Process

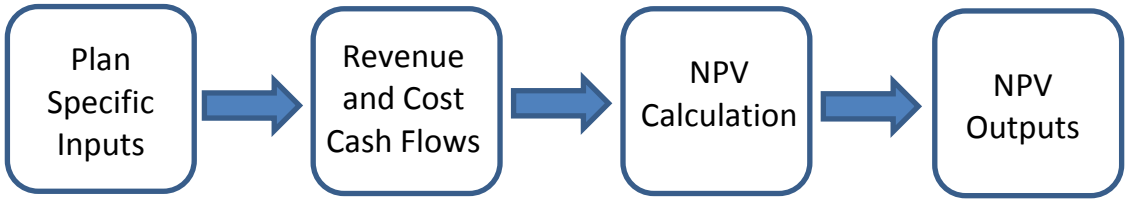
Manitoba Hydro's approach to economic evaluation is consistent with standard economic analysis methodology. Manitoba Hydro's use of development plan (portfolio) comparisons and the use of discounted cash-flow analysis to compare cash flows of two development plans (or sequences) has been reviewed and concurred with in previous

[1] Principles of Corporate Finance by Stewart Myers and Richard Brealey. McGraw Hill, pp 98-108

capital plan reviews (e.g. Report of the Public Utilities Board in respect of Major Capital Projects of Manitoba Hydro, November 1990; Report on Public Hearings Wuskwatim Generation and Transmission Projects, September 2004, Manitoba Clean Environment Commission.) The approach has been used by other major Canadian utilities to evaluate projects and development plans (e.g. Site C Clean Energy Project Environmental Impact Statement Volume 1: Introduction, Project Planning, and Description Section 5: Need for, Purpose of, and Alternatives to the Project , 5.5.3 Portfolio Modeling Framework, page 5-61, BC Hydro, January 2013).

Figure 9.1 shows Manitoba Hydro's process for the calculation of NPVs for all the development plans being evaluated, which is described in the following sections.

Figure 9.1 MANITOBA HYDRO'S PROCESS FOR CALCULATING NPVS



9.2.1 Plan-Specific Inputs

Table 9.1 provides a general summary of plan-specific revenue and cost inputs used for economic evaluation. The specific revenue and cost components will be dependent on the formulation of each development plan.

Table 9.1 ECONOMIC EVALUATION – SUMMARY OF REVENUE AND COST INPUTS

Plan-Specific Inputs	Sources of Input for all Development Plans
Revenue:	
• Contract revenue from proposed electricity export sales	Export sale contracts
• Electricity export revenue from surplus power	Manitoba Hydro's consensus electricity export price forecast as used in the generation system model (SPLASH)
Cost:	
• Capital investment	Manitoba Hydro capital cost estimates for each resource option including associated transmission for each development plan and transmission interconnection as applicable
• Fuel	• Water rental rate from *The Water Power Act* • Consensus natural gas price forecasts from Manitoba Hydro's Energy Price Outlook as used in the generation system model (SPLASH)
• Operating & Maintenance (O&M) including capital maintenance	Manitoba Hydro's O&M estimates for each facility in each development plan including capital maintenance items required over the life of the asset.
• Imports	Manitoba Hydro's consensus electricity export price forecast as used in the generation system model (SPLASH)
• Taxes	• Capital taxes based on *The Corporation Capital Tax Act* • Carbon tax on coal from the *Climate Change and Emissions Reductions Act* • Forecast of future carbon adder for Manitoba-based generation (federal/provincial)

While there are a number of direct sources of input into the economic evaluation, a significant source of input is the information provided from the generation system production-costing model, Simulation Program for Long-term Analysis of System

Hydraulics (SPLASH). The forecast information associated with Manitoba domestic load, demand side management, electricity export prices, natural gas prices, current and future carbon adders, and proposed export power sales is incorporated into the SPLASH model. The SPLASH model outputs include flow-related electricity export revenues and production costs such as fuel and variable O&M. The requirements of the corporation's Generation Planning Criteria are incorporated into the SPLASH model. The SPLASH model is described in more detail in ***Appendix 9.2 – Description of the SPLASH Model***.

9.2.2 Revenue and Cost Cash Flows

The next step in the process is to prepare a single revenue cash-flow stream and a single cost cash-flow stream for each development plan over the life of the study in order to calculate respective NPVs. The revenue and cost cash flows are the sum of all individual revenue and cost cash flows from the detailed inputs.

The total study life used in this analysis is 78-years. For the total study life, Manitoba Hydro combines two approaches – a 35-year detailed evaluation and a long-life asset evaluation which extends from the end of the 35-year study period to the end of the service life of hydro-electric generation assets, as representing the longest-lived assets.

Economic evaluations recognize that the economic lives of assets developed in the different development plans may extend well beyond the 35-year planning period. While natural gas-fired generation resources are estimated to have economic lives of 30-years, hydro-electric resources are estimated to have economic lives of 100-years or longer, with the "weighted average" life of the plants being around 67-years when accounting for the periodic replacement of major equipment. For the 35-year study period, detailed forecast information related to the Manitoba Hydro system, including a representation of electricity export markets for a 35-year period, is used.

Beyond the 35-year study period, replacement capital costs are assumed for assets that reach the end of their economic lives before the end of the long-study period (78-years). In addition, a net production cost approximation is used beyond the 35-year study period (see ***Appendix 9.3 - Economic Evaluation Documentation***) which includes:

- extending fixed operating and maintenance costs throughout the economic life of all assets (including major capital O&M investments for large hydro-electric resources); and
- extending the average net revenues of the last three years in a development plan to capture the expected ongoing incremental revenues between development plans to the end of the study period.

9.2.3 Net Present Value Calculation

After determining the cash-flow streams, the discount rate that will be applied is determined. The starting point for development of a discount rate is a company's overall cost of financing. As a discount rate is used to guide investment decisions based on uncertainty, a risk premium may be identified to arrive at a discount rate which makes the investor indifferent between cash amounts received at different points in time. In the case of Manitoba Hydro, the discount rate consists of the cost of financing, which includes a guarantee fee to the Province, and a return on equity as described in ***Appendix 9.3 - Economic Evaluation Documentation.***

As described in Section 9.1.1, the NPV is then calculated by discounting the annual costs and annual revenues to a common point in time and allows for alternatives with different streams of costs and revenues occurring at different times to be compared on an equivalent basis at a single point in time.

9.2.4 Outputs – Net Present Value

The outputs are the NPV for each development plan. In order to compare one development plan to another, the development plans are arranged in order of lowest to highest capital investment, based on the present value of the capital costs. The difference in NPV of one development plan to another represents the net benefit of the incremental investment between the development plans.

9.3 Economic Results – Reference Scenario

Section 9.3 provides the results of the economic analysis completed on the 15 development plans described in ***Chapter 8 – Determination and Description of Development Plans*** using reference scenario assumptions. The reference scenario represents a future based on the "most likely" outcomes.

9.3.1 Reference Scenario Inputs

Assumptions and forecasts for the reference scenario were based on 2012 resource planning assumptions with the exception of adjustments, primarily downwards, to the electricity export price forecast as described in ***Appendix 9.3 – Economic Evaluation Documentation***. Key assumptions for the reference scenario are provided in Table 9.2.

Table 9.2 KEY ASSUMPTIONS – REFERENCE SCENARIO

Economic Evaluation Inputs	Reference Scenario Assumption (See *Appendix 9.3 - Economic Evaluation Documentation*)	Appendix Reference
Electricity Export Revenue	• Adjusted 2012 electricity export price forecast • Proposed and existing export sale contracts	• Section 1.5.1.3, Appendix 9.3 • Section 1.6, Appendix 9.3
Power Purchases (Import Cost)	• Adjusted 2012 electricity export price forecast • Generation Planning Criteria	• Section 1.5.1.3, Appendix 9.3 • Appendix 4.1
Capital Costs – generation and transmission	• Base estimate in 2014$ • Real escalation applied to hydro and natural gas-fired generation	• Section 3, Appendix 9.3 • Section 2.1.3, Appendix 9.3
Fuel Costs	• Water rental costs • Natural gas fuel costs associated with Manitoba generation	• Section 3, Appendix 9.3 • Section 3, Appendix 9.3
Net Load	• 2012 Electric load forecast, base forecast • 2012 base DSM Forecast	• Appendix C • Appendix E
CDN/U.S. Exchange Rate	• 2012/13 consensus forecast of exchange rates	• Appendix F
Discount Rate	• Real weighted average cost of capital = 5.05%	• Section 1.4, Appendix 9.3
Total Study Life	• 2012 to 2090	• Section 1.2, Appendix 9.3

In Table 9.3, the 15 development plans, as described in ***Chapter 8 – Determination and Description of Development Plans***, are listed in order of lowest incremental capital investment (Plan 1 - All Gas) to highest incremental capital investment (Plan 15 - K19/C25/750MW).

Table 9.3 LIST OF FIFTEEN DEVELOPMENT PLANS

Order of Capital Investment (Plan Number)	Development Plan Short Name	Description of Development Plan
1	All Gas	Natural Gas-Fired Generation starting in 2022/23
2	K22/Gas	Keeyask 2022/23, Natural Gas-Fired Generation starting in 2029/30
3	Wind/Gas	Wind Generation starting in 2022/23 supported by Natural Gas-Fired Generation starting in 2025/26
4	K19/Gas24/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
5	K19/Gas25/750MW (WPS Sale & Inv)[2]	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2025/26, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale
6	K19/Gas31/750MW	Keeyask 2019/20, Imports, Natural Gas-Fired Generation starting in 2031/32, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale
7	SCGT/C26	Simple Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2038/39
8	CCGT/C26	Combined Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2039/40
9	Wind/C26	Wind in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2036/37
10	K22/C29	Keeyask 2022/23, Conawapa 2029/30, Natural Gas-Fired Generation starting in 2040/41
11	K19/C31/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, Conawapa 2031/32, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
12	K19/C31/750MW	Keeyask 2019/20, Imports, Conawapa 2031/32, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale
13	K19/C25/250MW	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2040/41, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
14	K19/C25/750MW (WPS Sale & Inv)[2] Preferred Development Plan	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale
15	K19/C25/750MW	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale

[2] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities.

9.3.2 Reference Scenario Results – Net Present Value

The results provide the NPV of the incremental investment associated with each development plan. The incremental investment associated with a more costly development plan is economically preferable if it provides a positive incremental NPV.

For the purposes of this evaluation, as appropriate for each development plan, costs will continue to be incurred until at least June, 2014 in order to protect earliest in-service dates for Keeyask and Conawapa generating stations as well as the option of a new U.S. interconnection and new export sale agreements. All incurred or estimated costs to June, 2014 are excluded from the analysis as they are assumed to be sunk.

In order to compare development plans in terms of economics, typically, a "do nothing" option is used as the basis for comparing alternatives. For Manitoba Hydro, the closest representation of a "do nothing" option is the least-capital investment development plan, which is the All Gas development plan.

The order of the development plans is based on the principle that Manitoba Hydro would undertake the lowest-capital cost option available, unless the incremental investment associated with a more costly option provides greater incremental benefits when evaluated at the reference scenario discount rate of 5.05% (see ***Appendix 9.3 – Economic Evaluation Documentation***). Thus, the All Gas development plan, as the plan requiring the lowest capital investment, is compared to development plans of increasingly higher investment. Table 9.4 provides a comparison of two development plans: the All Gas development plan to the development plan with the next lowest capital investment, K22/Gas.

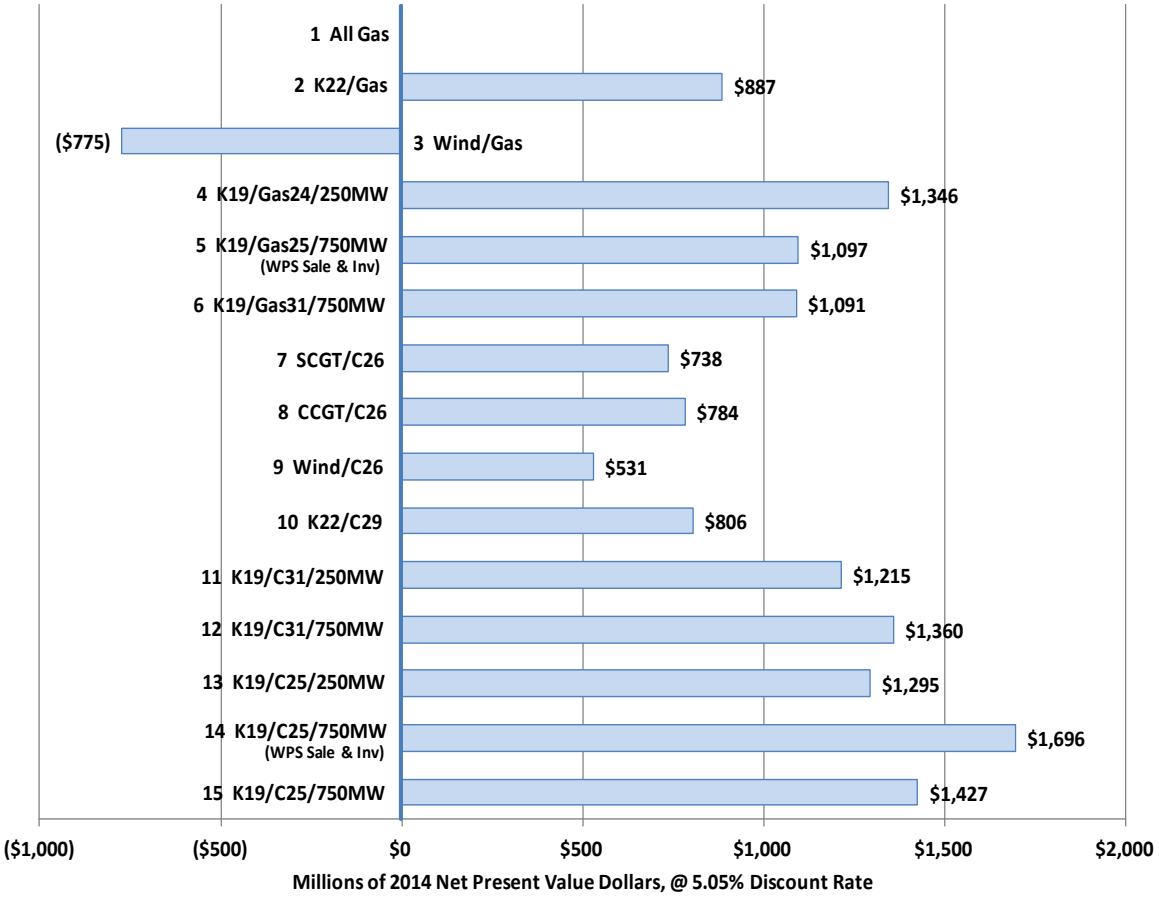
Table 9.4 INCREMENTAL ECONOMICS – ALL GAS COMPARED TO K22/GAS

Development Plan	Incremental NPV millions of 2014 Dollars @ 5.05% Discount Rate
	1 All Gas
1 All Gas	
Lowest Capital Investment Development Plan	-
2 K22/Gas	2 minus 1
	$887

The incremental NPV benefit of $887 million, shown in Table 9.4 as "2 minus 1", represents the net benefit of investing the additional capital required for the K22/Gas development plan when discounted at 5.05%.

Figure 9.2 provides a summary which compares the incremental NPV for each of the 15 development plans based on the incremental investment relative to the investment for the All Gas development plan, from the perspective of Manitoba Hydro (defined here as the economic benefits that Manitoba Hydro can pass on directly to its ratepayers – not including any transfers to the Province of Manitoba). The development plans are shown in order of lowest incremental investment (All Gas) to highest incremental investment (K19/C25/750MW).

Figure 9.2 DEVELOPMENT PLAN NPVS – BENEFITS TO MANITOBA HYDRO (RELATIVE TO ALL GAS PLAN)



The following sections discuss the reference scenario results, in terms of NPV, for:

- Development plans with no new interconnection – seven plans
- Development plans with a 250 MW U.S. interconnection – three plans
- Development plans with a 750 MW U.S. interconnection – five plans
- All development plans with either a U.S. 250 MW or a U.S. 750 MW interconnection.

9.3.2.1 Development Plans with No New U.S. Interconnection – Seven Plans

Table 9.5 provides a comparison of seven development plans that meet Manitoba Hydro's domestic load and firm export commitments starting in 2022/23 with no new U.S. interconnection and no new export contract commitments.

As previously shown in Table 9.4, there is a net benefit of $887 million associated with the incremental investment for the K22/Gas development plan as compared to the All Gas development plan. As shown in Figure 9.2, there is a net benefit between the K22/C29 plan and the All Gas development plan of $806 million. In comparing the K22/Gas development plan to the K22/C29 development plan, the net benefit between the two plans is not large enough to be decisive between the plans on the basis of the NPV.

The purpose of the Wind/Gas development plan is to provide a wind-based development plan which incorporates wind generation to meet energy requirements, combined with the most cost-effective natural gas-fired generation to provide capacity and to support the intermittent nature of the wind resource. When the Wind/Gas development plan is compared to either the All Gas or the K22/Gas development plans in Table 9.5, the NPV is significantly negative. Similarly, when all remaining development plans in Table 9.5 are compared to the Wind/Gas development plan, the incremental NPV is in the order of $1,300 to $1,600 million greater than that of the Wind/Gas development plan. These comparisons show that it would be significantly more beneficial to invest in any one of the other six development plans than in the Wind/Gas development plan.

The three development plans SCGT/C26, CCGT/C26 and Wind/C26 allow for the comparison to determine which of the non-hydro resources, when combined with the Conawapa generating station (G.S.), will be selected for further evaluation. In this comparison, the requirement of the non-hydro resources, including wind in the Wind/C26 development plan, is to fulfill the energy requirement prior to the development of the

Conawapa G.S. The Wind/C26 development plan requires an additional increment of investment, making it the development plan with the second-highest capital investment requirement in Table 9.5. Based on the measure of NPV, the CCGT/C26 development plan yields a marginally higher net benefit than the SCGT/C26 development plan and a substantially higher net benefit than the Wind/C26 development plan. In comparing development plans, the net benefit between SCGT/C26 and CCGT/C26 is small enough to result in indifference between the plans.

Of this group of seven development plans listed in Table 9.5, the K22/Gas plan has one of the highest incremental NPVs when compared to the All Gas plan. As stated earlier in this section, the net benefit of the K22/Gas development plan as compared to the K22/C29 development plan is small enough to result in indifference between the plans. However, the significantly greater investment required for the Conawapa G.S. in the K22/C29 development plan results in it being excluded from further evaluation.

Table 9.5 INCREMENTAL ECONOMICS – NO NEW INTERCONNECTION

Development Plan	Incremental NPV, millions of 2014 Dollars @ 5.05% Discount Rate					
	1 All Gas	2 K22/Gas	3 Wind/Gas	7 SCGT/C26	8 CCGT/C26	9 Wind/C26
1 All Gas						
Lowest Capital Investment Development Plan	-					
2 K22/Gas	2 -1					
	$887					
3 Wind/Gas	3 -1	3 -2				
	($775)	($1,662)				
7 SCGT/C26	7 -1	7 -2	7 -3			
	$738	($149)	$1,513			
8 CCGT/C26	8 -1	8 -2	8 -3	8 -7		
	$784	($103)	$1,559	$46		
9 Wind/C26	9 -1	9 -2	9 -3	9 -7	9 -8	
	$531	($356)	$1,306	($207)	($253)	
10 K22/C29	10 -1	10 -2	10 -3	10 -7	10 -8	10 -9
	$806	($81)	$1,581	$68	$22	$275

Of the seven development plans shown in Table 9.5, three development plans with no new interconnection have been selected for further analysis: All Gas, K22/Gas and

SCGT/C26. For consistency in ongoing corporate analysis, the SCGT/C26 development plan has been selected over the CCGT/C26 development plan. Due to the high level of interest in analyzing a development plan with substantial amounts of wind generation, the Wind/Gas development plan is also being included in the economic probabilistic analysis in ***Chapter 10 – Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities***.

9.3.2.2 Development Plans with a 250 MW U.S. Interconnection – Three Plans

As described in ***Chapter 8 — Determination and Description of Development Plans***, the executed agreement with MP for 250 MW (megawatt) of system power is contingent upon a new transmission interconnection with a minimum export capability of 250 MW as well as an import capability of up to 250 MW (50 MW minimum import capability has been assumed for evaluation purposes). In addition, Manitoba Hydro and Wisconsin Public Service (WPS) have a signed term sheet for a proposed sale by Manitoba Hydro of up to 500 MW of system power of which 400 MW would require the construction of a new transmission interconnection. For evaluation purposes a 300 MW sale to WPS has been assumed, which would require 200 MW of new transmission service. An interconnection with a transfer capability of larger than 250 MW would be required to accommodate new sales to both MP and WPS. In the event that the sale to WPS does not materialize, a smaller transmission interconnection would be sufficient to meet the 250 MW Minnesota Power (MP) sale. This section deals with such a situation.

Table 9.6 provides a comparison of the three development plans—Plan 4 (K19/Gas24/250MW), Plan 11 (K19/C31/250MW), and Plan 13 (K19/C25/250MW)—that enable the construction of a new U.S. interconnection, which is assumed to provide 250 MW of export and 50 MW of import capability. These development plans are facilitated by the MP 250 MW sale. When these three development plans are compared to the All Gas development plan in Table 9.6, the incremental NPV is greater than $1,200 million,

showing that it would be significantly more beneficial for Manitoba Hydro to invest in one of these three development plans. When directly comparing these development plans, the net benefit is small enough to result in indifference between the K19/Gas24/250MW and K19/C25/250MW plans. The K19/C31/250MW plan is considered to be marginally less beneficial when compared to the other two plans. A significant difference between these plans is the substantial incremental investment required with the addition of Conawapa in the K19/C25/250MW and K19/C31/250MW development plans.

Table 9.6 INCREMENTAL ECONOMICS – 250 MW U.S. INTERCONNECTION

Development Plan	Incremental NPV, millions of 2014 Dollars @ 5.05% Discount Rate		
	1 All Gas	4 K19/Gas24/250MW	11 K19/C31/250MW
1 All Gas			
Lowest Capital Investment Development Plan	-		
4 K19/Gas24/250MW	4 -1		
MP Sale	$1,346		
11 K19/C31/250MW	11 -1	11 -4	
MP Sale	$1,215	($131)	
13 K19/C25/250MW	13 -1	13 -4	13 -11
MP Sale	$1,295	($51)	$80

All three of the development plans that include the 250 MW U.S. interconnection have been selected for further analysis.

9.3.2.3 Preferred Development Plan and Other Development Plans with a 750 MW U.S. Interconnection – Five Plans

There are five development plans with a 750 MW U.S. interconnection in this group of plans. This group of plans recognizes the uncertainty associated with the finalization of and approvals for the proposed 300 MW WPS sale and the complexities associated with development of a 750 MW international power line, including agreements and regulatory approvals.

As shown in Table 9.7, the Preferred Development Plan (Plan 14) provides the highest net benefits relative to the other four development plans evaluated but requires the second highest incremental capital investment relative to the All Gas development plan.

All five of the development plans enable the construction of a new U.S. interconnection with 750 MW of import and export capability. Two of the development plans, the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)) and Plan 5 (K19/Gas25/750 (WPS Sale & Inv)) are facilitated by both the 250 MW MP sale and the proposed 300 MW WPS sale. In these development plans, it is assumed that Manitoba Hydro will be responsible for 40% of the capital and ongoing operating costs, associated with the U.S. portion of the 750 MW interconnection facilities. In addition, Manitoba Hydro will be responsible for the full cost of the Manitoba portion of the new interconnection.

Plan 5 (K19/Gas25/750MW (WPS Sale & Inv)) and the Preferred Development Plan (Plan 14) are similar plans, with the major difference being the development of natural gas-fired generation instead of the Conawapa G.S. This plan allows for the comparison of the option of building natural gas-fired generation as an alternative to building Conawapa G.S. in 2025/26. For the sales requiring new hydro generation, power from the Keeyask G.S. is assumed to be sufficient to meet the contract requirements.

The other three development plans provided in Table 9.7 represent potential futures which continue to enable the development of a 750 MW U.S. interconnection in the event that the proposed 300 MW WPS sale does not proceed. For the purposes of the NFAT evaluation, while Manitoba Hydro will not enter into an arrangement where it owns more than 49% of the proposed U.S. interconnection, a conservative assumption has been used where Manitoba Hydro will be responsible for approximately two-thirds of the

capital and ongoing operating costs associated with the U.S. portion of the 750 MW interconnection facilities. In addition, Manitoba Hydro will be responsible for the entire cost of the Manitoba portion of the new interconnection.

Plan 15 (K19/C25/750MW) contemplates development of the same resources as the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)) but without the proposed 300 MW WPS sale. Without the proposed 300 MW sale to WPS and WPS investment in the 750 MW U.S. interconnection, the net benefits of this development plan decrease by $269 million as shown in Table 9.7.

Plan 12 (K19/C31/750MW) incorporates a deferral of Conawapa G.S. while still facilitating the sale of surplus power over the interconnections, including the new 750 MW U.S. interconnection. The K19/Gas31/750MW (Plan 6) development plan allows for the comparison of the option of building natural gas-fired generation as an alternative to building Conawapa G.S. in 2031/32, while still facilitating the sale of surplus power over the interconnections including the new 750 MW U.S. interconnection. The Preferred Development Plan (Plan 14) provides $336 million in net benefits when compared to Plan 12 (K19/C31/750MW) and $605 million in net benefits when compared to Plan 6 (K19/Gas31/750MW).

As shown in Table 9.7, when compared to the All Gas development plan, the Preferred Development Plan (K19/C25/750MW (WPs Sale & Inv)) yields net benefits of $1,696 million, while the other four development plans with a 750 MW interconnection show net benefits greater than $1,000 million: $1,097 million, $1,091 million, $1,360 million and $1,427 million, respectively.

Table 9.7 INCREMENTAL ECONOMICS – 750 MW U.S. INTERCONNECTION

Development Plan	Incremental NPV, millions of 2014 Dollars @ 5.05% Discount Rate				
	1 All Gas	5 K19/Gas25/750MW WPS Sale & Inv	6 K19/Gas31/750MW	12 K19/C31/750MW	14 K19/C25/750MW WPS Sale & Inv
1 All Gas					
Lowest Capital Investment Development Plan	-				
5 K19/Gas25/750MW	5 -1				
MP Sale, WPS Sale & Inv	$1,097				
6 K19/Gas31/750MW	6 -1	6 -5			
MP Sale	$1,091	($6)			
12 K19/C31/750MW	12 -1	12 -5	12 -6		
MP Sale	$1,360	$263	$269		
14 K19/C25/750MW	14 -1	14 -5	14 -6	14 -12	
MP Sale, WPS Sale & Inv Preferred Development Plan	$1,696	$599	$605	$336	
15 K19/C25/750MW	15 -1	15 -5	15 -6	15 -12	15 -14
MP Sale	$1,427	$330	$336	$67	($269)

The five development plans that include the 750 MW U.S. interconnection have been selected for further analysis.

9.3.2.4 Comparison of Development Plans with a New Interconnection

Table 9.8 provides a comparison of a number of development plans that include either the 250 MW or the 750 MW U.S. interconnection. All five of the plans with a 750 MW U.S. interconnection are shown in Table 9.7. The two development plans with a 750 MW U.S. interconnection and with Keeyask G.S. followed by natural gas-fired generation have incremental NPVs of $1,091 million (K19/Gas31/750MW) and $1,097 million (K19/Gas25/750MW) when compared to the All Gas plan. When Plan 4 (K19/Gas24/250MW) is compared to these two plans, its incremental NPV exceeds that of each plan by $255 million ($1,346 million minus $1,091 million) and $249 million ($1,346 million minus $1,097 million), respectively.

The Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)), which includes a 750 MW U.S. interconnection, yields the highest net benefits ($481 million, $350 million

and $401 million), when compared to the development plans that have a 250 MW U.S. interconnection. In addition, Plan 12 (K19/C31/750MW) yields incremental NPVs that are $14 million, $65 million and $145 million higher than the development plans that have a 250 MW U.S. interconnection. In the event that the process for development of an international power line results in a 250 MW U.S. interconnection, Tables 9.7 and 9.8 show that the net benefits associated with a smaller line are greater than $1,200 million compared to the All Gas development plan and exceed the incremental NPVs of development plans that have a 750 MW U.S. interconnection with Keeyask G.S. followed by natural gas-fired generation.

Table 9.8 DEVELOPMENT PLANS WITH A NEW U.S. INTERCONNECTION

Development Plan	Incremental NPV, millions of 2014 Dollars @ 5.05% Discount Rate					
	1 All Gas	4 K19/Gas24/250MW	11 K19/C31/250MW	12 K19/C31/750MW	13 K19/C25/250MW	14 K19/C25/750MW WPS Sale & Inv
1 All Gas						
Lowest Capital Investment Development Plan	-					
4 K19/Gas24/250MW	4 -1					
MP Sale	$1,346					
11 K19/C31/250MW	11 -1	11 -4				
MP Sale	$1,215	($131)				
12 K19/C31/750MW	12 -1	12 -4	12 -11			
MP Sale	$1,360	$14	$145			
13 K19/C25/250MW	13 -1	13 -4	13 -11	13 -12		
MP Sale	$1,295	($51)	$80	($65)		
14 K19/C25/750MW	14 -1	14 -4	14 -11	14 -12	14 -13	
MP Sale, WPS Sale & Inv Preferred Development Plan	$1,696	$350	$481	$336	$401	
15 K19/C25/750MW	15 -1	15 -4	15 -11	15 -12	15 -13	15 -14
MP Sale	$1,427	$81	$212	$67	$132	($269)

9.3.3 Reference Scenario Results – NPVs Including Cash Transfers to the Province of Manitoba

Section 9.3.3 provides the NPVs for the reference scenario showing the additional assumed cash transfers to the Province of Manitoba for water rentals, capital taxes and provincial guarantee fee over the 78-year study period for the 15 development plans. ***Appendix 9.3 - Economic Evaluation Documentation*** includes the assumptions used in the analysis that relate to cash transfers to the Province.

Water rentals are based on the operation of Manitoba Hydro's hydro-electric generation and are calculated and paid to the Province of Manitoba in accordance with *The Water Power Act*.

Capital taxes are a provincial tax assessed under *The Corporation Capital Tax Act* of Manitoba. In general terms, this tax is applied at a rate of 0.5% to the capital invested by Manitoba Hydro in the province, where "capital" can be generally defined as "the total debt and retained earnings of the corporation".

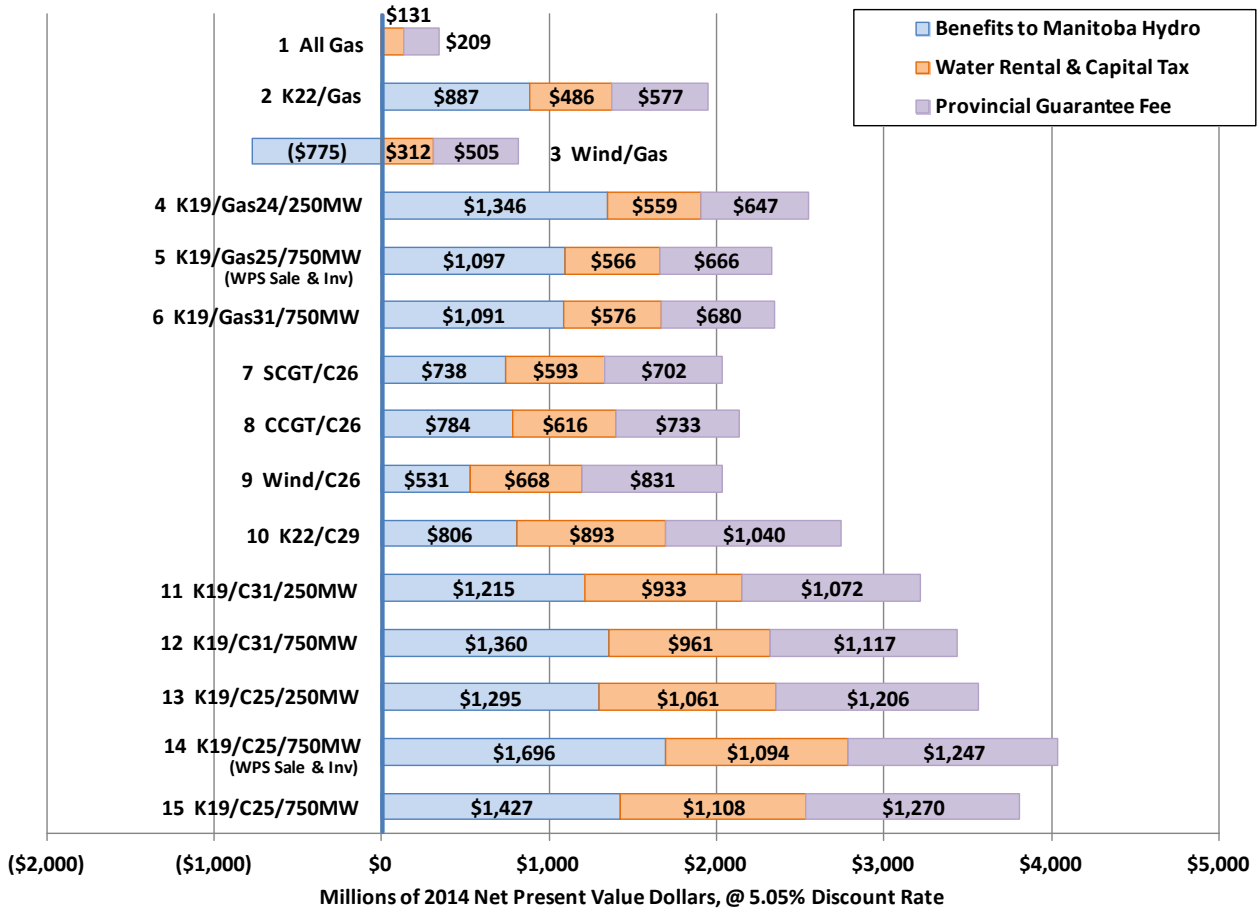
The provincial guarantee fee is an annual fee payable to the Province of Manitoba in return for the guarantee of the corporation's debt (with the exception of some MHEB bonds) and is calculated using a rate of 1% multiplied by the gross outstanding debt at March 31 of the previous fiscal year.

These cash transfers are provided here as an addition to the economic benefits noted earlier because they benefit the provincial government and indirectly Manitobans. (It must be recognized that the debt guarantee fee provides Manitoba Hydro a benefit and has the potential to incur costs to the Province. See ***Chapter 11 – Financial Evaluation of Development Plans*** for discussion of provincial borrowing and credit rating implications). As shown in Figure 9.3, cash transfers to the Province of Manitoba for water rentals and capital taxes are included as costs when performing economic evaluations. The provincial guarantee fee shown in Figure 9.3 represents the 1% fee applied to the total capital investment for each of the 15 development plans evaluated. The water rental rate, the capital tax rate and the provincial guarantee fee percentages are assumed to remain the same.

For the development plans evaluated, the majority of the cash transfers to the Province are from the provincial guarantee fee; while the capital taxes make up approximately 30%

of the cash transfers; and the water rentals make up approximately 10% (with the exception of the All Gas and Wind/Gas development plans in which incremental water rentals are zero). The greatest cash transfers to the Province result from those development plans that include both Keeyask and Conawapa generating stations; these cash transfers are significantly greater than for those development plans that include only one or no hydro-electric generating station.

Figure 9.3 DEVELOPMENT PLAN NPVS COMPARED TO ALL GAS DEVELOPMENT PLAN - INCLUDING POTENTIAL CASH TRANSFERS TO THE PROVINCE



9.3.4 Development Plans Selected for Economic Uncertainty Analysis

As demonstrated by the economic evaluations for the reference scenario shown throughout this chapter, development plans with a U.S. interconnection provide higher net benefits than those development plans without a U.S. interconnection. The Preferred

Development Plan (K19/C25/750MW (WPS Sale & Inv)) yields the highest net benefits across all of the development plans evaluated.

Table 9.9 lists the 12 development plans that will be further considered in the economic uncertainty analysis provided in ***Chapter 10 – Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities***.

Table 9.9 DEVELOPMENT PLANS SELECTED FOR ECONOMIC UNCERTAINTY ANALYSIS

Development Plan	Incremental NPV, millions of 2014 Dollars @ 5.05% Discount Rate										
	1 All Gas	2 K22/Gas	3 Wind/Gas	4 K19/Gas24/250MW	5 K19/Gas25/750MW WPS Sale & Inv	6 K19/Gas31/750MW	7 SCGT/C26	11 K19/C31/250MW	12 K19/C31/750MW	13 K19/C25/250MW	14 K19/C25/750MW WPS Sale & Inv
1 All Gas											
Lowest Capital Investment Development Plan	-										
2 K22/Gas	2 -1										
	$887										
3 Wind/Gas	3 -1	3 -2									
	($775)	($1,662)									
4 K19/Gas24/250MW	4 -1	4 -2	4 -3								
MP Sale	$1,346	$459	$2,121								
5 K19/Gas25/750MW	5 -1	5 -2	5 -3	5 -4							
MP Sale, WPS Sale & Inv	$1,097	$210	$1,872	($249)							
6 K19/Gas31/750MW	6 -1	6 -2	6 -3	6 -4	6 -5						
MP Sale	$1,091	$204	$1,866	($255)	($6)						
7 SCGT/C26	7 -1	7 -2	7 -3	7 -4	7 -5	7 -6					
	$738	($149)	$1,513	($608)	($359)	($353)					
11 K19/C31/250MW	11 -1	11 -2	11 -3	11 -4	11 -5	11 -6	11 -7				
MP Sale	$1,215	$328	$1,990	($131)	$118	$124	$477				
12 K19/C31/750MW	12 -1	12 -2	12 -3	12 -4	12 -5	12 -6	12 -7	12 -11			
MP Sale	$1,360	$473	$2,135	$14	$263	$269	$622	$145			
13 K19/C25/250MW	13 -1	13 -2	13 -3	13 -4	13 -5	13 -6	13 -7	13 -11	13 -12		
MP Sale	$1,295	$408	$2,070	($51)	$198	$204	$557	$80	($65)		
14 K19/C25/750MW	14 -1	14 -2	14 -3	14 -4	14 -5	14 -6	14 -7	14 -11	14 -12	14 -13	
MP Sale, WPS Sale & Inv Preferred Development Plan	$1,696	$809	$2,471	$350	$599	$605	$958	$481	$336	$401	
15 K19/C25/750MW	15 -1	15 -2	15 -3	15 -4	15 -5	15 -6	15 -7	15 -11	15 -12	15 -13	15 -14
MP Sale	$1,427	$540	$2,202	$81	$330	$336	$689	$212	$67	$132	($269)

Tab 91

NEEDS FOR AND ALTERNATIVES TO (NFAT)

Manitoba Hydro Undertaking #27

Manitoba Hydro to file the additional calculations performed on all of the plans upon which Manitoba Hydro conducted a probabilistic analysis, using base level DSM, with respect to the new information provided as of March 10, 2014.

Response:

Please see the attached Updated Economic Uncertainty Analysis Results.

Updated Economic Uncertainty Analysis Results

The economic uncertainty analysis as provided in Manitoba Hydro's Exhibit 104-2 has been further updated to reflect the following:

- addition of Plan 6 (K-19/Gas31/750MW) and Plan 12 (K-19/C31/750MW),
- Plans 5 and 14 are now shown with no WPS investment in the new 750 MW US interconnection (Manitoba Hydro is assumed to pay the WPS portion of investment costs); Plan 5 and Plan 14 are now labeled as K-19/Gas25/750MW (WPS Sale & no WPS Inv) and K-19/C25/750MW (WPS Sale & no WPS Inv), respectively.

The following updates reflected in Manitoba Hydro's Exhibit 104-2 are also applied:

- updated capital costs for Keeyask and Conawapa,
- updated probability weightings associated with the Capital Costs factor,
- updated treatment of common factors (costs and revenues common to all alternatives).

Updated Capital Costs

As a result of recently receiving General Civil Contract bids for Keeyask, Manitoba Hydro has updated its capital cost estimates for Keeyask and Conawapa. The updated capital cost estimates used in the updated economic uncertainty analysis, in billions of 2014 base dollars, are provided in the table below. Consistent with the assumptions documented in the NFAT submission, all costs prior to June 2014 are not included in the totals as they are considered sunk and having been made to protect the in-service dates shown in the table.

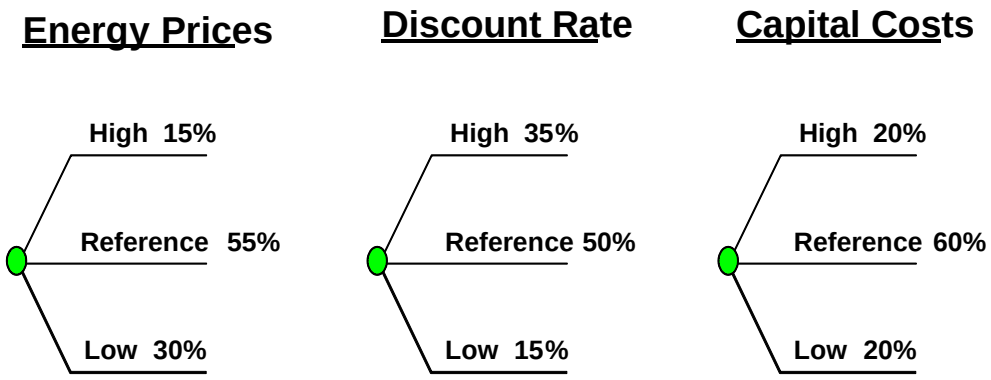
Updated Capital Cost Estimates for Keeyask and Conawapa
Used in Economic Uncertainty Analysis

(Billions of 2014 Base $)

	Keeyask - 2019			**Keeyask – 2022**			**Conawapa – 2025**			**Conawapa - 2026**			**Conawapa - 2031**		
	Low	Ref	High	Low	Ref	High	Low	Ref	High	Low	Ref	High	Low	Ref	High
2012 NFAT Analysis	3.0	3.3	3.7	3.1	3.4	3.9	5.1	5.7	6.4	5.2	5.8	6.5	5.3	6.0	6.7
2014 Update	3.1	3.6	4.2	3.1	3.7	4.4	5.0	6.1	7.5	5.0	6.1	7.5	5.2	6.4	7.9

Updated Probability Weightings

As described in Appendix 9.3 of the NFAT submission, the Capital Costs factor and associated probability weightings apply to capital costs for hydro-electric generation, natural gas-fired generation, wind generation and transmission line and station. To reflect the greater certainty in the new estimate for Keeyask and the enhanced labour productivity reserve methodology, the low, reference and high probabilities have been updated. The updated probabilities are presented below. The reference capital cost scenario probability weighting has been updated to 60% from the 50% used in the NFAT submission and the high capital cost scenario probability weighting has been updated to 20% from the 30% used in the NFAT submission. The probability weighting for the low capital cost scenario has not changed from that assumed in the NFAT submission.



Results

The latest NPV results with the three updates are presented in the quilt and table below. The results for Plan 1, Plan 2, Plan 4 and Plan 8 are unchanged from those provided in MH Exhibit 104-2. The results for Plan 6 and Plan 12 have been added to the quilt and table below. The results for Plan 5 and Plan 14 have been adjusted for the assumption that WPS does not invest in the new 750 MW US interconnection and Manitoba Hydro pays that portion of investment costs. The assumption that the WPS Sale is included in Plan 5 and Plan 14 remains unchanged.

Relative to All Gas – Ref – Ref – Ref, expected values range from essentially zero to more than $600M. While Plan 4 has the highest expected value, this plan is no longer realistically viable and the economic benefits can only be considered as hypothetical. Excluding Plan 4, Plan 6 has the highest expected value. Plan 1 has the lowest expected value. Again, relative to All Gas – Ref – Ref – Ref, 10th percentile values range from -$700M to -$2.9B. All plans have some

downside risk. Excluding Plan 4 because it is no longer viable, Plan 2 has the least downside risk. Plan 14 has the most downside risk followed by Plan 12.

Revised Capital Costs and Revised Treatment of Common factors

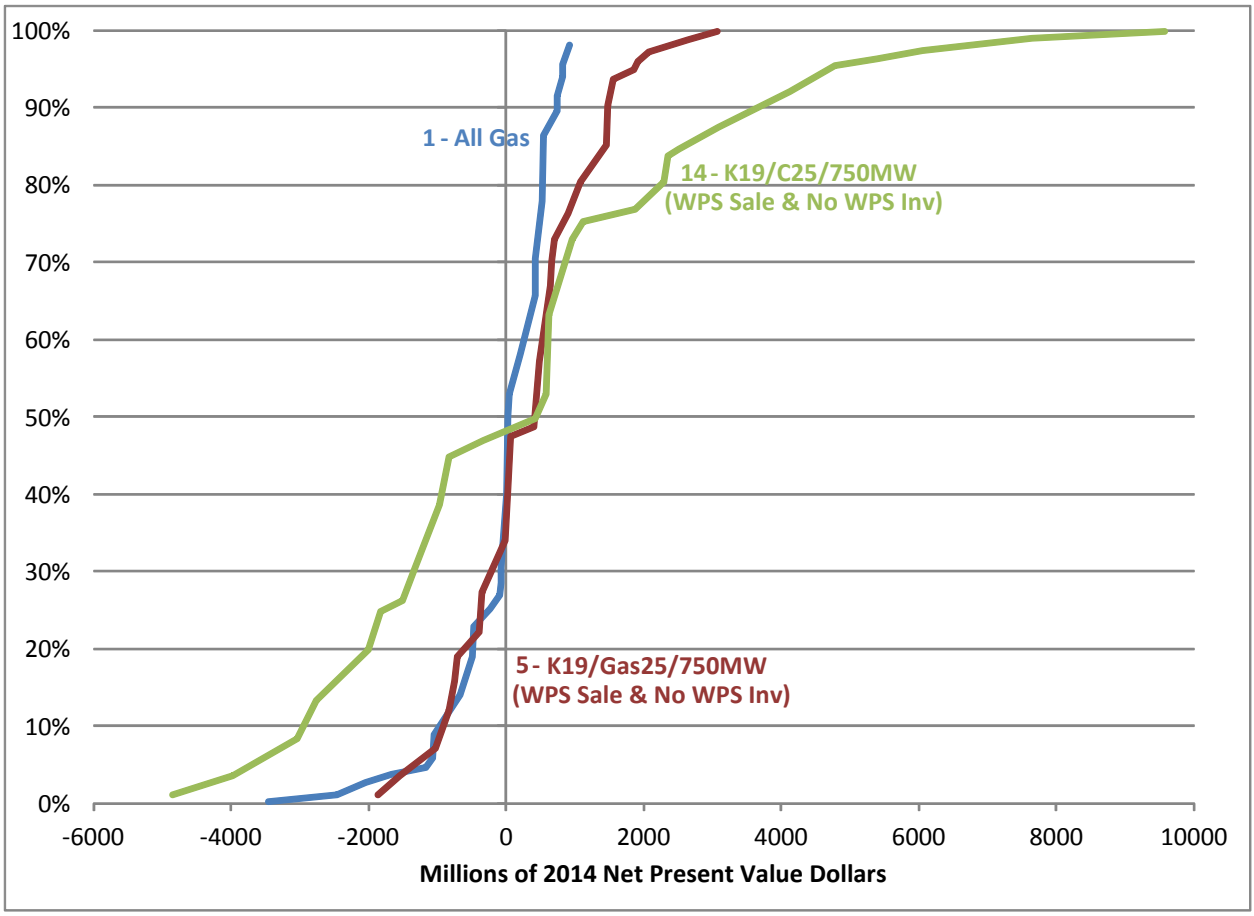
Development Plan			1	2	4	8	6	12	5	14
			All Gas	K22/Gas	K19/Gas24 /250MW	CCGT/C26	K19/Gas31 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
									WPS Sale & no WPS Inv	
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV Dollars							
Low	Low	H	-1062	-1401	-851	-1501	-1079	-2143	-758	-1825
		Ref	-68	16	646	106	392	-53	698	424
		L	734	1205	1898	1449	1613	1750	1906	2359
	Ref	H	-463	-1751	-1512	-2398	-1793	-3717	-1546	-3969
		Ref	208	-677	-334	-1085	-614	-1977	-355	-2010
		L	750	232	658	15	369	-476	637	-325
	High	H	-88	-1782	-1761	-2625	-2060	-4202	-1872	-4838
		Ref	416	-891	-748	-1480	-1033	-2668	-820	-3044
		L	823	-133	110	-519	-172	-1345	61	-1500
Ref	Low	H	-2033	-120	543	325	298	1410	-7	1869
		Ref	-1039	1296	2040	1932	1770	3501	1449	4118
		L	-237	2486	3292	3275	2991	5304	2658	6053
	Ref	H	-671	-585	-260	-910	-517	-1204	-707	-1345
		Ref	0	489	917	403	662	536	484	614
		L	542	1397	1910	1503	1645	2037	1477	2300
	High	H	17	-716	-620	-1343	-880	-2214	-1034	-2759
		Ref	520	175	393	-198	148	-680	18	-966
		L	927	933	1251	762	1008	643	899	578
High	Low	H	-3454	892	1647	2005	1333	4820	402	5388
		Ref	-2460	2309	3143	3612	2804	6911	1858	7638
		L	-1658	3498	4396	4955	4025	8714	3066	9573
	Ref	H	-1158	402	797	469	526	1178	-103	1125
		Ref	-487	1476	1974	1782	1704	2918	1088	3084
		L	55	2384	2967	2882	2687	4418	2081	4770
	High	H	-82	210	368	-156	115	-352	-384	-824
		Ref	422	1101	1381	989	1143	1182	669	969
		L	828	1859	2239	1949	2003	2505	1549	2513

Development Plan	1	2	4	8	6	12	5	14
	All Gas	K22/Gas	K19/Gas24 /250MW	CCGT/C26	K19/Gas31 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
							WPS Sale & no WPS Inv	
	Millions of 2014 NPV Dollars							
10th Percentile -"Risk"	-953	-862	-727	-1457	-1007	-2512	-909	-2946
25th Percentile	-244	-622	-290	-980	-556	-1482	-367	-1760
75th Percentile	483	1026	1339	916	1099	1232	824	1105
90th Percentile - "Reward"	738	1448	2019	1898	1749	3239	1475	3653
Expected Value	-9	268	651	143	386	115	268	120
Ref-Ref-Ref NPV	0	489	917	403	662	536	484	614

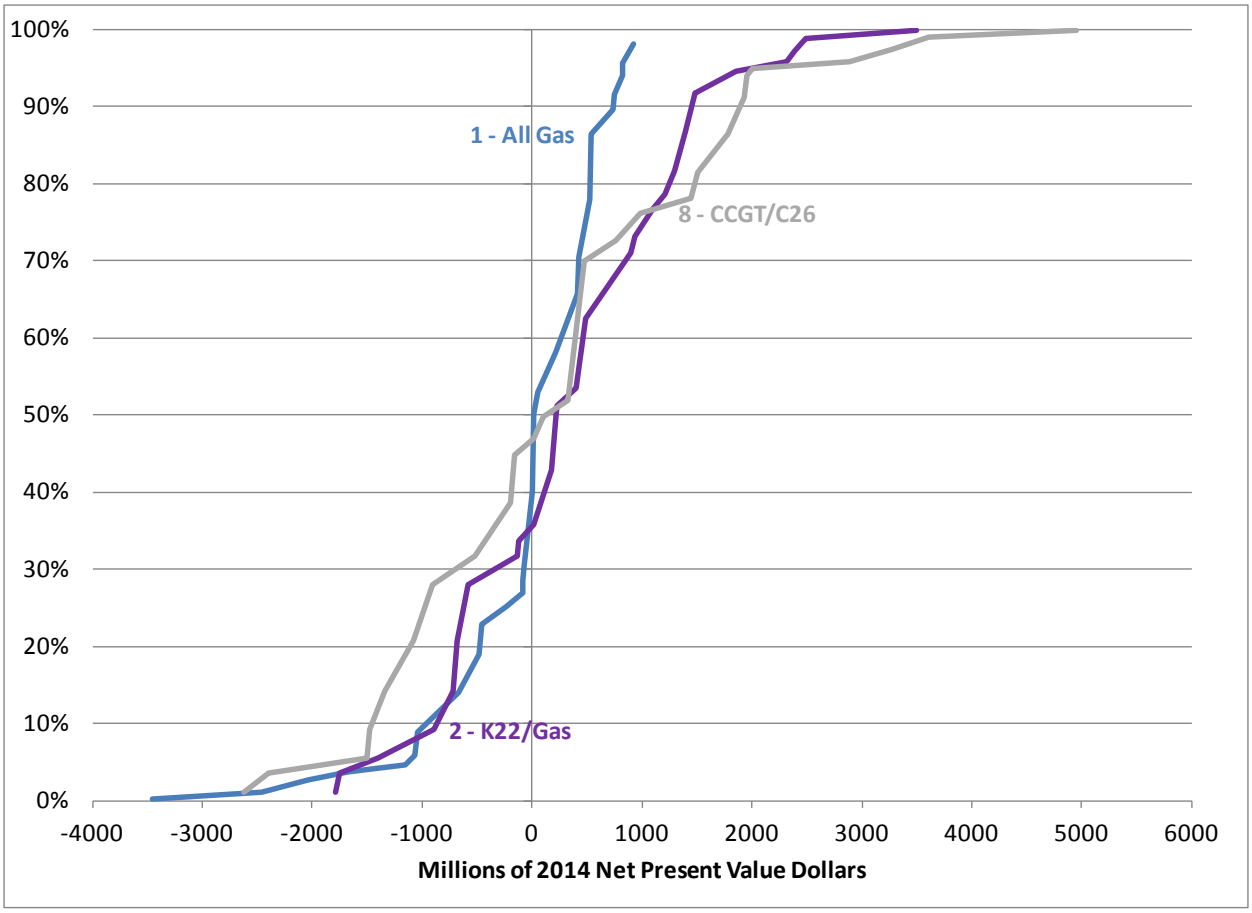
S-curves are provided below for the following four sets of comparisons:

1) Plan 1, Plan 5, Plan 14
2) Plan 1, Plan 2, Plan 8
3) Plan 1, Plan 2. Plan 6
4) Plan 1, Plan 6, Plan 8.

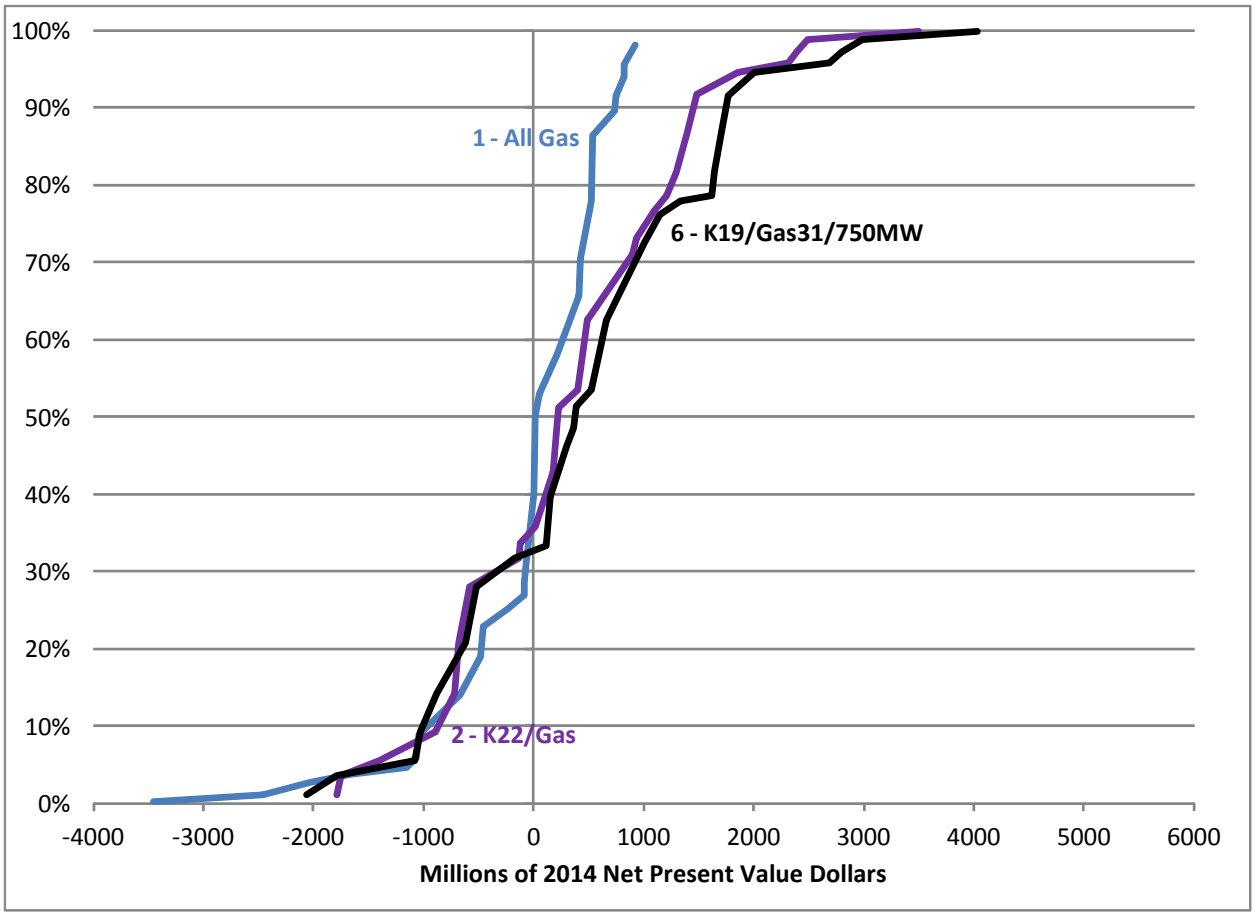
S-Curves - Plans 1, 5 and 14



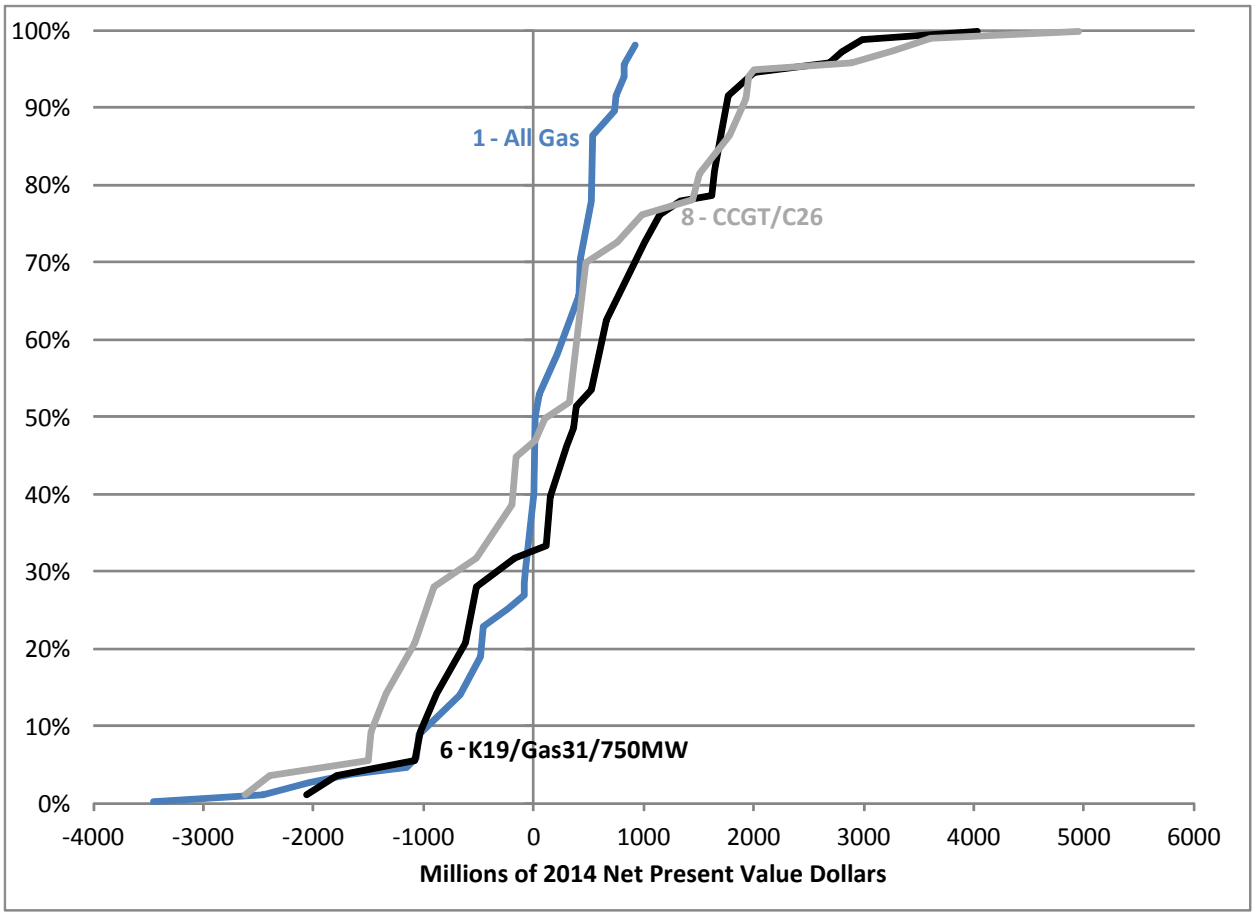
S-Curves - Plans 1, 2 and 8



S-Curves - Plans 1, 2 and 6



S-Curves - Plans 1, 6 and 8



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10 Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities

10.0 Chapter Overview

Despite efforts to understand and predict the future, it inherently remains uncertain. For decision making, including resource planning decisions, potential outcomes can directly and indirectly affect the impact of the alternatives considered and the choices made. The outcome of a wide range of economic, financial, social, technological and political events in both the near-term and the long-term is unpredictable. It is important to recognize uncertainty and identify the way forward that has the best balance of value and risk given that uncertainty.

Chapter 10 - Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities Section 1.0 introduces the concept of scenarios and presents extensive probabilistic analysis on 12 of the development plans with and without probabilities on the factors that have a high impact on the economics of the development plans.

While probabilistic analysis considers several key factors at once, sensitivity analysis focuses on a single variable that tests the impact of that variable on selected development plans. Section 2.0 provides sensitivity analysis on drought, climate change, load growth, and in-service delay. Through ***Chapter 10 - Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities*** it is recognized that there are many factors that are considered in formulating and analyzing development plans and uncertainty and risk associated with these factors.

As it would be a virtually endless task to study the effect of the uncertainty in each of the factors in depth, Section 3.0 provides a matrix which presents a framework in which uncertainties and risks associated with the development of resource options in Manitoba are summarized and are assessed either qualitatively or quantitatively.

Supporting information and additional detail for the analyses presented in this chapter is available in ***Appendix 9.3– Economic Evaluation Documentation.***

10.1 Probabilistic Analysis with Scenarios

10.1.1 Methodology

Probabilistic analysis considers the range of uncertainty defined by reference, high and low values on key factors which are formulated into scenarios. An assessment is done to determine which factors have the highest impact on the economic and financial outcomes. Probabilistic analysis will grow exponentially with each added factor and, therefore, in this submission it is based on three sets of factors. These sets of factors represent 1) the electricity market 2) investment costs and 3) the economy and, when combined, result in 27 individual scenarios for each development plan analyzed. As each combination of these factors does not have the same likelihood of occurring, probabilities for reference, high and low are applied to the factors and subsequently the weighted factors are applied to the development plans. The application of these probabilities results in a probabilistic comparison of development plans.

10.1.1.1 Determination of Highest Impact Factors

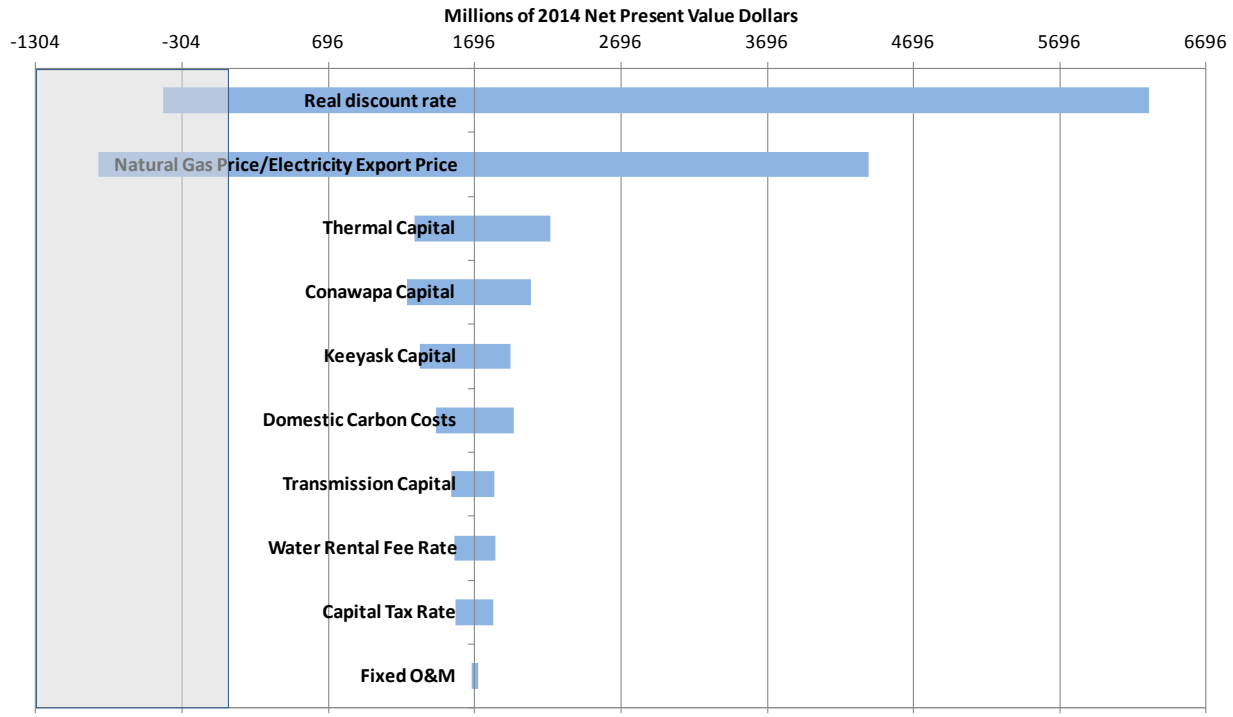
There are numerous inputs and assumptions that are required to formulate and analyze development plans. It would be an endless task to study the effect of uncertainty in each of the inputs and assumptions in depth and uncertainty in some factors is relatively unimportant. In order to focus attention on matters of significance, analysis was conducted to determine which of these factors have the greatest impact and require the most attention and, in turn, which factors have the least impact and do not require in-depth analysis.

In probabilistic analysis, each individual factor is varied from a plausible low value to a plausible high value. For the Needs For and Alternatives To (NFAT) economic evaluation, the impact of

this variation has been measured between the two development plans with the most significant difference in characteristics – the All Gas development plan and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)). One useful way of displaying this sensitivity information is a "tornado diagram."

Figure 10.1 is a tornado diagram which shows the impact of uncertainty in 10 individual factors; the length of each bar shows the impact of varying each factor from low to high. The "high impact" factors are electricity and natural gas prices, discount rate (representative of the cost of capital), and capital costs. "Low impact" factors include operating and maintenance (O&M) costs, and changes in water rental and capital tax rates. It is important to note that impact refers to the uncertainty in each factor not the factor itself. For example, this diagram does not indicate that O&M is itself relatively unimportant, simply that uncertainty within O&M is relatively unimportant. All else being equal, uncertainty analysis should be focused on the "high impact" factors. The grey area in Figure 10.1 indicates factors that can have a significant impact on the net present value (NPV), resulting in a net loss as opposed to a net benefit.

Figure 10.1 Tornado Diagram of Highest Impact Factors



10.1.1.2 Combinations of Highest Impact Factors

The high impact factors are grouped into three sets: Energy Prices, Capital Costs and Economic Indicators.

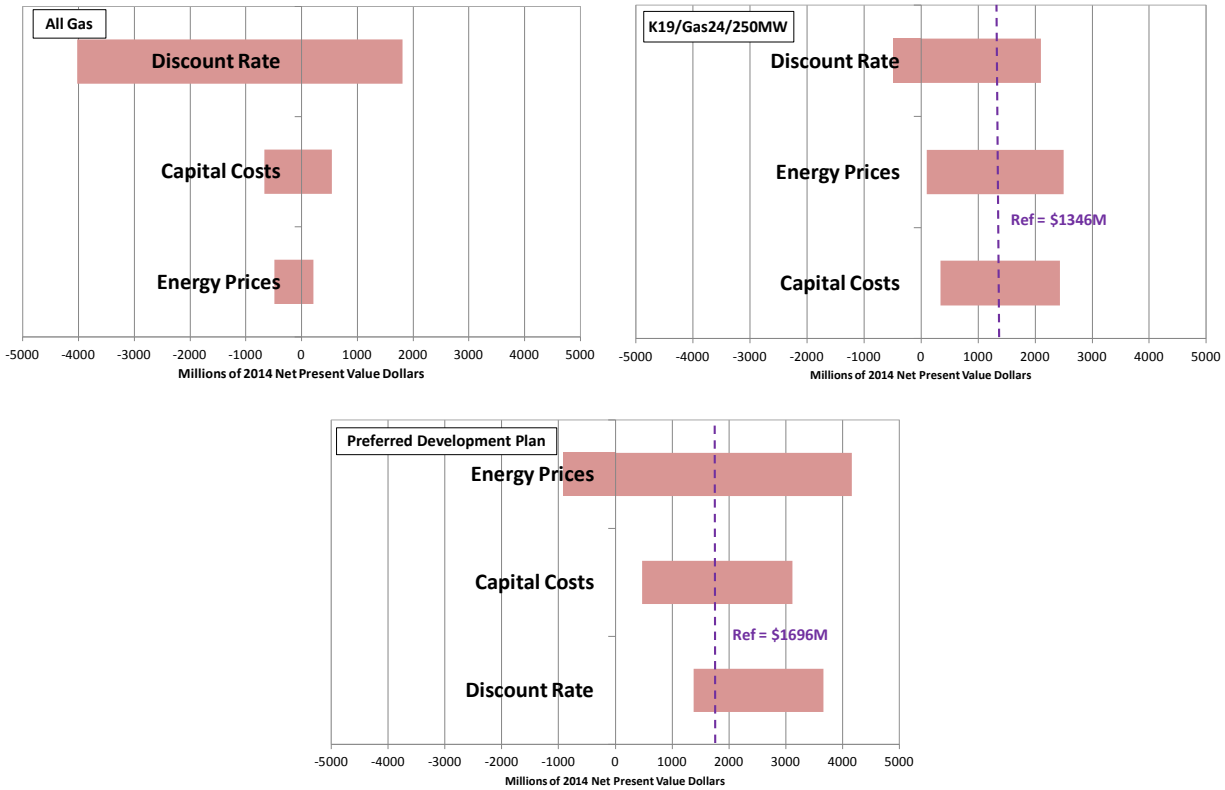
Energy Price factors consist of natural gas, electricity and carbon prices. Electricity export prices are a key factor in evaluating Manitoba Hydro's development plans. As described in ***Chapter 3 – Trends and Factors Influencing North American Electricity Supply***, natural gas is a significant factor in the determination of electricity prices in the North American market. The effect of natural gas prices on electricity export prices is embedded in Energy Prices as is the effect of carbon. Carbon prices are reflected in Energy Prices from two perspectives. One is the impact of carbon policy on electricity export prices in the Midcontinent Independent System Operator, Inc. (MISO) market and the other is the impact of a potential carbon adder on Manitoba based fossil fuel-fired generation.

Capital Cost factors include generation costs for all resource types, transmission costs and applicable real escalation. As more analysis on capital cost estimates is undertaken, the uncertainty range narrows.

Economic Indicators include U.S. and Canadian, short- and long-term interest rates, inflation rates including U.S. gross domestic product implicit price deflator, CAD/USD exchange rate, and Manitoba Hydro's real weighted average cost of capital. For economic uncertainty analysis the relevant Economic Indicator is the real weighted average cost of capital (discount rate).

Figure 10.2 provides a tornado diagram of the highest impact factors for a selection of development plans which are representative of a plan with no new large hydro resources, a plan with one new large hydro resource and a plan with two new large hydro resources. For each set of factors, the length of the bar in Figure 10.2 is indicative of the impact of the range of that factor on NPV.

Figure 10.2 Probabilistic Analysis – Tornado Diagram
Highest Impact Factors – All Gas, K19/Gas24/250MW
Preferred Development Plans



For the All Gas development plan, Figure 10.2 illustrates that the Discount Rate is the dominant factor and can result in a significant negative impact on incremental NPV. Over the long-term, the amount of natural gas-fired generation required to meet domestic load requirements increases significantly. These operating costs when combined with a low discount rate result in a significant downside risk and a negative impact on the incremental NPV. For the Preferred Development Plan, on a relative basis, the Discount Rate factor does not result in as significant an impact on incremental NPV. Unlike the All Gas development plan, it is the high discount rate that results in a negative impact on incremental NPV. This is primarily due to the impact of the capital intensive nature of large hydro-electric projects which have high upfront costs and which rely on revenue that occurs over the long-term.

For the Preferred Development Plan, the Energy Prices factor has the most significant impact on the incremental NPV due to the sale of large volumes of surplus power associated with the development of two large hydro-electric generating stations, exposing the Preferred Development Plan to the effect of changes in energy price.

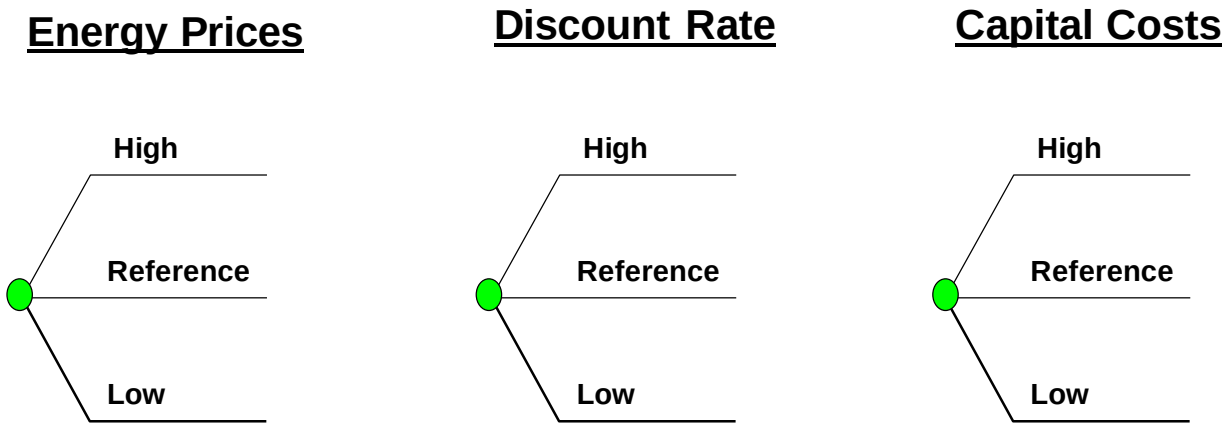
From an overall perspective, the Preferred Development Plan is most affected by the Energy Prices set of factors but still has significant exposure to the Discount Rate and Capital Cost sets of factors. The All Gas plan has exposure to the Discount Rate with narrow ranges of exposure to the Capital Cost and Energy Prices factors. For Plan 4 (K19/Gas24/250MW), because it has a mix of new gas and hydro resources, the impact of the three factors is moderated. The diversity provided by the mix of hydro-electric and natural gas-fired resources in the K19/Gas24/250MW development plan balances the effect of the factors and limits the significance of their effect on incremental NPV.

10.1.1.3 Development of Scenarios

In ***Chapter 9 – Economic Evaluations – Reference Scenario***, the reference scenario was presented as the "most likely" set of assumptions for evaluating development plans. Assumptions higher and lower than the reference assumptions are incorporated into the development of scenarios. The resulting scenarios represent all possible combinations of the high impact factors with the range of high, reference and low assumptions.

When combined, three sets of factors with the high, reference and low assumptions result in 27 discrete scenarios.

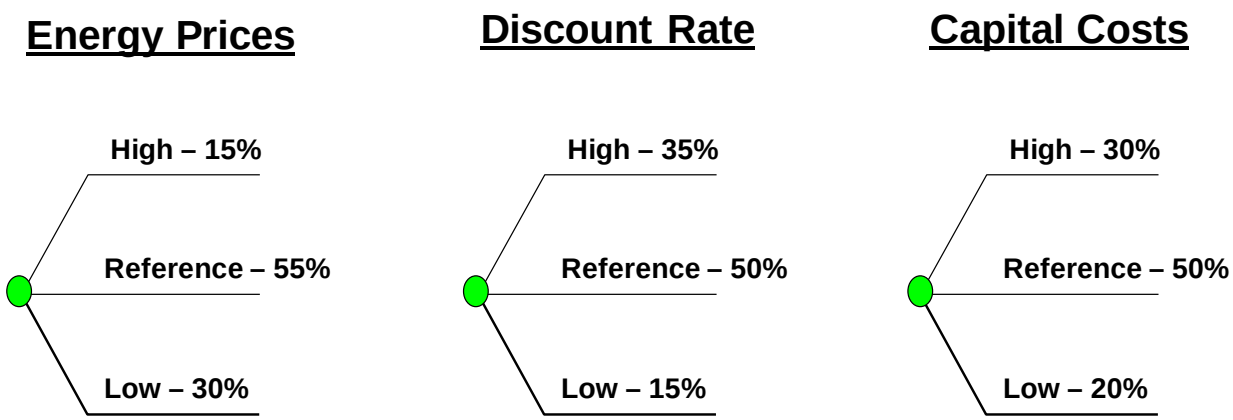
Figure 10.3 Combination of Highest Impact Factors



10.1.1.4 Probabilities for Scenarios

As each of the combinations of the highest impact factors do not have the same likelihood of occurring, probabilities were developed for each set of these factors as explained in ***Appendix 9.3 – Economic Evaluation Documentation***. Figure 10.4 provides the probabilities for each of the highest impact factors.

Figure 10.4 Probabilities for Highest Impact Factors



10.1.2 Inputs for Probabilistic Analysis with Scenarios

Chapter 9 – Economic Evaluations – Reference Scenario provided the economic analysis from the reference scenario perspective and determined which development plans that will be considered in the economic uncertainty analysis documented in this chapter. The reference scenario represents one view of the future. This section builds on the reference scenario economic analysis and considers the impact of uncertainty, using probabilistic analysis to compare the net benefits for the 12 development plans identified in ***Chapter 9 – Economic Evaluations – Reference Scenario***, Section 9.3.4.

The 12 development plans analyzed in this chapter are provided in Table 10.1.

Table 10.1 List of Twelve Development Plans for Probabilistic Analysis

Order of Capital Investment	Development Plan Short- Name	Description of Development Plan	
		U.S. Interconnection	Resources/Sales
1	All Gas	None	Natural Gas-Fired Generation starting in 2022/23
3	Wind/Gas		Wind Generation starting in 2022/23 supported by Natural Gas-Fired Generation starting in 2025/26
7	SCGT/C26		Simple Cycle Gas Turbines in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2038/39
2	K22/Gas		Keeyask 2022/23, Natural Gas-Fired Generation starting in 2029/30
4	K19/Gas24/250MW	250 MW export/50 MW import in 2020/21	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, 250 MW MP Sale
13	K19/C25/250MW		Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2040/41, 250 MW MP Sale
11	K19/C31/250MW		Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, Conawapa 2031/32, 250 MW MP Sale
6	K19/Gas31/750MW	750 MW import and export in 2020/21	Keeyask 2019/20, Imports, Natural Gas-Fired Generation starting in 2031/32, 250 MW MP Sale
15	K19/C25/750MW		Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 250 MW MP Sale
12	K19/C31/750MW		Keeyask 2019/20, Imports, Conawapa 2031/32, Natural Gas-Fired Generation starting in 2041/42, 250 MW MP Sale
5	K19/Gas25/750MW (WPS Sale & Inv[1])		Keeyask 2019/20, Natural Gas-Fired Generation starting in 2025/26, 250 MW MP Sale, proposed 300 MW WPS Sale
14 (Preferred Development Plan)	K19/C25/750MW (WPS Sale & Inv[1])		Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 250 MW MP Sale, proposed 300 MW WPS Sale

[1] Inv refers to WPS investment in the U.S. portion of the 750 MW interconnection facilities

Assumptions and forecasts for all of the scenarios were based on adjusted 2012 planning assumptions and are provided in ***Appendix 9.3 – Economic Evaluation Documentation***.

10.1.3 Analysis of Development Plans Using Scenarios

Table 10.2 provides the framework for comparing the 12 development plans under the 27 scenarios. The 12 development plans are listed across the top of the table. The 27 scenarios are shown in the three left-most columns and represent all possible combinations of the three sets of highest impact factors (3 Energy Prices x 3 Discount Rates x 3 Capital Costs = 27 scenarios). The 12 development plans combined with 27 scenarios result in 324 cases (12 development plans x 27 scenarios = 324 cases). The colour red indicates a negative NPV and the colour green indicates a positive NPV when assuming the All Gas Ref-Ref-Ref case is used as a single point base for comparison. The darkest colours of green represent an NPV that is equal to or greater than +$3,000 million and the darkest colours of red represent an NPV that is equal to or less than -$3,000 million. The colours become lighter as the NPV approaches zero. When all 324 cases are populated in the table and assigned a colour, the table resembles a patchwork quilt.

Table 10.2 Probabilistic Analysis - Quilt
Incremental Economics – Reference Scenario

Development Plan			1	3	7	2	4	13	11	6	15	12	5	14
			All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
													WPS Sale & Investment	
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV dollars											
Low	Low													
	Ref													
	High													
Ref	Low													
	Ref	Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696
	High													
High	Low													
	Ref													
	High													

Colour Legend: < -3000 | 0 | > 3000

The NPVs shown in Table 10.2 and identified as reference assumptions (Ref-Ref-Ref) for all three sets of factors — Energy Prices, Discount Rates, and Capital Costs — are incremental to the All Gas plan under reference assumptions. These reference assumptions are indicated by the "0" NPV for the All Gas Ref-Ref-Ref case. The NPVs shown in Table 10.2 are the same for each development plan as those shown in Table 9.9 in ***Chapter 9 – Economic Evaluations - Reference Scenario.***

The reference scenario (Ref-Ref-Ref) only represents one view of the future, which we know is uncertain. The Ref-Ref-Ref scenario represents the "most likely" future. Table 10.3 introduces two additional scenarios where the range of Energy Prices is shown in the scenarios Low-Ref-Ref (low Energy Prices, reference Discount Rates, and reference Capital Costs) and High-Ref-Ref (high Energy Prices, reference Discount Rates, and reference Capital Costs).

Table 10.3 Probabilistic Analysis – Quilt
Incremental Economics Range of Energy Prices

Development Plan			1	3	7	2	4	13	11	6	15	12	5	14
			All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
													WPS Sale & Investment	
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV dollars											
Low	Low													
	Ref	Ref	208	-1478	-582	-278	95	-1368	-1050	-185	-1559	-1153	257	-929
	High													
Ref	Low													
	Ref	Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696
	High													
High	Low													
	Ref	Ref	-487	-189	1956	1874	2403	3888	3420	2134	4250	3741	1701	4166
	High													

Colour Legend: < -3000 | 0 | > 3000

Table 10.3 demonstrates how the incremental NPVs for development plans are affected by changes in the Energy Prices set of factors. The All Gas Ref-Ref-Ref case is used as a fixed base for comparing each development plan in the context of each of the 27 scenarios and is indicated by the "0" NPV. An improvement in NPV is reflected by the shade of red becoming lighter or the shade of green becoming darker with a reduction in NPV having the opposite effect. The comparison of the Low-Ref-Ref scenario of all development plans to the All Gas Ref-Ref-Ref case shows the impact on the incremental NPV due to the decrease in the Energy Prices factor. Similarly, the comparison of the High-Ref-Ref scenario for all development plans to the All Gas Ref-Ref-Ref case shows the impact on the incremental NPV due to the increase in the Energy Prices factor. In this way, Table 10.3 provides a measure of relative performance between each of the 12 development plans and the All Gas Ref-Ref-Ref case for the three scenarios identified: Low-Ref-Ref, Ref-Ref-Ref, and High-Ref-Ref.

Table 10.4 Probabilistic Analysis Quilt
Incremental Economics – All Scenarios

Development Plan			1	3	7	2	4	13	11	6	15	12	5	14
			All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
													WPS Sale & Investment	
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV dollars											
Low	Low	H	-4043	-7769	-3309	-3792	-3190	-3459	-3506	-3418	-3642	-3554	-2855	-2841
		Ref	-3049	-5403	-2401	-2532	-1877	-2124	-2166	-2130	-2177	-2138	-1616	-1410
		L	-2247	-3666	-1655	-1590	-890	-1069	-1099	-1175	-1030	-1022	-703	-292
	Ref	H	-463	-3056	-1297	-1212	-911	-2510	-2161	-1191	-2816	-2323	-730	-2155
		Ref	208	-1478	-582	-278	95	-1368	-1050	-185	-1559	-1153	257	-929
		L	750	-323	6	408	837	-473	-176	548	-585	-243	974	20
	High	H	1204	-796	-284	25	117	-2029	-1413	-182	-2383	-1622	203	-1810
		Ref	1708	384	323	785	963	-994	-434	679	-1243	-592	1060	-698
		L	2114	1245	822	1336	1580	-189	327	1297	-364	201	1674	157
Ref	Low	H	-5014	-7167	-1760	-2511	-1796	206	-334	-2041	498	0	-2103	853
		Ref	-4020	-4802	-852	-1251	-482	1541	1006	-753	1963	1415	-865	2284
		L	-3217	-3064	-107	-309	504	2597	2073	202	3110	2531	49	3402
	Ref	H	-671	-2354	23	-46	341	152	104	85	170	190	109	470
		Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696
		L	542	380	1326	1573	2089	2189	2089	1824	2401	2270	1813	2645
	High	H	1308	-82	879	1091	1258	109	391	998	2	366	1041	268
		Ref	1812	1098	1487	1851	2104	1144	1370	1859	1143	1396	1898	1380
		L	2218	1959	1986	2402	2721	1949	2132	2478	2022	2189	2512	2235
High	Low	H	-6435	-6719	-355	-1499	-692	3819	2796	-1006	4455	3410	-1694	4372
		Ref	-5441	-4353	552	-239	621	5154	4135	282	5921	4826	-456	5803
		L	-4638	-2616	1298	703	1607	6210	5203	1237	7068	5941	458	6922
	Ref	H	-1158	-1767	1241	941	1398	2746	2308	1127	2993	2571	713	2940
		Ref	-487	-189	1956	1874	2403	3888	3420	2134	4250	3741	1701	4166
		L	55	966	2543	2560	3146	4783	4293	2867	5225	4652	2417	5115
	High	H	1210	533	1956	2017	2246	2170	2127	1993	2236	2228	1691	2203
		Ref	1713	1712	2563	2777	3092	3206	3106	2854	3377	3259	2549	3315
		L	2120	2573	3063	3328	3709	4010	3867	3473	4256	4051	3163	4170

Colour Legend: < -3000 | 0 | > 3000

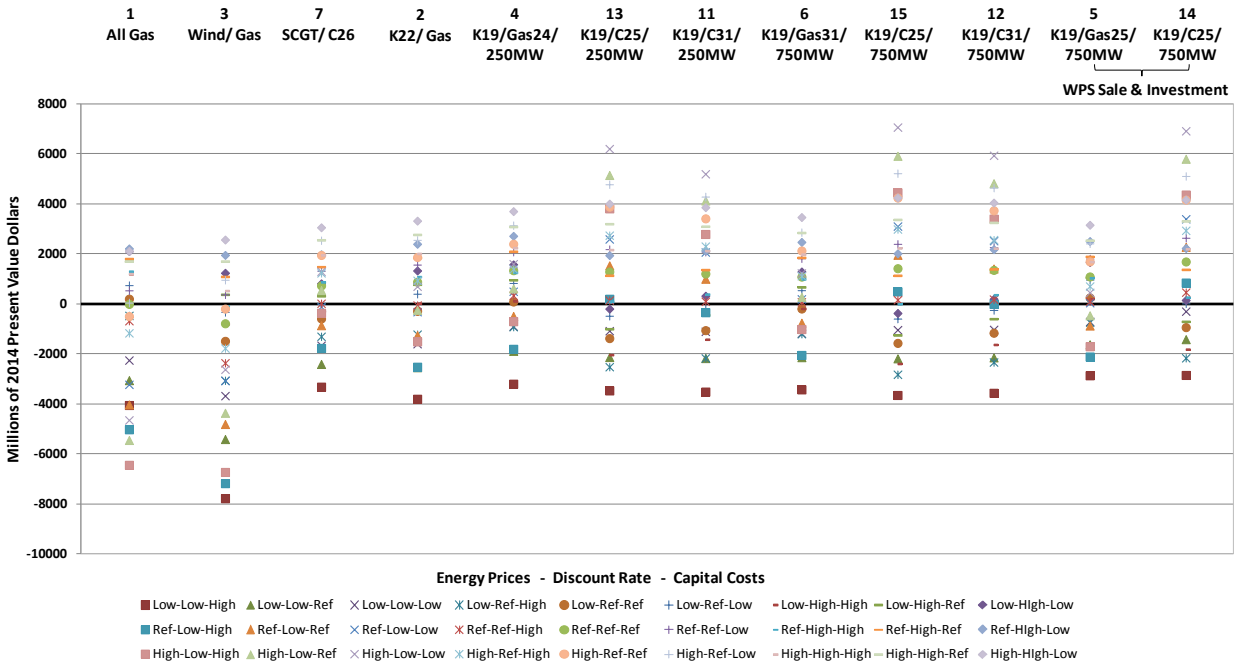
Table 10.4 populates the table with all 324 cases. The purpose of the table is to provide a visual representation of the development plans over the 27 future scenarios. As stated previously, the All Gas Ref-Ref-Ref case is used as a single point base for comparing each development plan in the context of each of the 27 scenarios and is indicated by the "0" NPV for the All Gas Ref-Ref-Ref case. In this type of analysis, NPVs for a development plan provide a measure of the relative performance between that development plan and the All Gas Ref-Ref-Ref case.

The development plan evaluations are categorized as follows:

- development plans with no new U.S. interconnection designed to serve only Manitoba load and existing export commitments
- development plans with a 250 MW U.S. interconnection
- development plans with a 750 MW U.S. interconnection
- comparison of development plans across categories.

Figure 10.5 is a scatter plot that provides the same incremental NPVs as in Table 10.4 but graphically displays the range of incremental NPVs by development plans. It demonstrates that the rank of a particular scenario will not be the same in all development plans. Figure 10.5 confirms the insights drawn from the Table 10.4 quilt. The All Gas plan and the Wind/Gas plan have more downside risk and less upside potential than the other development plans, by hundreds of millions of dollars. The other development plans without an interconnection have modest downside risk and upside potential. The development plans with an interconnection have modest downside risk and varying degrees of upside potential, again, differences of hundreds of millions of dollars.

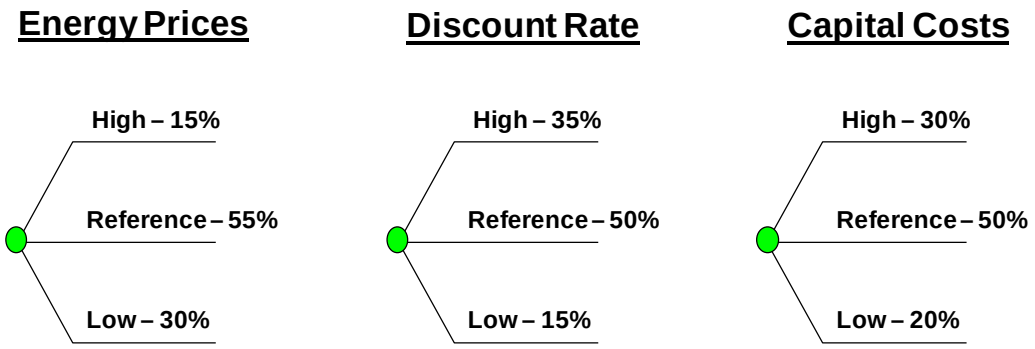
Figure 10.5 Probabilistic Analysis – Scatter Plot
Incremental Economics – All Scenarios



10.1.4 Probabilistic Analysis

As indicated in Section 10.1.1.4, each of the scenarios does not have the same likelihood of occurring and therefore probabilities were developed for each of the sets of these factors. Figure 10.6 repeats the illustration previously introduced in Section 10.1.1.4 and provides the probabilities for each of the highest impact factors.

Figure 10.6 Probabilities for Highest Impact Factors



As Table 10.5 shows, all plans have a substantial range of outcomes which vary from substantially worse than the baseline outcome (All Gas Ref-Ref-Ref case) to substantially better than the baseline outcome. The degree and direction of this variation differs from plan to plan. Both the All Gas and Wind/Gas development plans appear to have the most downside risk as there are more scenarios showing red. Plans with a 250 MW or 750 MW interconnection appear to have the most upside potential as there are more scenarios showing green.

The expected values, provided in Table 10.6, are weighted-average NPVs for each development plan. The information in Table 10.5 is the basis for the determination of the expected value for each development plan when combined with the probabilities provided in Figure 10.6.

Expected value is calculated for each development plan by taking the sum of the NPVs multiplied by their appropriate scenario probabilities listed on the right-most column of the table (see ***Appendix 9.3 - Economic Evaluation Documentation*** for more information on calculating expected value).

Table 10.5 Probabilistic Analysis Quilt – Single Point Base
Incremental Economics – All Scenarios

Development Plan			1	3	7	2	4	13	11	6	15	12	5	14	
			All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW	
													WPS Sale & Investment		
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV dollars												Probabilities
Low	Low	H	-4043	-7769	-3309	-3792	-3190	-3459	-3506	-3418	-3642	-3554	-2855	-2841	1.35%
		Ref	-3049	-5403	-2401	-2532	-1877	-2124	-2166	-2130	-2177	-2138	-1616	-1410	2.25%
		L	-2247	-3666	-1655	-1590	-890	-1069	-1099	-1175	-1030	-1022	-703	-292	0.90%
	Ref	H	-463	-3056	-1297	-1212	-911	-2510	-2161	-1191	-2816	-2323	-730	-2155	4.50%
		Ref	208	-1478	-582	-278	95	-1368	-1050	-185	-1559	-1153	257	-929	7.50%
		L	750	-323	6	408	837	-473	-176	548	-585	-243	974	20	3.00%
	High	H	1204	-796	-284	25	117	-2029	-1413	-182	-2383	-1622	203	-1810	3.15%
		Ref	1708	384	323	785	963	-994	-434	679	-1243	-592	1060	-698	5.25%
		L	2114	1245	822	1336	1580	-189	327	1297	-364	201	1674	157	2.10%
Ref	Low	H	-5014	-7167	-1760	-2511	-1796	206	-334	-2041	498	0	-2103	853	2.48%
		Ref	-4020	-4802	-852	-1251	-482	1541	1006	-753	1963	1415	-865	2284	4.13%
		L	-3217	-3064	-107	-309	504	2597	2073	202	3110	2531	49	3402	1.65%
	Ref	H	-671	-2354	23	-46	341	152	104	85	170	190	109	470	8.25%
		Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696	13.75%
		L	542	380	1326	1573	2089	2189	2089	1824	2401	2270	1813	2645	5.50%
	High	H	1308	-82	879	1091	1258	109	391	998	2	366	1041	268	5.78%
		Ref	1812	1098	1487	1851	2104	1144	1370	1859	1143	1396	1898	1380	9.63%
		L	2218	1959	1986	2402	2721	1949	2132	2478	2022	2189	2512	2235	3.85%
High	Low	H	-6435	-6719	-355	-1499	-692	3819	2796	-1006	4455	3410	-1694	4372	0.68%
		Ref	-5441	-4353	552	-239	621	5154	4135	282	5921	4826	-456	5803	1.13%
		L	-4638	-2616	1298	703	1607	6210	5203	1237	7068	5941	458	6922	0.45%
	Ref	H	-1158	-1767	1241	941	1398	2746	2308	1127	2993	2571	713	2940	2.25%
		Ref	-487	-189	1956	1874	2403	3888	3420	2134	4250	3741	1701	4166	3.75%
		L	55	966	2543	2560	3146	4783	4293	2867	5225	4652	2417	5115	1.50%
	High	H	1210	533	1956	2017	2246	2170	2127	1993	2236	2228	1691	2203	1.58%
		Ref	1713	1712	2563	2777	3092	3206	3106	2854	3377	3259	2549	3315	2.63%
		L	2120	2573	3063	3328	3709	4010	3867	3473	4256	4051	3163	4170	1.05%

Colour Legend: < -3000 | 0 | > 3000

Table 10.6 Probabilistic Analysis – Expected Values
Incremental Economics – All Scenarios

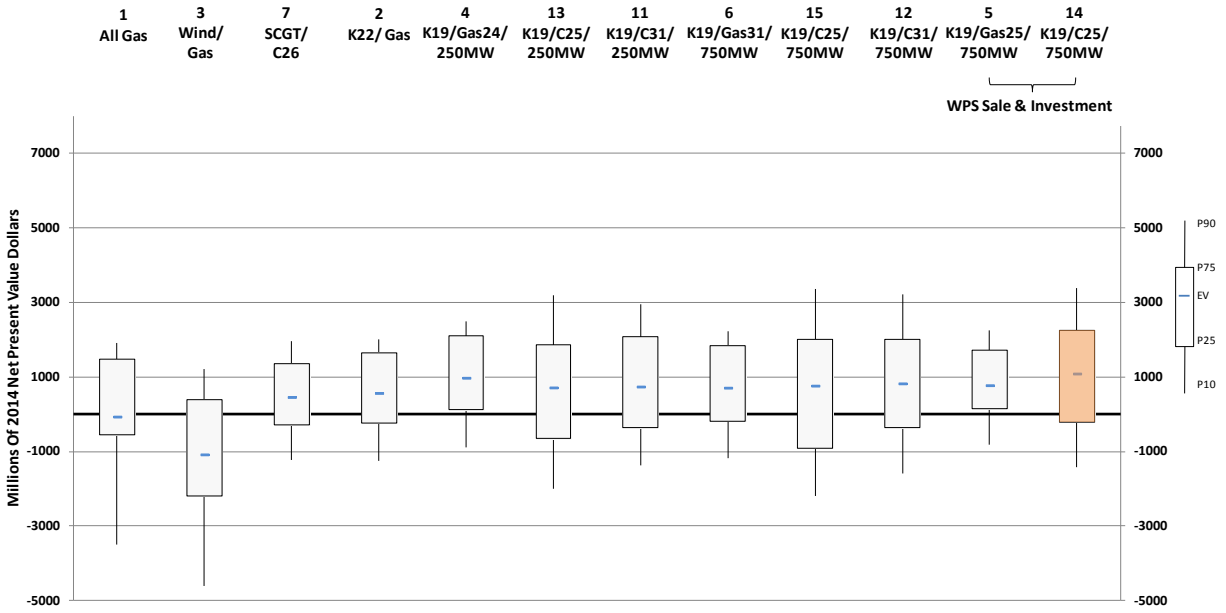
Development Plan	1	3	7	2	4	13	11	6	15	12	5	14
	All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
											WPS Sale & Investment	
	Millions of 2014 NPV dollars											
10th Percentile -"Risk"	-3502	-4599	-1217	-1249	-898	-1988	-1362	-1181	-2186	-1594	-828	-1429
25th Percentile	-560	-2200	-297	-248	115	-650	-363	-183	-904	-361	139	-204
75th Percentile	1481	383	1363	1636	2092	1854	2074	1832	2008	2009	1726	2255
90th Percentile - "Reward"	1905	1209	1956	2007	2479	3180	2953	2215	3360	3220	2256	3377
Expected Value	-70	-1084	455	564	971	712	736	706	760	821	772	1085
Ref-Ref-Ref NPV	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696

The expected values, or weighted-average NPVs, incorporate the uncertainty associated with the highest impact factors represented in the scenarios. For example, the reference scenario economics provided in ***Chapter 9 – Economic Evaluations – Reference Scenario*** used a single un-weighted scenario (Ref-Ref-Ref) with a resulting incremental NPV of $1,696 million for the Preferred Development Plan (Plan 14) as compared to the All Gas development plan. For this same comparison using expected value economics, the incremental NPV is $1,155 million ($1,085 minus -$70, as shown in Table 10.6). Table 10.6 shows that the incremental expected

value for the Preferred Development Plan (Plan 14) is higher than the expected value for all other development plans.

Figure 10.7 provides a box plot which is another method to visualize the range of NPVs for the different development plans being considered. While a scatter plot does not give an indication of the relative likelihood of the NPVs, the box plot is based on the same NPV information used to develop the NPVs presented in Table 10.5, and uses the probabilities provided in Figure 10.6 to produce a probability distribution. The probability distribution is then used to develop the percentiles shown in Table 10.6 and create the "box and whiskers" chart shown in Figure 10.7. The box is defined by the 25th and 75th percentiles and the whiskers are defined by the 10th and 90th percentiles. The expected value is demarked by the dash inside the box. For greater clarity, at the 90th percentile (P90) there is a 10% chance of being greater than the P90 NPV or a 90% chance of being lower than the P90 NPV.

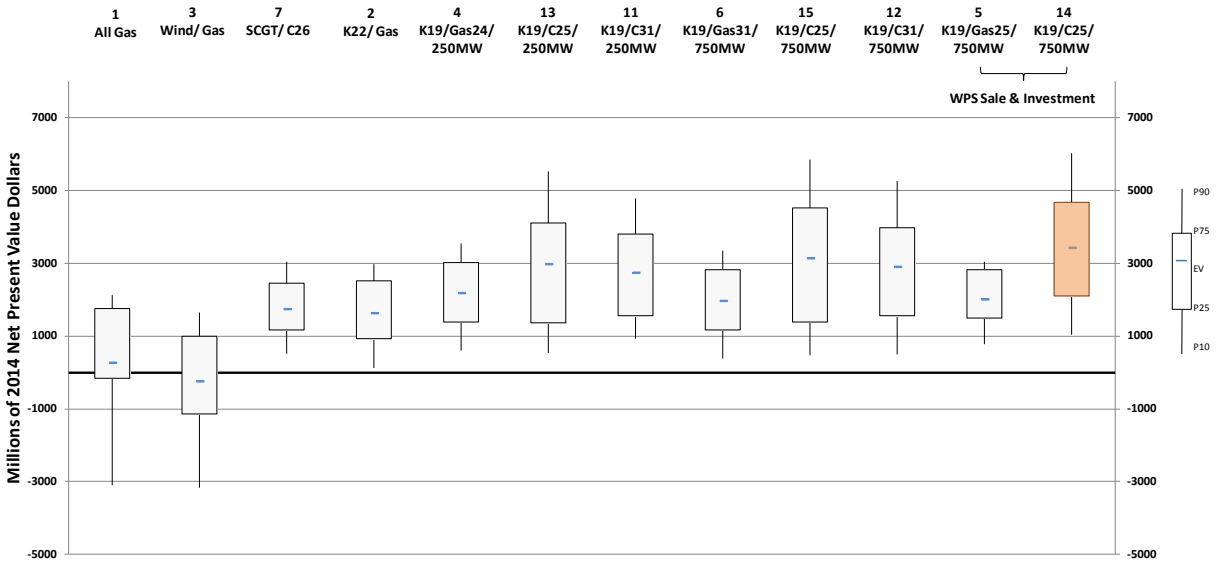
Figure 10.7 Probabilistic Analysis – Box Plot
Incremental Economics – All Scenarios



The "0" on the y-axis is the basis for comparison and represents the All Gas Ref-Ref-Ref case. The smaller the size of the box (between the 25th and 75th percentiles) the less variability a

development plan has, and the shorter the "whiskers" the lower the risk and the lower the upside potential. For example, Plan 5 has a smaller box and shorter whiskers than the Preferred Development Plan (Plan 14): this indicates that the Preferred Development Plan has greater variability but has more upside potential. The long whiskers between the 10th and 25th percentiles on the All Gas and Wind/Gas plans indicate a significant downside risk for these plans. Figure 10.7 adds further confirmation to the earlier observations. The All Gas and Wind/Gas plans are relatively low value and high risk. The other plans without an interconnection are low value and low risk. The plans with an interconnection are generally higher value with low to moderate risk, while the ranking among the various interconnection plans represents a value/risk trade-off.

Figure 10.8 Probabilistic Analysis – Box Plot with Transfers to the Province Incremental Economics –All Scenarios



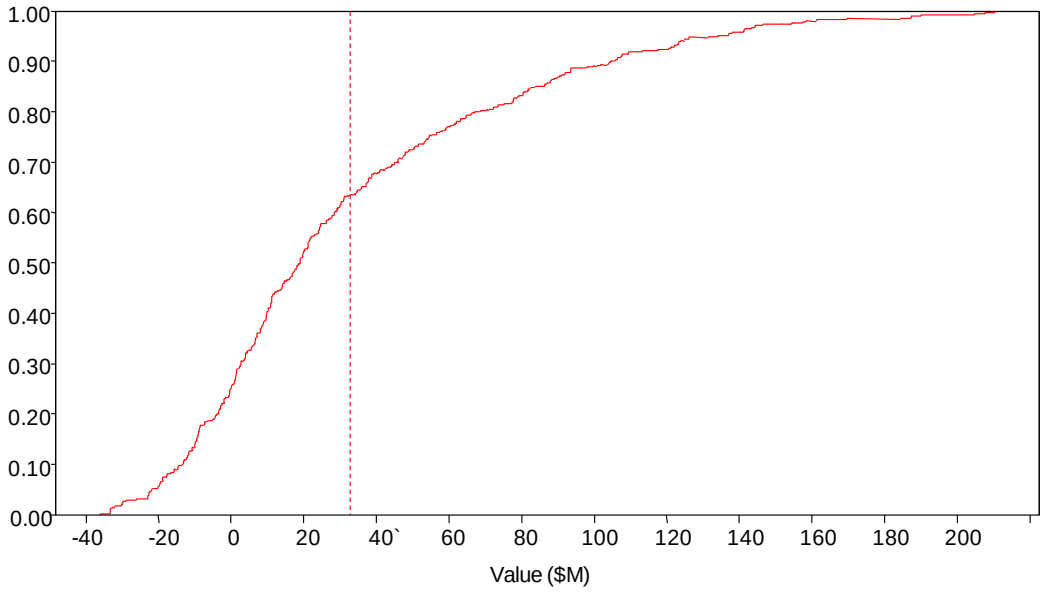
As discussed in ***Chapter 9 – Economic Evaluations – Reference Scenario***, Section 9.3.3, cash transfers to the Province were calculated for each development plan as additional economic benefits. The cash transfers are water rentals, capital taxes and the debt guarantee fee and they benefit the provincial government and indirectly Manitoba taxpayers. The cash transfers to the Province increase the net benefits of all development plans as shown by the higher

expected values in Figure 10.8 as compared to similar values without the cash transfers in Figure 10.7. It has been determined that the higher the capital cost of the development plan the greater the cash transfers to the Province. Development plans with one hydro-electric resource will have a greater increase in net benefits than development plans with no hydro-electric resources. As well, the development plans with two hydro-electric resources will have a greater increase in net benefits than development plans with one hydro-electric resource. This reflects the capital intensive nature of hydro project development.

10.1.4.1 Probabilistic Analysis: Understanding S-Curves

Probabilistic information is often displayed in the form of a cumulative distribution function, called an s-curve or risk profile. The risk profile displays the full range of values associated with an individual alternative in a compact, understandable, graphic format that is suitable for answering a variety of questions about value, risk and opportunity.

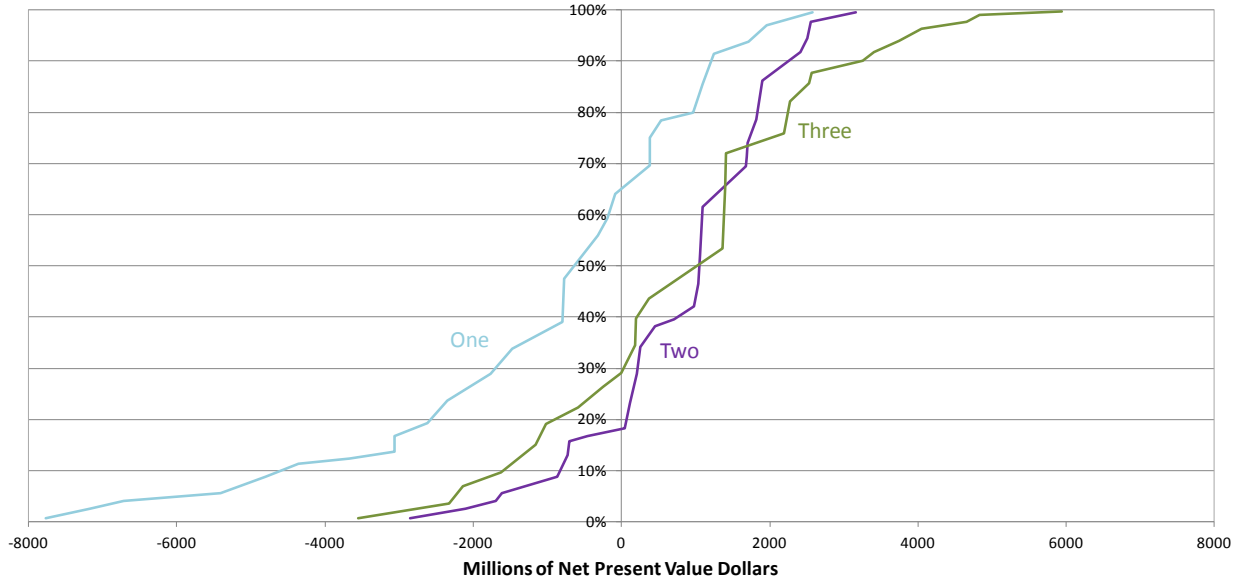
Figure 10.9 Sample S-Curve



The risk profile contains a wealth of useful information. Figure 10.9 provides a sample s-curve. The risk profile clearly shows the range of possible outcomes, from a loss of more than $30 million to a gain of more than $200 million. It also shows that there is roughly a 25% chance

that the value is less than 0; that is, that the investment results in a loss or failure. There is roughly a 90% chance that the value is less than $100 million, meaning that there is a 10% chance that the value is more than $100 million; indicating that the investment has a 10% probability of being highly successful. Consequently, it can be determined that there is a 65% (90% less 25%) chance that the value lies between $0 million and $100 million, a modest success. At the 50th percentile or median point, there is a 50% chance that the value is less than (or greater than) $20 million. The expected value or mean can also be determined from the risk profile, although it requires additional processing. In Figure 10.9, the expected value is indicated by the dotted line at roughly $35 million—it is the value represented by the line where the roughly triangular areas to the lower left and upper right are equal.

Figure 10.10 Sample S-curve Comparison



Risk profiles are generally most useful for comparing alternatives. Figure 10.10 shows three risk profiles on the same scale. Based on the risk profiles, alternative One is "dominated" by alternatives Two and Three; that is, alternative One is strictly to the left of (or worse than) alternatives Two and Three. Therefore, no matter what target dollar value is selected, it is less likely that alternative One will achieve that target than alternatives Two or Three. Alternative One is also much more likely to result in a loss (roughly an 80% chance) than alternatives Two

or Three (roughly a 30% chance). Given these observations, it is difficult to support alternative One.

The choice between alternatives Two and Three is more difficult. Alternative Two has a slightly steeper risk profile than alternative Three; this means that the range of values with alternative Two is smaller than alternative Three. One consequence is that alternative Two has less "downside risk" than alternative Three. Similarly, alternative Two has less "upside opportunity" than alternative Three. Alternative Three has a slightly higher expected value than alternative Two, so the choice is effectively a risk-return trade-off issue. Alternative Two has less risk than alternative Three, but a lower expected value. Alternative Three has higher expected value than alternative Two, but more risk.

10.1.4.2 Probabilistic Analysis: S-Curves

In this section, development plans are compared within each category as described in Section 10.1.3 and across all categories based on economic benefits to Manitoba Hydro using expected value, risk profiles (downside risk and upside opportunity) and the reference (most likely) scenario. In subsequent chapters, further comparisons are made incorporating financial and "multiple-account" impacts.

The comparisons in this section draw out the differences between the plans, as some of the plans have expected values that are within the same order of magnitude but may have different risk profiles. A table which provides the incremental NPV for the Ref-Ref-Ref scenario, the expected value and the 10th and 90th percentile values for each development plan, is included on each s-curve figure.

The development plans being evaluated are categorized as follows:

- development plans with no new U.S. interconnection designed to serve only Manitoba load and existing export commitments
- development plans with a 250 MW U.S. interconnection
- development plans with a 750 MW U.S. interconnection
- comparison of development plans across categories.

Within the comparison of plans across the categories, comparisons were made to demonstrate the difference between pursuing:

- plans with a 250 MW interconnection or a 750 MW interconnection
- plans with and without the proposed 300 MW WPS sale and related investment in the 750 MW interconnection
- plans with and without Conawapa generating station (G.S.).

Development Plans with No New U.S. Interconnection - Four Plans

Figure 10.11 displays the four plans in the "Manitoba Load" category that were evaluated: All Gas, Wind/Gas, K22/Gas and SCGT/C26. The expected values for the four plans are: $70 million, $1,084 million, $564 million and $455 million, respectively. With the exception of the Wind/Gas Plan, the plans all have similar upside potential above the 60th percentile. The Wind/Gas plan has the greatest downside risk and the least upside potential when compared to the other three plans and results in an expected value that is significantly lower than the other three plans at $1,084 million. The Wind/Gas plan is less economic than that of the All Gas plan due to the greater capital cost of the Wind/Gas plan. Both plans require the same level of natural gas-fired generation to meet increases in system peak loads. The Wind/Gas plan has the additional cost of the wind turbines and the fuel savings associated with the wind generation is not sufficient to offset these increased costs. With the increased capital cost, the Wind/Gas plan is more sensitive to lower discount rates. As shown in Figure 10.11, the All Gas plan lies to the right of the Wind/Gas plan, clearly dominating the Wind/Gas plan.

While the All Gas plan dominates the Wind/Gas plan, it has a significantly greater downside potential than the K22/Gas and SCGT/C26 plans due to the greater proportion of thermal generation, particularly under low discount rate scenarios. Therefore, on the basis of the expected values and the risk profile, it can be concluded that the All Gas and Wind/Gas plans are effectively dominated, making both inferior to K22/Gas and SCGT/C26.

Figure 10.11 Probabilistic Analysis: S-Curves
Plans With No New Interconnection

Development Plan	1	3	7	2
	All Gas	Wind/Gas	SCGT/C26	K22/Gas
Millions of 2014 NPV dollars				
Ref-Ref-Ref NPV	0	-775	738	887
P10 - "Risk"	-3502	-4599	-1217	-1249
P90 - "Reward"	1905	1209	1956	2007
Expected Value	-70	-1084	455	564

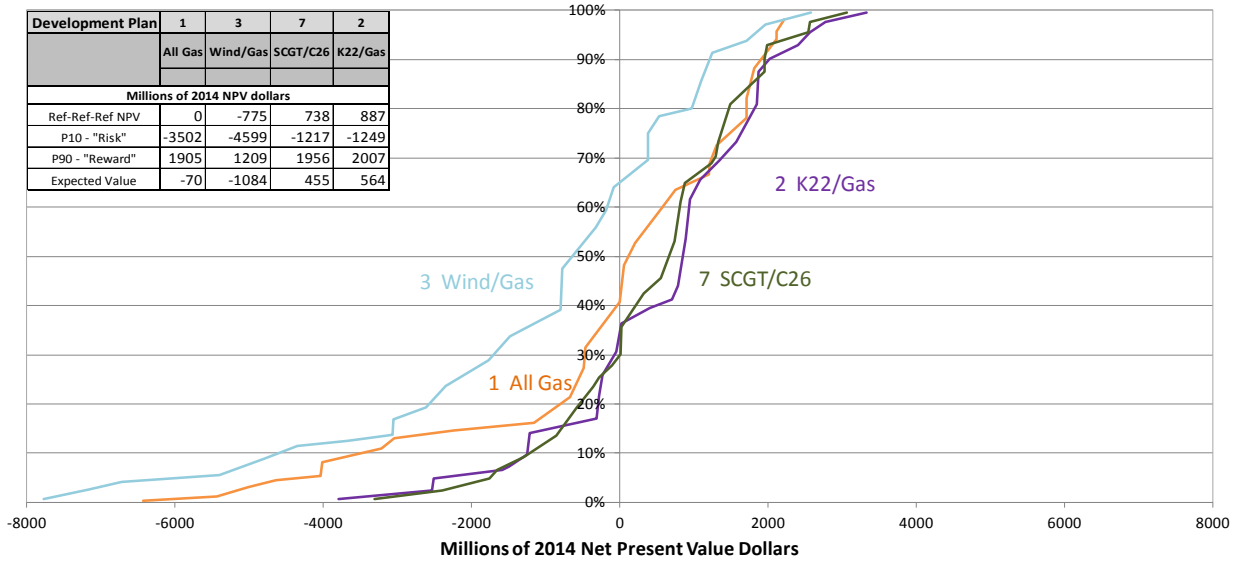
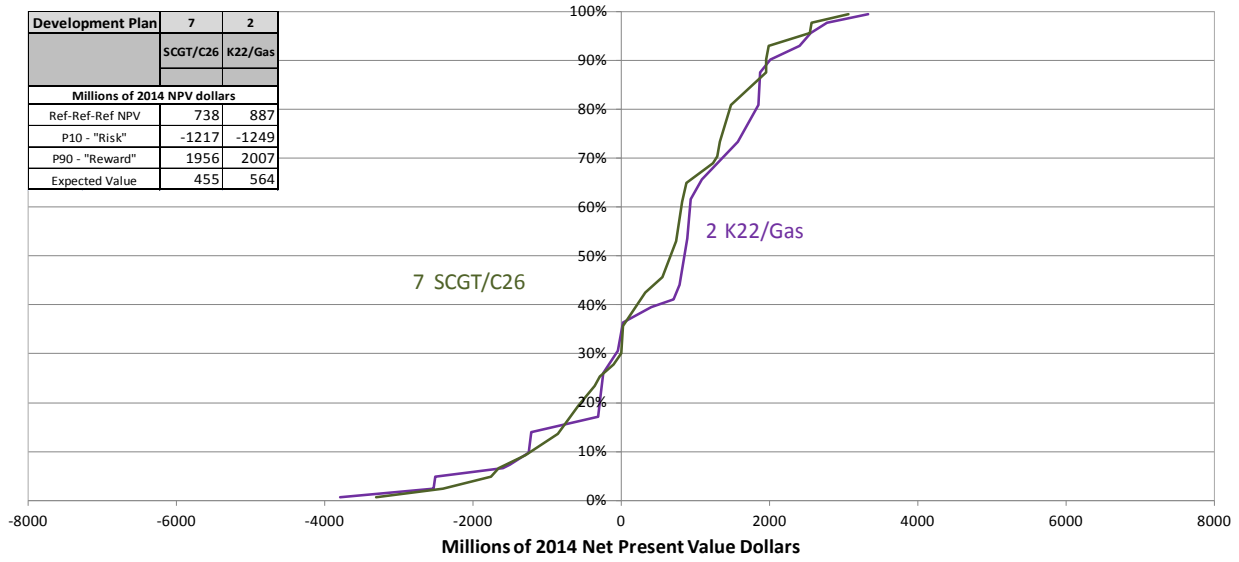


Figure 10.12 Probabilistic Analysis: S-Curves
K22/Gas and SCGT/C26 Plans

Development Plan	7	2
	SCGT/C26	K22/Gas
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	738	887
P10 - "Risk"	-1217	-1249
P90 - "Reward"	1956	2007
Expected Value	455	564



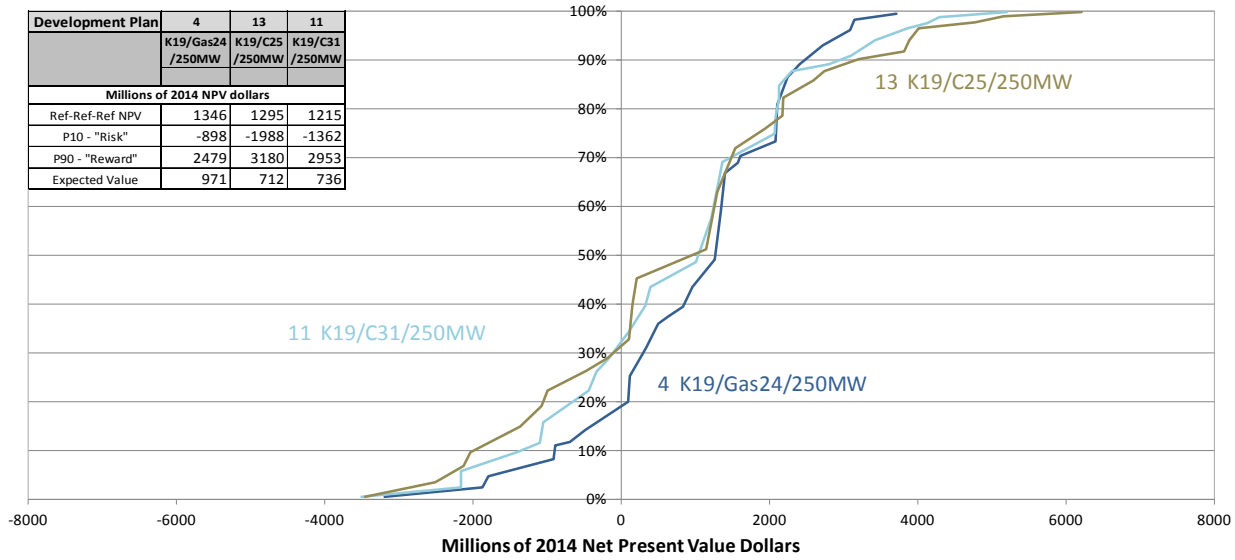
As shown in Figure 10.12, K22/Gas and SCGT/C26 have comparable risk profiles, with the expected value of K22/Gas approximately $100 million greater than the SCGT/C26 plan. On this basis, K22/Gas is preferable to the other three "Manitoba load only" plans. SCGT/C26 is a reasonable second choice.

Development Plans with a 250 MW U.S. Interconnection - Three Plans

Figure 10.13 displays the three plans in the "250 MW interconnection" category.

Figure 10.13 Probabilistic Analysis: S-Curves
Plans With 250 MW U.S. Interconnection

Development Plan	4	13	11
	K19/Gas24 /250MW	K19/C25 /250MW	K19/C31 /250MW
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1346	1295	1215
P10 - "Risk"	-898	-1988	-1362
P90 - "Reward"	2479	3180	2953
Expected Value	971	712	736



The expected value of Plan 4 (K19/Gas24/250MW) exceeds that of Plan 13 (K19/C25/250MW) and Plan 11 (K19/C31/250MW) by over $230 million. As shown in Figure 10.13, below the 50th percentile, Plan 4 lies to the right of both of the other 250 MW interconnection plans, indicating that Plan 4 has less downside risk. Above the 80th percentile, Plan 4 lies to the left of the other 250 MW interconnection plans, showing less upside potential due to limited surplus power as it does not have the Conawapa G.S. As the two plans with the Conawapa G.S. have greater surplus energy, without fixed-priced surplus power sales they would have more exposure to export price risk when prices are low and greater upside potential when prices are high. The relative risk-reward trade-off between the three plans is reflected in their expected values of $971 million, $712 million and $736 million. From an economic evaluation perspective Plan 4,

with an expected value of over $200 million higher than the other two plans, is the most economic of the three plans. Careful consideration must be given to the trade-offs between the plans due to difference in their risk profiles as shown in this economic evaluation. Further analysis of other perspectives (financial, multiple accounts and optionality), which are provided in following chapters, will be an important consideration.

Development Plans with a 750 MW U.S. Interconnection - Five Plans

There are five plans in the "750 MW interconnection" category. Two of the plans, Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)) and Plan 5 (K19/Gas25/750MW (WPS Sale & Inv)), include the proposed 300 MW WPS sale and related investment in the 750 MW transmission interconnection. The other three plans, Plan 12 (K19/C31/750MW), Plan 6 (K19/Gas31/750MW) and Plan 15 (K19/C25/750MW), reflect the uncertainty in the outcome of the ongoing negotiations with Wisconsin Public Service (WPS) and, therefore, do not include the proposed 300 MW WPS sale and, in addition, in one of the plans the in-service date of Conawapa is deferred to 2031/32.

Figure 10.14 shows the two development plans with the proposed 300 MW WPS sale. As shown in Figure 10.14, when compared with Plan 5 (K19/Gas25/750MW (WPS Sale & Inv)), the Preferred Development Plan (Plan 14) is $300 million higher in expected value. Below the 50th percentile, the risk profile is similar for the two plans but is driven by different factors. The downside risk of Plan 5 is due to a greater proportion of operating costs being related to thermal generation, particularly under low discount rate scenarios. As the Preferred Development Plan, which has Conawapa in 2025/26, has a large volume of surplus power, it is more sensitive to lower energy prices particularly when combined with higher discount rates and higher capital costs. Above the 50th percentile, the Preferred Development Plan lies to the right of Plan 5, reflecting significantly greater value primarily due to the availability of surplus power from the Conawapa G.S. at reference or higher energy prices.

Figure 10.14 Probabilistic Analysis: S-Curves
Plans With 750 MW Interconnection and Proposed WPS Sale

Development Plan	5	14
	K19/Gas25 /750MW	K19/C25 /750MW
	WPS Sale & Inv	WPS Sale & Inv
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1097	1696
P10 - "Risk"	-828	-1429
P90 - "Reward"	2256	3377
Expected Value	772	1085

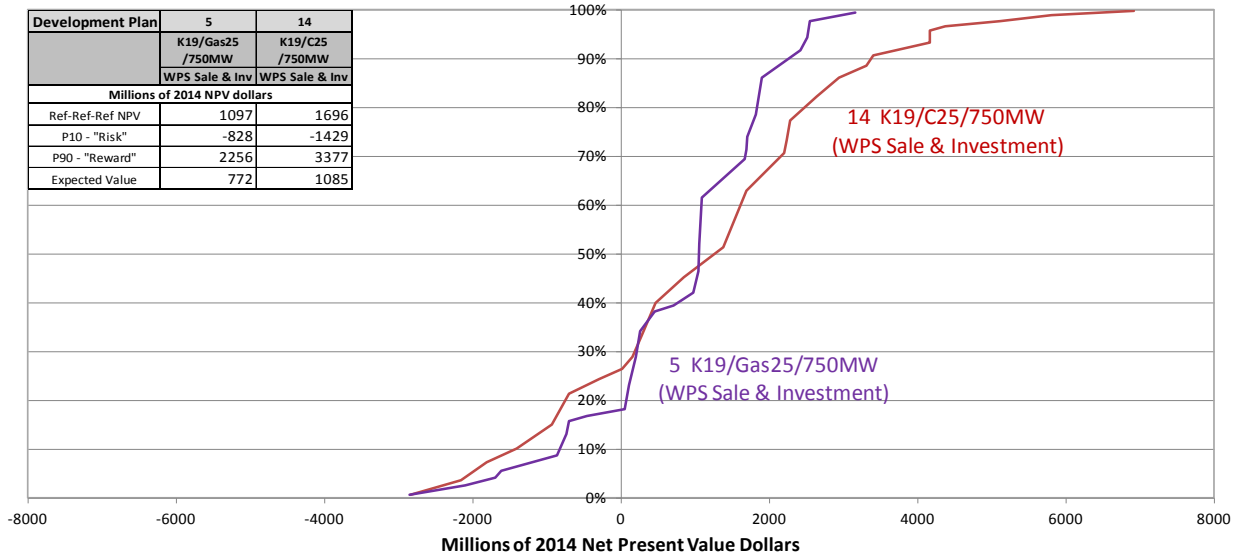


Figure 10.15 shows the three development plans without the proposed 300 MW WPS sale. As shown in Figure 10.15, when comparing the plans that do not include the proposed 300 MW WPS sale, the range of expected values is in the order of $100 million. Under scenarios where energy prices are low, Plan 12 (K19/C31/750MW) and Plan 15 (K19/C25/750MW) yield lower incremental NPVs than Plan 6 (K19/Gas31/750MW). Plan 12 and Plan 15 have greater upside potential when the energy prices are at reference or high (regardless of whether capital cost is at low, reference or high values and when discount rate is at low or reference values) because in Plans 12 and 15 there is surplus power from the Conawapa G.S. to take advantage of the energy prices. As the two plans with the Conawapa G.S. (Plan 12 and Plan 15) have greater surplus energy without fixed-priced export sales, they have more exposure to export price risk when prices are low and greater upside potential when prices are high. With such a narrow range in the expected values of the three development plans (i.e. within approximately $100 million), careful consideration must be given to the risk/reward trade-offs between the plans.

Figure 10.15 Probabilistic Analysis: S-Curves Plans With 750 MW Interconnection and Without Proposed WPS Sale

Development Plan	6	15	12
	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1091	1427	1360
P10 - "Risk"	-1181	-2186	-1594
P90 - "Reward"	2215	3360	3220
Expected Value	706	760	821

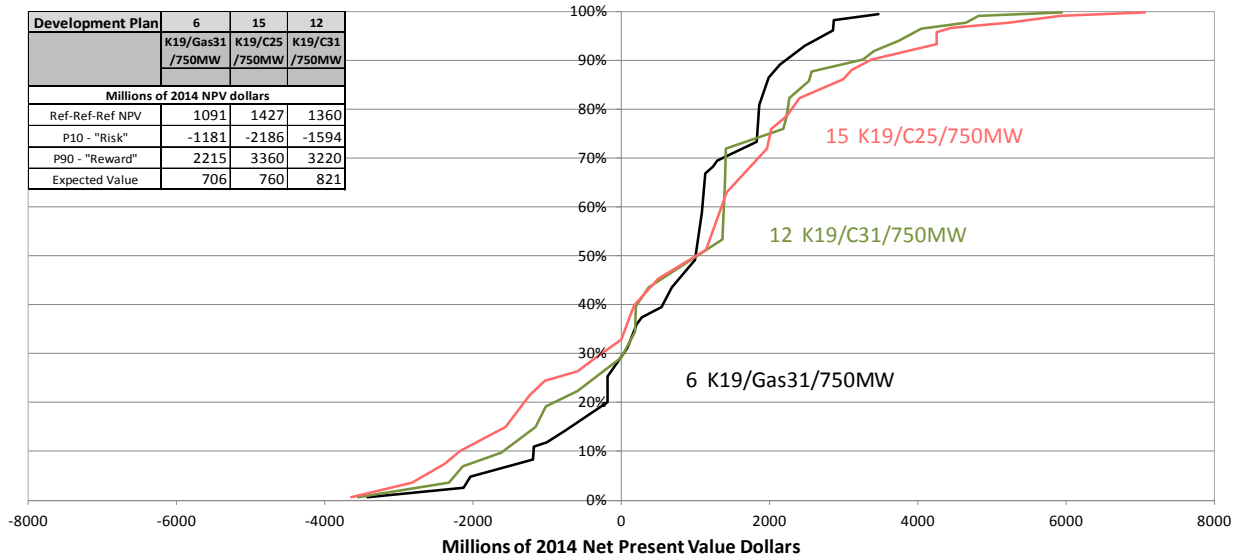


Figure 10.16 displays the three development plans with the 750 MW interconnection and Conawapa G.S.: the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)), Plan 12 (K19/C31/750MW), and Plan 15 (K19/C25/750MW). The Preferred Development Plan and Plan 15 both have the Conawapa G.S. in 2025/26, while Plan 15 reflects the uncertainty in the outcome of the ongoing negotiations with WPS by not including this sale and, therefore, provides a direct comparison to the Preferred Development Plan (Plan 14). The two plans without the proposed 300 MW WPS sale include increased costs to Manitoba Hydro associated with the U.S. interconnection as no investment from WPS is assumed.

The expected value of $1,085 million for the Preferred Development Plan is the highest expected value of the development plans evaluated. The other two development plans in Figure 10.16 have expected values that place them in the top three development plans after the Preferred Development Plan.

Figure 10.16 Probabilistic Analysis: S-Curves
Plans with 750 MW Interconnection and Conawapa G.S.

Development Plan	15	12	14
	K19/C25 /750MW	K19/C31 /750MW	K19/C25 /750MW WPS Sale & Inv
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1427	1360	1696
P10 - "Risk"	-2186	-1594	-1429
P90 - "Reward"	3360	3220	3377
Expected Value	760	821	1085

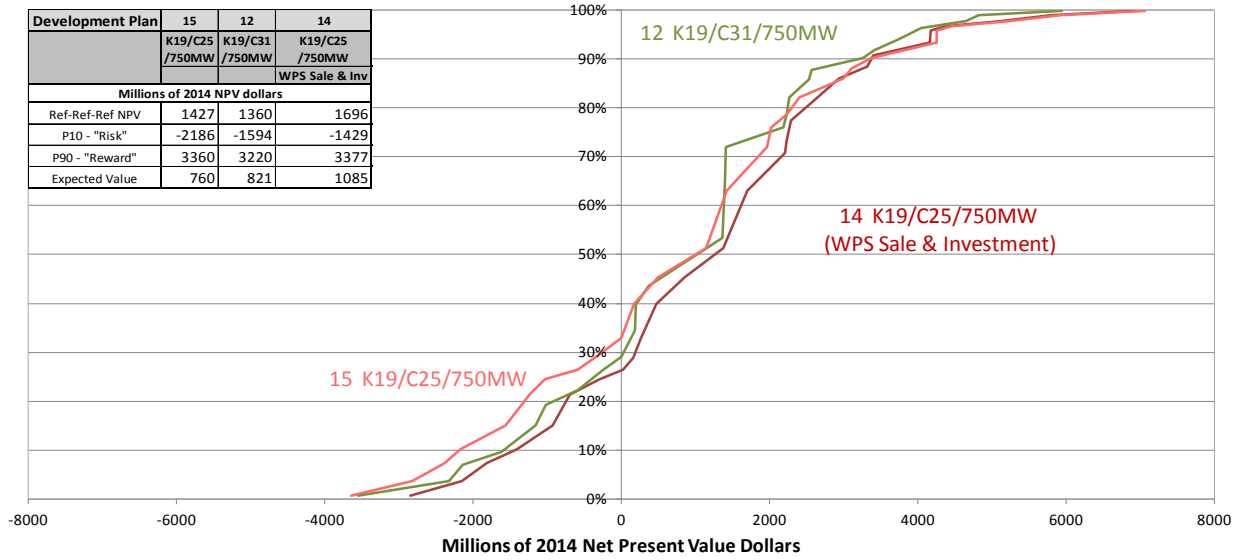


Figure 10.16 highlights the difference between plans which have more surplus power at fixed export prices as opposed to plans with surplus capacity and energy evaluated at forecasted long-term electricity export prices. The Preferred Development Plan, which includes the proposed 300 MW WPS Sale, when compared to Plan 15 (without the proposed 300 MW WPS sale) has an expected value that is higher by over $300 million. Plan 15 has slightly more upside potential than the Preferred Development Plan above the 90th percentile—more of the surplus power in the Preferred Development Plan is at fixed prices, which are lower than those in the high end of the range of energy prices being evaluated. The benefit of this upside potential for Plan 15, however, is more than offset by the significant downside risk related to the exposure to low energy prices on surplus power unprotected by fixed prices. Plan 12 benefits from comparatively lower capital costs and less exposure to low energy prices partially offset by lower upside potential all due to the deferral of Conawapa G.S. This is reflected in an expected value of $821 million which falls between that of the Preferred Development Plan at $1,085 million and Plan 15 at $760 million.

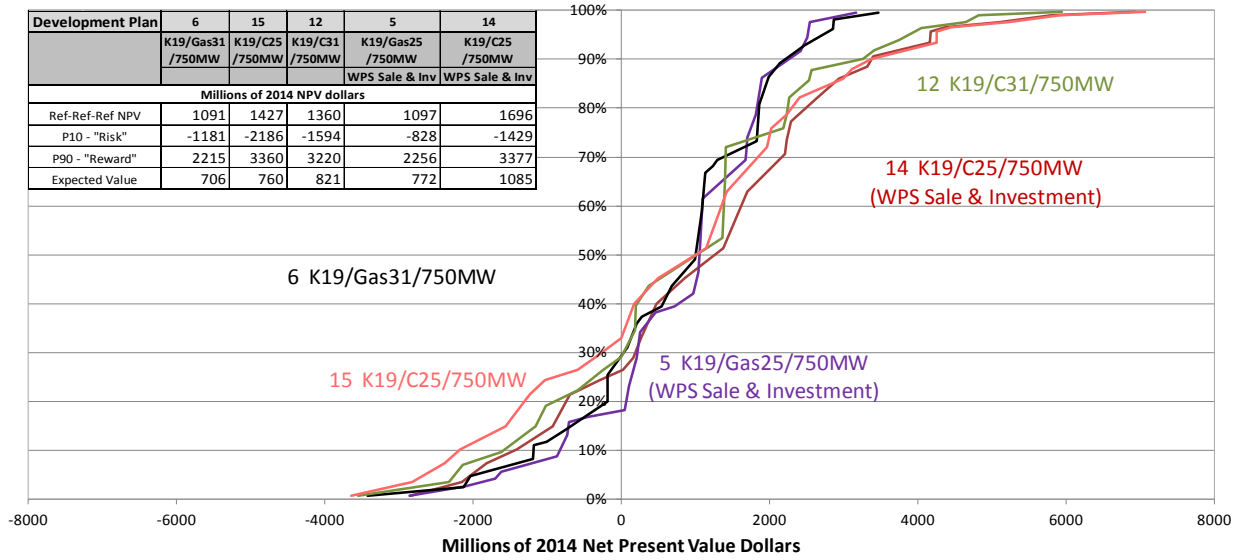
Figure 10.17 displays the five plans in the “750 MW interconnection” category. Two of the plans with a 750 MW interconnection reflect the proposed 300 MW sale to WPS, while the other

three plans reflect the sale of all surplus capacity and energy at forecasted long-term electricity export prices. When all five plans are considered together, there is a noticeable distinction in the upside potential (beyond the 70th percentile) for the plans with the Conawapa G.S. There is a smaller range across the five plans below the 40th percentile, with the plans with natural gas generation lying to the right of the other three plans, indicating less downside risk.

Plan 12 (K19/C31/750MW) and the Preferred Development Plan are higher in expected value when compared to the other plans. On the basis of both the expected value and upside potential, the Preferred Development Plan is the most attractive plan with a "750 MW interconnection" plan. Plan 12 is a reasonably close second choice.

Figure 10.17 Probabilistic Analysis: S-Curves
Plans With 750 MW Interconnection

Development Plan	6	15	12	5	14
	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
				WPS Sale & Inv	WPS Sale & Inv
Millions of 2014 NPV dollars					
Ref-Ref-Ref NPV	1091	1427	1360	1097	1696
P10 - "Risk"	-1181	-2186	-1594	-828	-1429
P90 - "Reward"	2215	3360	3220	2256	3377
Expected Value	706	760	821	772	1085



Comparison of Development Plans Across Categories

Comparisons were made across categories to demonstrate the differences between development plans. Figures 10.18 to 10.21 compare a number of the major elements of the development plans, including:

- plans with a 250 MW interconnection or a 750 MW interconnection
    - a 250 MW interconnection compared to no interconnection (Figure 10.18)

- a 250 MW interconnection compared to a 750 MW interconnection with natural gas-fired generation (Figure 10.19)
- a 250 MW interconnection compared to a 750 MW interconnection with Conawapa G.S. (Figure 10.20)
- a 250 MW interconnection with natural gas-fired generation compared to a 750 MW interconnection with Conawapa G.S. (Figure 10.21)

- plans with and without the proposed 300 MW WPS sale and related investment in the750 MW interconnection (Figure 10.20 and Figure 10.21)
- plans with and without Conawapa G.S.
  - Plans *without* Conawapa G.S. (Figure 10.18 and Figure 10.19)
  - Plans *with* Conawapa G.S. (Figure 10.20 and Figure 10.21).

As shown in Figure 10.18, when compared to the K22/Gas development plan, Plan 4 (K19/Gas24/250MW) is dominant and has an expected value that is higher by over $400 million. This means that it is more beneficial to advance the Keeyask G.S. and invest in a small interconnection than to consider any of the development plans without a new U.S. interconnection.

Figure 10.18 Probabilistic Analysis: S-Curves
K22/Gas and K19/Gas24/250MW Plans

Development Plan	2	4
	K22/Gas	K19/Gas24 /250MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	887	1346
P10 - "Risk"	-1249	-898
P90 - "Reward"	2007	2479
Expected Value	564	971

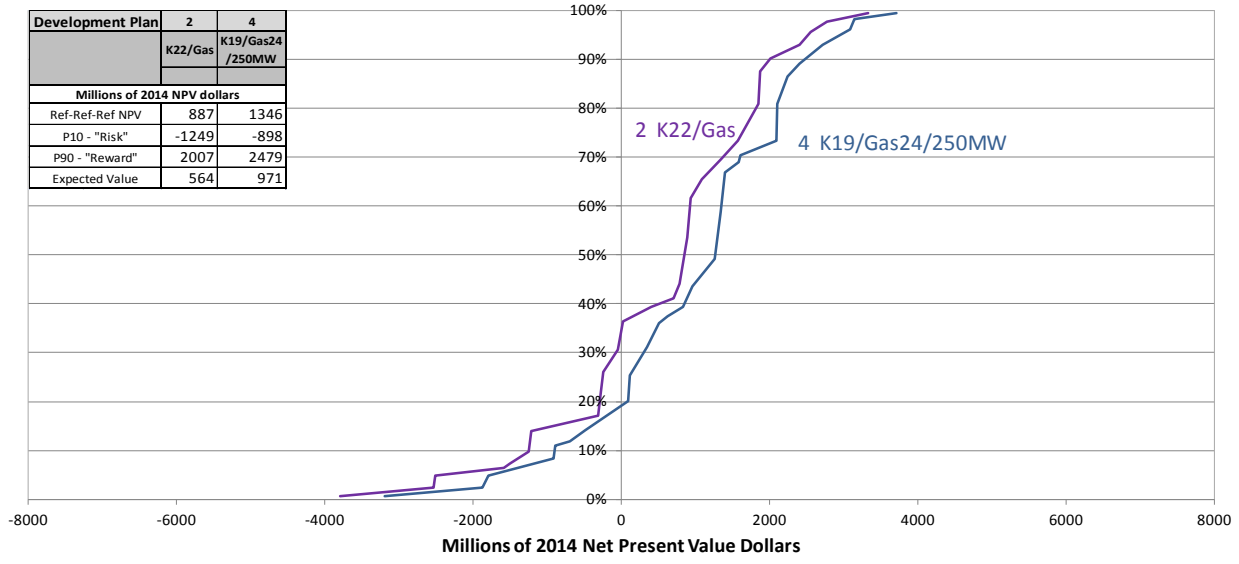


Figure 10.19 compares Plan 4 (K19/Gas24/250MW) to the 750 MW interconnection plans with natural gas-fired generation: Plan 5 (K19/Gas25/750MW) and Plan 6 (K19/Gas31/750MW). The chart on the left shows that Plan 4 dominates Plan 6.

The chart on the right shows that below the 40th percentile, risk profiles for Plan 4 and Plan 5 are similar because the additional value associated with the import capability of the large interconnection offsets the higher capital cost of the large interconnection. Above the 70th percentile, Plan 5 (with the 750 MW interconnection) has lower incremental NPVs as there is limited surplus energy to export on the large line to compensate for its higher capital cost. This illustrates that it is more beneficial to invest in a small interconnection when the Keeyask G.S. is followed by natural gas-fired generation.

Figure 10.19 Probabilistic Analysis: S-Curves
250 MW to 750 MW Interconnections
Development Plans with Natural Gas Generation

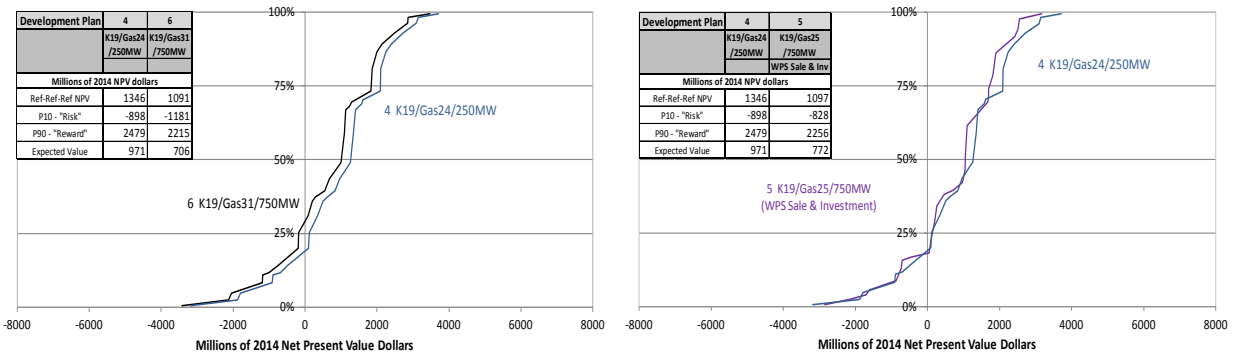


Figure 10.20 shows various comparisons of plans with Conawapa G.S. and either a 250 MW or a 750 MW interconnection.

Figure 10.20 Probabilistic Analysis: S-Curves
250 MW to 750 MW Interconnections
Development Plans with Conawapa G.S.

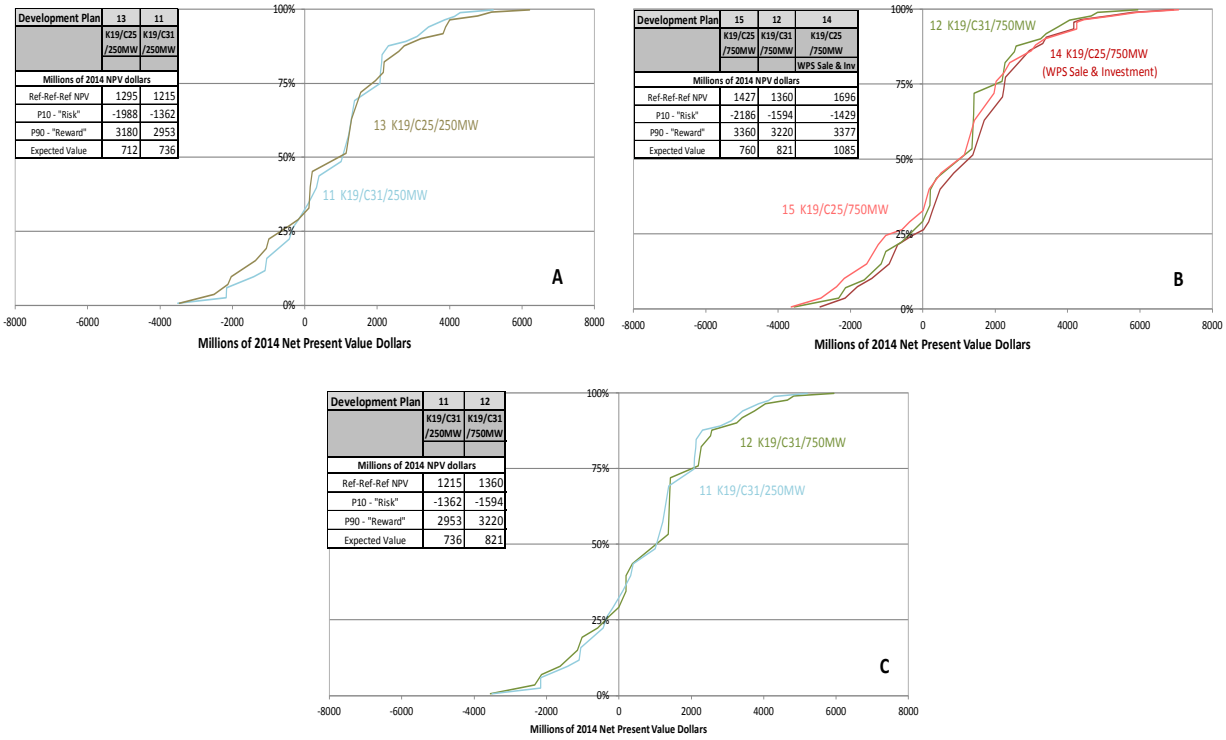


Chart A, on the left side of Figure 10.20, compares Plan 13 (K19/C25/250MW) to Plan 11 (K19/C31/250MW). From an expected value perspective, each plan yields similar values of $712 million and $736 million, respectively, and the NPV at Ref-Ref-Ref scenario for Plan 11 is only $80 million higher. In both plans surplus power from Conawapa G.S. is priced at forecasted long-term electricity export prices. With Plan 13 (Conawapa G.S. in 2025/26), the early years of Conawapa G.S. will have a greater surplus as Manitoba load is lower than it would be in 2031/32. This surplus is likely to exceed available export transmission capability more frequently with only a 250 MW interconnection. The incremental revenue from Plan 13 is unlikely to provide sufficient revenue to offset the additional capital cost of advancing it from 2031/32 to 2025/26 without a larger interconnection. The economic analysis slightly favours the development plan with Conawapa G.S. in 2031/32.

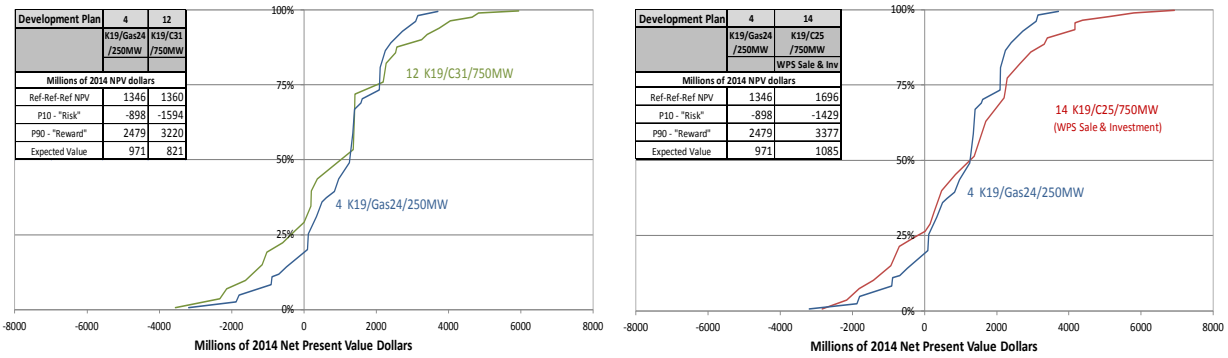
Chart B, on the right side of Figure 10.20, compares Plan 15 (K19/C25/750MW), Plan 12 (K19/C31/750MW) and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)). As explained in the comparison of "Development Plans with a 750 MW U.S. Interconnection - Five Plans", when the Preferred Development Plan is compared to Plan 15, the Preferred Development Plan (with the WPS Sale & Inv) has an expected value that is higher by over $300 million. Plan 15 has slightly more upside potential above the 90th percentile than the Preferred Development Plan, while Plan 12 (Conawapa 2031) benefits from the deferral of Conawapa G.S. This is reflected in an expected value of $821 million which falls between that of the Preferred Development Plan at $1,085 million and Plan 15 (Conawapa 2025) at $760 million. Chart B shows the Preferred Development Plan has the highest expected value and shows that a deferral of Conawapa to 2031 (Plan 12) yields similar results to Plan 15 (Conawapa 2025).

Chart C of Figure 10.20 compares Plan 11 (K19/C31/250MW) and Plan 12 (K19/C31/750MW) to illustrate the effect of developing a 750 MW interconnection as compared to a 250 MW interconnection. When comparing these two plans on an expected value basis, Plan 12 (with a 750 MW interconnection) exceeds Plan 11 by only $85 million while under the reference scenario Plan 12 exceeds the incremental NPV of Plan 11 by $145 million. The risk profiles are similar between the two plans with slightly more upside potential for Plan 12 above the 75th percentile where there is more opportunity to derive benefit from a larger interconnection. The two plans have very similar downside risk with slightly less risk for Plan 11 below the 25th percentile. From an expected value perspective, the analysis yields similar results and slightly favours Plan 12 (750 MW interconnection). Further analysis of other perspectives (financial, multiple accounts and optionality), which are provided in following chapters, will be important when considering whether to pursue a 250 MW or 750 MW interconnection.

Figure 10.21 provides additional comparisons that demonstrate the difference between pursuing a 250 MW interconnection compared to a 750 MW interconnection. Plan 4

(K19/Gas24/250MW) is compared to Plan 12 (K19/C31/750MW) and to the Preferred Development Plan.

Figure 10.21 Probabilistic Analysis: S-Curves
250 MW to 750 MW Interconnections
Selected Development Plans with Conawapa G.S. or Gas



In order to reflect the uncertainty in the outcome of the ongoing negotiations with WPS, Plan 12 is compared to Plan 4 as shown in the chart on the left side of Figure 10.21. These plans have different risk profiles, with Plan 4 being less sensitive to low energy prices and high discount rates. Plan 12 has greater upside potential when energy prices are high (regardless of whether capital cost or discount rate factors are at low, reference or high values) because in this plan there is surplus power from the Conawapa G.S. to take advantage of the higher energy prices. As Plan 12 (K19/C31/750MW) requires a higher capital investment in generation and in the U.S. interconnection when compared to Plan 4 (K19/Gas24/250MW), there is more exposure to higher discount rates. Plan 12 (without the WPS sale) has a higher volume of surplus energy priced at forecasted long-term electricity export prices rather than at fixed prices and is more exposed to lower energy prices than is Plan 4. While Plan 4 has an expected value of $150 million higher than Plan 12, careful consideration must be given to the trade-offs between the plans given the difference in their characteristics and in their risk profiles.

The chart on the right side of Figure 10.21 compares the Preferred Development Plan to Plan 4. When comparing these two plans on an expected value basis, the Preferred Development Plan exceeds Plan 4 by only $114 million, while under the reference scenario the Preferred Development Plan exceeds the incremental NPV of Plan 4 by $350 million. The Preferred

Development Plan has the highest incremental NPV of all of the development plans for the Ref-Ref-Ref scenario as shown in ***Chapter 9 – Economic Evaluations – Reference Scenario***.

The Preferred Development Plan has higher upside potential while Plan 4 (K19/Gas24/250MW) has less downside risk. Under scenarios where energy prices are low, the Preferred Development Plan as compared to Plan 4 yields lower incremental NPVs, with the exception of those scenarios where both energy prices and discount rates are low. At low energy prices, the surplus energy from the Preferred Development Plan does not result in sufficient revenues—when compared to Plan 4—to offset the higher capital cost of the Conawapa G.S. and a larger interconnection. The revenues are insufficient when energy prices are low primarily due to the assumption that surplus capacity and energy (beyond that which is under proposed or existing long-term contracts) are not at fixed prices but are exposed to a range of energy prices.

Generally, at reference or high energy prices, the Preferred Development Plan has greater incremental NPVs because there is surplus power from the Conawapa G.S. and a large interconnection to move the energy to the export market. Under the reference scenario, the Preferred Development Plan exceeds the incremental NPV of Plan 4 by $350 million while the difference in the expected value between the two plans is just over $100 million. Plans with the Conawapa G.S. protect the potential benefits associated with the development of a large interconnection. Given the different characteristics of these plans (Conawapa G.S. versus Gas, and 750 MW interconnection versus 250 MW interconnection), careful consideration must be given to the trade-offs between the plans. Further analysis of other perspectives (financial, multiple accounts and optionality), which are provided in following chapters, are important to the overall conclusions provided in ***Chapter 14 - Conclusions***.

10.1.5 Probabilistic Analysis Conclusions

In section 10.1, probabilistic analysis was used to compare 12 plans within and across three categories:

- development plans with no new U.S. interconnection designed to serve only Manitoba load and existing export commitments
- development plans with a 250 MW U.S. interconnection
- development plans with a 750 MW U.S. interconnection.

Table 10.7 Probabilistic Analysis – Expected Values and Reference NPV Incremental Economics – All Scenarios

Development Plan	1	3	7	2	4	13	11	6	15	12	5	14
	All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
											WPS Sale & Investment	
	Millions of 2014 NPV dollars											
Expected Value	-70	-1084	455	564	971	712	736	706	760	821	772	1085
Ref-Ref-Ref NPV	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696

The following conclusions are provided for the probabilistic analysis of development plans.

Conclusion from the evaluation of the four plans in the "Manitoba load" category (All Gas, Wind/Gas, K22/Gas and SCGT/C26):

- Based on the expected values, reference scenario NPVs and on risk profiles, the All Gas and Wind/Gas plans are effectively dominated, making both inferior to K22/Gas and SCGT/C26. The K22/Gas plan is preferable to the SCGT/C26 plan with the SCGT/C26 plan being a reasonable second choice. (Figures 10.11 and 10.12)

Conclusions from the evaluation of the three plans with a 250 MW interconnection (Plan 4 (K19/Gas24/250MW), Plan 11 (K19/C31/250MW) and Plan 13 (K19/C25/250MW)):

- It is more beneficial to advance Keeyask G.S. and invest in a small interconnection than it is to pursue development plans designed to serve only Manitoba load and existing export commitments. (Figure 10.18)
- Of the plans that contemplate a 250 MW interconnection, Plan 4 (K19/Gas24/250MW) is the most economic plan; however, careful consideration must be given to the trade-offs between the plans as there are notable differences in their risk profiles. (Figure 10.13)

Conclusion from the evaluation of the five development plans with a 750 MW interconnection (Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)), Plan 5 (K19/Gas25/750MW (WPS Sale & Inv)), Plan 12 (K19/C31/750MW), Plan 6 (K19/Gas31/750MW) and Plan 15 (K19/C25/750MW)):

- There is a noticeable distinction in the upside potential for the plans with the Conawapa G.S. As well, the Preferred Development Plan has a higher expected value than the other plans. On the basis of expected value, reference scenario NPV and upside potential, the Preferred Development Plan is the most attractive "750 MW interconnection" plan. Plan 12 is a reasonably close second choice. (Figures 10.14, 10.15, 10.16 and 10.17)

Comparisons were made across categories to demonstrate the differences between development plans. Figures 10.18 to 10.21 compare a number of the major elements of the development plans, including:

- plans with a 250 MW interconnection or a 750 MW interconnection
- plans with and without the proposed 300 MW WPS sale and related investment in the 750 MW interconnection (Figure 10.20 and Figure 10.21)
- plans with and without Conawapa G.S.
    - plans *without* Conawapa G.S. (Figure 10.18 and Figure 10.19)
    - plans *with* Conawapa G.S. (Figure 10.20 and Figure 10.21)

Conclusions from comparisons made across categories:

- Energy prices have the most significant impact on development plans with both Keeyask G.S. and Conawapa G.S. (including the Preferred Development Plan) and a 750 MW interconnection while discount rate has the most significant impact on plans with higher levels of natural gas-fired generation.
- The comparison of Plan 4 (K19/Gas24/250MW) to Plan 5 (K19/Gas25/750MW) shows it is more beneficial to invest in a small interconnection when the Keeyask G.S. is followed by natural gas-fired generation.

- While Plan 4 (K19/Gas24/250MW) has an expected value of $150 million higher than Plan 12 (K19/C31/750MW), careful consideration must be given to the differences in their characteristics and their risk profiles.
- While the Preferred Development Plan has a significantly higher incremental NPV under the reference scenario than that of Plan 4 (K19/Gas24/250MW) (over $350 million), the difference in their expected values is only $114 million. As a result, careful consideration must be given to the trade-offs between the plans given the different characteristics of these plans (Conawapa G.S. versus Gas and 750 MW interconnection versus 250 MW interconnection). Further analysis of other perspectives (financial, multiple accounts and optionality), which are provided in the following chapters, are important to the overall conclusions provided in **Chapter 14 - Conclusions**.

10.2 Sensitivity Analysis

Sensitivity analysis focuses on a single variable that tests the impact of that variable on selected development plans. This section will provide sensitivity analyses on drought, climate change, Manitoba load, and in-service delay.

10.2.1 Drought

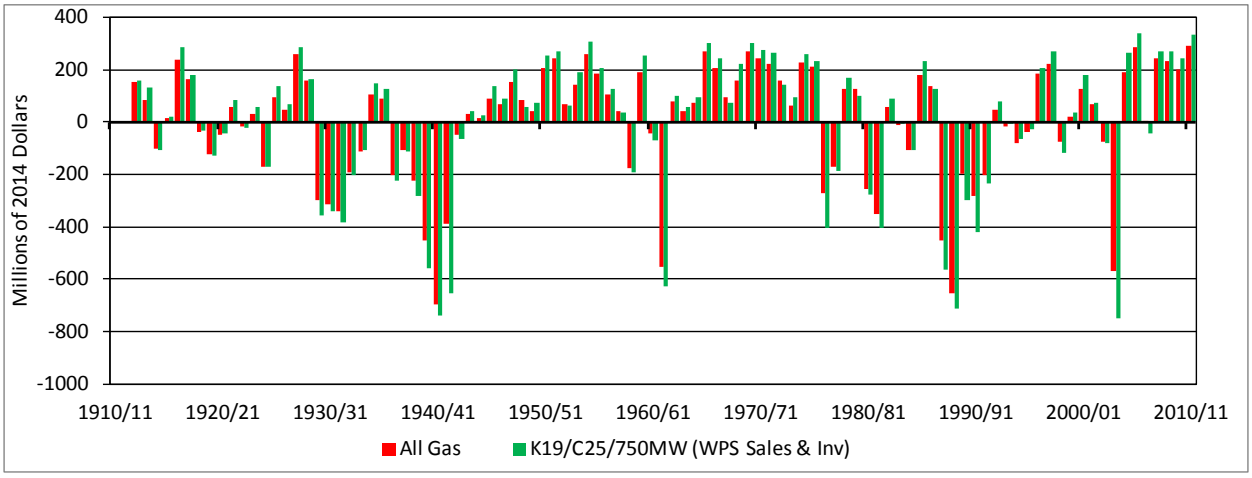
This section provides a comparison of the impact of a prolonged period of below-average streamflows (5-year drought) on incremental net revenues for the All Gas plan, K22/Gas plan, K19/Gas24/250MW plan and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv). To assess the impact of energy prices and the timing of drought on the present value of revenues, analysis is provided for low, reference and high energy price scenarios for a 5-year drought starting in four future fiscal years as follows:

- 2014/15 — during construction of Keeyask
- 2021/22 — affecting early revenues from Keeyask and during construction of Conawapa
- 2027/28 — affecting early revenues from Conawapa

- 2032/33 — beyond early revenues from Conawapa.

The impact of specific annual flow cases on flow-related revenues will differ between development plans. Figure 10.22 shows the variation of flow-related revenues from average for the All Gas plan and the Preferred Development Plan for the 2032/33 fiscal year under each of the historic flow years from 1912-2010.

Figure 10.22 Sensitivity Analysis
Comparison of Flow Related Revenue Variability from Average
All Gas Plan and Preferred Development Plan (Reference Scenario)



Generally, Figure 10.22 shows that development plans with new hydro resources will yield incrementally higher revenues under higher flow periods and incrementally lower revenues under lower flow periods. There are several occurrences of severe drought in the historical record of flows as reflected in the years that have significantly lower than average revenue[2]. Of particular note, in the historic record, are the 5-year-periods centered on 1940 and 1990, both of which have a significant impact on flow-related revenues and provide a basis to compare this impact across development plans. While the 5-year period that spans fiscal years 1937/38 to 1941/42 has been shown to have a modestly greater financial impact, the analysis in this section is based on the 5-year period that spans fiscal year 1987/88 to fiscal year 1991/92 since

[2] A qualitative discussion on drought risk sensitivity related to a drought worse than the drought of record is presented in Chapter 10 Section 3.

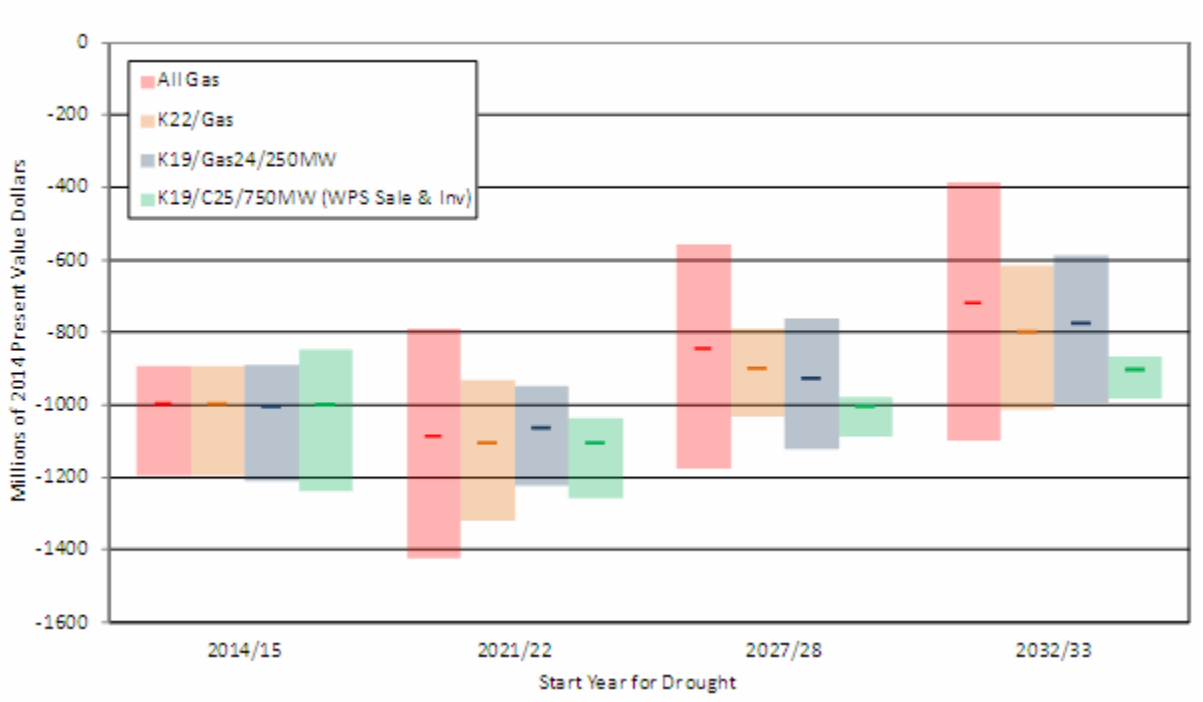
there is more confidence in the flow record and this period better reflects the current regulation patterns and water use practices in watersheds upstream of Manitoba.

Table 10.8 shows the incremental change in NPV to the reference scenario for four of the development plans presented in ***Chapter 9 – Economic Evaluations – Reference Scenario***, at low, reference and high energy prices for a 5-year drought starting in 2014/15, 2021/22, 2027/28 and 2032/33. This information is also displayed in Figure 10.23.

Table 10.8 Sensitivity Analysis – 5-year Drought
Impact on Reference Scenario NPV
Low, Reference and High Energy Prices

		Impact on Reference Scenario NPV Millions of 2014$ @ 5.05 discount rate			
Start year	Prices	All Gas	K22/Gas	K19/Gas24/250MW	K19/C25/750MW (WPS Sale & Inv)
2014/15	Low	-893	-892	-891	-849
	Ref	-997	-997	-1003	-999
	High	-1194	-1196	-1209	-1239
2021/22	Low	-789	-932	-949	-1035
	Ref	-1086	-1104	-1063	-1105
	High	-1422	-1320	-1223	-1257
2027/28	Low	-558	-787	-762	-1089
	Ref	-844	-898	-926	-1004
	High	-1174	-1034	-1123	-979
2032/33	Low	-386	-613	-589	-866
	Ref	-718	-798	-774	-902
	High	-1100	-1013	-996	-981

Figure 10.23 Sensitivity Analysis – 5-year Drought
Incremental Impact on Reference Scenario NPV
Low, Reference and High Energy Prices



For each of the four 5-year drought year periods identified in Figure 10.23, there is a coloured bar for the All Gas, K22/Gas, K19/Gas24/250MW, and K19/C25/750MW (WPS Sale & Inv) development plans. The horizontal dash in each bar is the change in NPV at reference energy prices and indicates the relative sensitivity to drought. Comparing the change in NPV at reference energy prices across the development plans, and into the future, shows that the incremental negative impact of drought is greater for plans with increasing amounts of new hydro-electric generation and a larger interconnection. This is due to a proportionally greater loss in flow-related export revenue in these plans during droughts.

The lower and upper ends of the bars represent the change in NPV due to energy prices, with the size range indicating the overall sensitivity to energy prices coincident with a drought. Overall, the All Gas plan has the greatest relative sensitivity to changes in energy prices over the course of a 5-year drought as shown in Figure 10.23. This is due to the ability of the plans with more new hydro and larger interconnection capability to generate revenue in those years in the

5-year drought that are above the critical low-flow year—such revenue offsets the additional cost of thermal generation and/or imports in the critical low-flow years. In plans with proportionally more natural gas-fired generation there is less ability to generate export revenues and, consequently, changes in energy prices translate directly into changes in the cost of generation and increasing sensitivity to energy prices into the future.

This section presented the impact of a 5-year drought on the incremental NPVs across development plans. ***Chapter 11 - Financial Evaluation of Development Plans*** includes an evaluation of drought on financial indicators, such as retained earnings, debt levels and consumer rates. In general, plans with more hydro-electric generation result in higher retained earnings which place Manitoba Hydro in a better financial position to withstand a drought.

10.2.2 Climate Change

As discussed in ***Appendix K - Manitoba Hydro Climate Change Report Fiscal Year 2012-2013***, Manitoba Hydro has long been investigating the potential impact of climate change on the operation and long-term planning of the generation system. These studies apply the results of global climate models (GCM) which simulate the changes to the global climate based on projected future emission scenarios focused on watersheds that contribute to the Manitoba Hydro system. A goal of these studies is to understand potential changes in temperature and precipitation as well as their impact on runoff and resulting streamflow. The results from GCM were used to establish a range of projected changes to average temperature, precipitation and runoff for different future time frames[3].

[3]Manitoba Hydro climate change studies to date have focused on potential changes in averages due to the strength of GCMs in being able to simulate change in climatic normals. While there is general scientific consensus that climate change may result in increased volatility of weather events, GCMs have a weaker signal of climate impacts to variability and to extreme events due to the coarseness of model resolution. Manitoba Hydro is working with Ouranos, several universities, and other utilities to investigate downscaling and post-treatment methods to quantify local impacts to extreme events and climatic variability. These studies are currently ongoing.

Changes to temperature and precipitation can have an overall effect on the planning and operation of Manitoba Hydro's system. More specifically, temperature and precipitation changes can have a direct impact on load and supply of hydro-electricity, respectively. While the effect of climate change on temperature and forecasted load has not been studied in detail, a general discussion on climate change effects related to a rise in temperature on forecasted load is provided in ***Appendix C – 2012 Electric Load Forecast***. Appendix C indicates that a uniform one degree Celsius of warming in Winnipeg throughout the year would result in a reduction in winter peak but an overall increase in energy demand as reduced winter heating requirements are more than offset by increased summer cooling requirements.

This section presents an analysis of the potential impact of climate-changed streamflow on projections of average revenue under the All Gas development plan, the K22/Gas development plan and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)). Comparison of these plans demonstrates the incremental effects of climate change on plans with no new hydro resources, one new hydro resource and two new hydro resources, respectively.

Runoff projections from an ensemble of GCM were used to adjust Manitoba Hydro's existing 99 year record of long-term streamflows to reflect potential changes in average runoff. The modified streamflow records were then used in Manitoba Hydro's Simulation Program for Long-term Analysis of System Hydraulics (SPLASH) model to provide average annual revenues. The main assumptions for this analysis were:

- Climate projections were based on the 2050 time frame as the 2050 projections are readily available among global climate model outputs and this time frame corresponds to the end of the 35-year planning horizon.
- A set of 109 global climate model outputs was sorted and ranked based on projected changes to average annual Manitoba Hydro system inflow. For the purpose of this evaluation, projected changes to runoff were chosen corresponding to the 5th, 25th, 50th, 75th, and 95th percentiles.

- The general results from the GCM reflect changes in overall averages and do not reflect changes to specific flows, in particular, extreme low flows. The long-term streamflows were adjusted based on the projected changes to runoff, while maintaining the historic drought levels for critical low flow years. Maintaining the historic droughts in the streamflow records preserves in-service dates for development plans and enables a direct comparison of revenue changes. A qualitative discussion on risk sensitivity related to a drought worse than the drought of record is presented in Section 10.3.
- There is general scientific consensus that the effects of climate change occur over the long-term.
- To model the long-term effects of climate change, calculations were done to derive incremental average revenues for each year from 2012-2047 using the 2050s climate adjustment for flows. This results in applying the full 2050 climate change impact in every year from 2012/13 to 2047/48. To introduce incremental change in climate to the average annual revenues from 2012-2047, the revenues were proportionally adjusted, starting with no adjustment to 2012/13 average annual revenues and 100% in 2050/51.

Table 10.9 provides a summary of the change in net revenue across the various climate change projections incremental to a base, which is the unadjusted flow case for each development plan for reference scenario assumptions as provided in ***Chapter 9 – Economic Evaluations – Reference Scenario***. In general, the results indicate that approximately 70% of the GCM projections show an increase in total runoff, which results in a related increase in revenue above that of the reference scenario. Conversely 30% of the projections show a decrease in average annual revenues below that of the reference scenario. As shown in Table 10.9, for all three development plans, revenues increase or decrease with corresponding increases and decreases in streamflows.

Table 10.9 Sensitivity Analysis - Climate Change
Incremental Impact on Reference Scenario NPV

Incremental Impact on reference scenario NPVs millions of 2014$ @ 5.05% discount rate					
Development Plan	Flow Ranked Percentiles from GCMs				
	5th	25th	50th	75th	95th
All Gas	(1,431)	(240)	560	922	1,697
K22/Gas	(1,519)	(244)	602	993	1,806
Preferred Plan	(1,847)	(276)	714	1,186	2,145

Table 10.9 shows that the All Gas plan has the least amount of variability, followed by the K22/Gas plan when compared to the Preferred Development Plan. This is shown by the difference in incremental NPV impacts between the 5th and 95th percentile flows which are $3,128 million ($1,697 million minus $-1,431 million), $3,325 million and $3,992 million for the All Gas plan, the K22/Gas plan and Preferred Development Plan, respectively.

Table 10.9 also shows that plans with more new hydro-electric generation have greater upside potential (higher incremental average revenues) and greater downside risk (lower incremental average revenues) as a result of changing streamflows. For a 95th percentile runoff change, the incremental NPV relative to the All Gas plan is increased by $109 million ($1,806 million minus $1,697 million) for the K22/Gas plan and by $498 million ($2,145 million minus $1,697 million) for the Preferred Development Plan. For a 5th percentile change in runoff, the incremental NPV relative to the All Gas plan is reduced by $88 million ($-1,519 minus $-1,431 million) for the K22/Gas plan and by $416 million ($-1,847 million minus -$1,431 million) for the Preferred Development Plan. The incremental NPV changes for the K22/Gas plan are less than those for the Preferred Development Plan but exhibit similar characteristics in that there is comparatively higher upside and greater downside effects on revenues relative to the All Gas plan.

Table 10.10 combines the results of the climate change analysis on the three selected development plans with the reference scenario economics presented in ***Chapter 9 – Economic Evaluations – Reference Scenario***. In Table 10.10 the incremental NPVs resulting from the climate changed stream flow analysis are added to the incremental NPVs from the reference scenario economics from ***Chapter 9 – Economic Evaluations – Reference Scenario*** with the All Gas reference scenario as the basis for comparison. As shown in Table 10.10 both the K22/Gas plan and the Preferred Development Plan have higher net benefits than the All Gas plan across the full range of climate change results and the Preferred Development Plan has the greatest net benefits of all three plans. Development plans with new hydro have a larger base of revenue than the All Gas and therefore can withstand the downside variability in streamflows and benefit more from the upside variability in streamflows.

Table 10.10 Sensitivity Analysis- Climate Change Incremental Impact on NPV Relative to All Gas Reference Scenario

	Incremental NPV benefit, millions of 2014$ @ 5.05% discount rate			
Development Plan	Reference Scenario	Reference Scenario at 5th percentile streamflow	Reference Scenario at 50th percentile streamflow	Reference Scenario 95th percentile streamflow
All Gas	0	($1431)	$560	$1,697
K22/Gas	$887	($632)	$1,489	$2,693
Preferred Plan	$1696	($151)	$2,410	$3,841

As the Manitoba Hydro system currently consists of predominantly hydro-based generation, all plans will be affected by changes in streamflow driven by climate change. In general, the projections from GCM indicate that it is more likely that there will be an increase in average annual streamflow as approximately 70% of projections show an increase in runoff. As a result it is more likely that there will be an increase in average revenues than there will be a decrease. This analysis shows that the All Gas plan has the least amount of variability when compared to

the K22/Gas plan and the Preferred Development Plan. Plans with more new hydro-electric generation have greater upside potential (higher average revenues) and greater downside risk (lower average revenues) as a result of changing streamflows. Even when the 5th percentile annual average system inflow is assumed, plans with new hydro generation have higher incremental NPVs when compared to the All Gas plan (K22/Gas plan: $799 million ($-632 million minus $-1,431 million) and Preferred Development Plan: $1,280 million ($-151 million minus $-1,431 million)).

10.2.3 Manitoba Load

This section presents an analysis of the potential impact of changes in Manitoba load to the incremental NPVs of three development plans: the All Gas development plan, the K22/Gas development plan and the Preferred Development Plan (K19/C25/750 MW (WPS Sale & Inv)). Comparison of these plans demonstrates the incremental effects of changes in load on plans with no new hydro resources, one new hydro resource and two new hydro resources, respectively.

This sensitivity analysis is based on the low and high load forecast described in ***Appendix C – 2012 Electric Load Forecast***. Figure 10.24 and Figure 10.25 show the 90th percentile and 10th percentile probability bands for the energy and peak capacity Manitoba load forecasts, respectively. This means that there is an 80% chance that Manitoba load will fall between the high and low bands for a given forecast year. The energy forecast bands correspond to an annual growth rate of 1.2% for the low band and 2.0% for the high band, compared to 1.6% per year for the base energy forecast. The capacity forecast bands correspond to an annual growth rate of 1.1% for the low band and 2.1% for the high band, compared to 1.6% per year for the base peak capacity forecast.

Figure 10.24 Sensitivity Analysis – Manitoba Load Forecast Energy Forecast Probability Bands

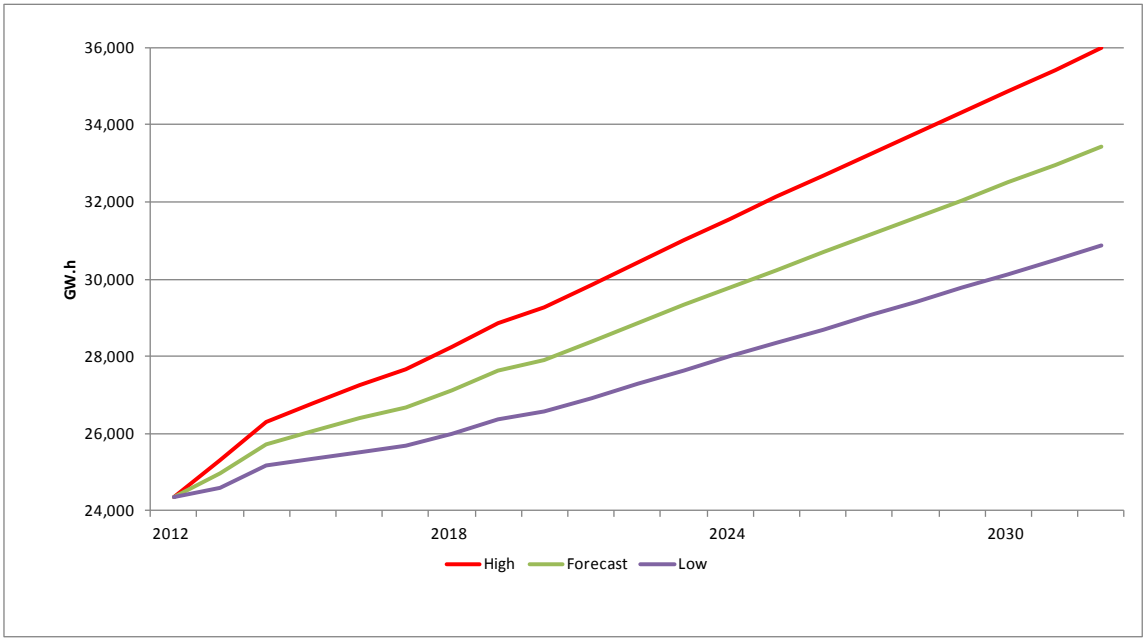
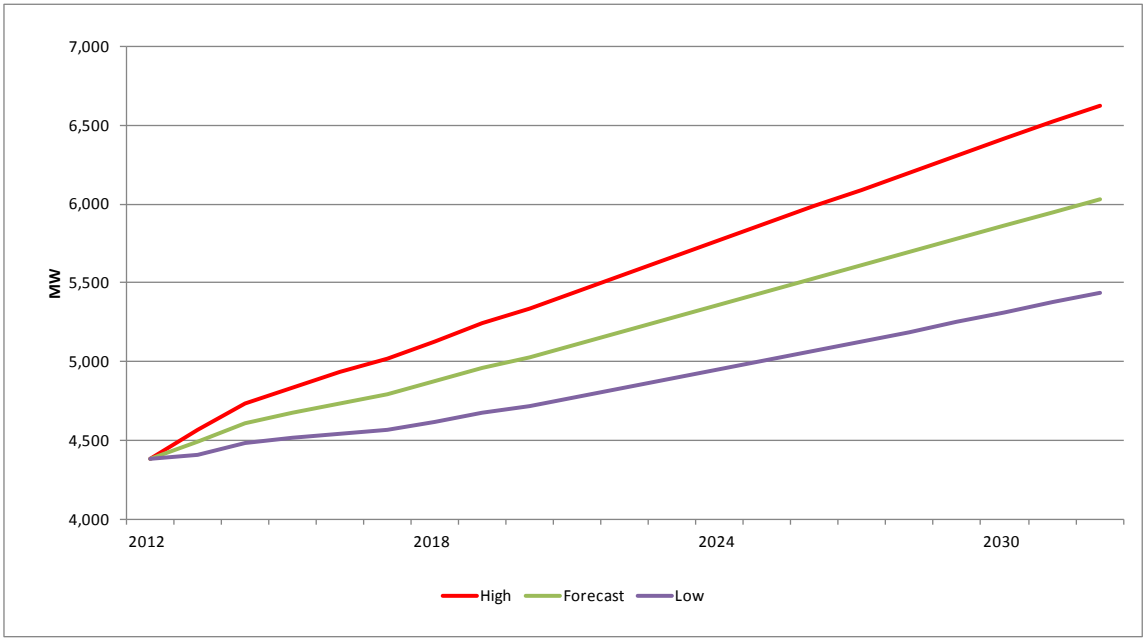


Figure 10.25 Sensitivity Analysis – Manitoba Load Forecast Peak Capacity Forecast Probability Bands



In order to evaluate the development plans, the in-service dates for new resources were adjusted in the All Gas plan, K22/Gas plan and the Preferred Plan, as required, to accommodate

the change in the load forecast (consistent with the methodology described in ***Chapter 8 – Determination and Description of Development Plans***. For the Preferred Development Plan, the in-service dates for Keeyask G.S., Conawapa G.S. and the new U.S. interconnection were held constant and the effect of changes in Manitoba load are mainly reflected in increased or decreased surplus hydro-electric energy. As shown in Table 10.11[4], under the low load forecast, new resources are required for dependable energy in 2028/29 and persistent winter peak capacity deficits start in 2029/30. Assuming the high load forecast, new resources are required for dependable energy in 2020/21 and persistent winter peak capacity deficits start in 2021/22.

Table 10.11 Sensitivity Analysis – Manitoba Load
Supply-Demand Balances for High, Base and Low Load Forecast
Dependable Energy (GWh) and Winter Peak Capacity (MW)

No New Resources											
Fiscal Year	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027/28**	**2028/29**	**2029/30**
90%th Percentile (2012 Load Forecast)											
System Surplus (Deficit) Dependable GW.h	251	(894)	(1,423)	(1,961)	(2,497)	(3,054)	(2,694)	(3,321)	(3,892)	(4,472)	(5,047)
System Surplus (Deficit) Winter Peak MW	112	-	(109)	(218)	(335)	(452)	(815)	(928)	(1,047)	(1,169)	(1,291)
2012 Load Forecast											
System Surplus (Deficit) Dependable GW.h	1,607	574	152	(279)	(713)	(1,168)	(733)	(1,262)	(1,712)	(2,197)	(2,678)
System Surplus (Deficit) Winter Peak MW	458	376	296	214	126	35	(301)	(388)	(481)	(577)	(674)
10%th Percentile (2012 Load Forecast)											
System Surplus (Deficit) Dependable GW.h	2,964	2,042	1,728	1,402	1,072	718	1,053	613	272	(79)	(428)
System Surplus (Deficit) Winter Peak MW	805	753	701	646	586	522	212	152	85	14	(58)

The description of the development plans under base, low and high load forecasts is provided in Table 10.12. The All Gas, K22/Gas and Preferred Development Plan described as "Base Load" in Table 10.12, are the same as those described in ***Chapter 8 – Determination and Description of Development Plans***. Under low and high load forecasts the resources are adjusted, as applicable, to accommodate the change in the load forecast.

[4] Based on Appendix 4.2 Manitoba Hydro Supply and Demand Tables, Section 3 NFAT 2012 Reference and Section 4 NFAT 2012 Sensitivities

Table 10.12 Sensitivity Analysis - Manitoba Load
Description of Development Plans

Order of Reference Scenario Capital Investment	Development Plan	Description of Development Plan
	All Gas Low Load	Natural Gas-Fired Generation starting in 2028/29
1	All Gas Base Load	Natural Gas-Fired Generation starting in 2022/23
	All Gas High Load	Natural Gas-Fired Generation starting in 2020/21
	K28/Gas Low Load	Keeyask 2028/29, Natural Gas-Fired Generation starting in 2037/38
2	K22/Gas Base Load	Keeyask 2022/23, Natural Gas-Fired Generation starting in 2029/30
	K19/Gas High Load	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25
	K19/C25/750MW Preferred Development Plan Low Load	Keeyask 2019/20, Conawapa 2025/26, 750 MW Import/Export Interconnection 2020/21
14	K19/C25/750MW (WPS Sale & Inv) Preferred Development Plan Base Load	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export Interconnection 2020/21
	K19/C25/750MW Preferred Development Plan High Load	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2023/24, Conawapa 2025/26, 750 MW Import/Export Interconnection 2020/21

Table 10.13 presents the incremental NPVs for the low load and high load sensitivities for each development plan studied as compared to each respective base load development plan under the reference scenario. The table demonstrates that load changes have a larger impact on the All Gas development plan. Low load growth increases the NPV and high load growth decreases the NPV of the All Gas plan and the change is greater for this plan than for either the K22/Gas plan or the Preferred Development Plan. The variability in the impact on NPV decreases with the addition of new hydro resources and a new interconnection.

Table 10.13 Sensitivity Analysis- Changes in Manitoba Load
Incremental Impact on NPV Relative to Reference Scenario

	Incremental NPV benefit, millions of 2014$ @ 5.05% discount rate		
Development Plan	**Reference Scenario**	**10th percentile Manitoba Load (Low Load)**	**90th percentile Manitoba Load (High Load)**
All Gas	-	$3,470	($3,605)
K22/Gas	-	$3,319	($3,538)
K19/C25/750MW (WPS Sale & Inv) Preferred Plan	-	$3,164	($3,442)

Table 10.14 presents the incremental NPVs for the low load and high load sensitivities for each development plan studied as compared to the All Gas development plan. The reference scenario is also provided for comparison purposes.

Table 10.14 Sensitivity Analysis - Changes in Manitoba Load
Incremental Impact on NPV Relative to All Gas

	Incremental NPV benefit, millions of 2014$ @ 5.05% discount rate		
Development Plan	**Reference Scenario**	**10th percentile Manitoba Load (Low Load)**	**90th percentile Manitoba Load (High Load)**
All Gas	-	-	-
K22/Gas	$887	$736	$954
K19/C25/750MW (WPS Sale & Inv) Preferred Plan	$1,696	$1,390	$1,858

Table 10.14 shows that under the low load sensitivity the incremental NPV for development plans with new hydro resources and a new interconnection decreases relative to the All Gas development plan. Conversely under the high load sensitivity the incremental NPV for development plans with new hydro resources and a new interconnection increases relative to the All Gas development plan, but to a lesser degree than under the low load sensitivity.

Table 10.14 also shows that under the low and high load sensitivities the economic ranking of the development plans studied does not change. The K22/Gas development plan continues to be more economic than the All Gas development plan, and the Preferred Development Plan continues to be the most economic of the three plans studied.

10.2.4 In-service Date Delay

In order to demonstrate the sensitivity of the Preferred Development Plan to delays in the in-service date of Keeyask G.S. and Conawapa G.S., a development plan was studied in which the in-service date of both generating stations is delayed by one-year. Delaying the in-service dates of both plants decreases the NPV of the Preferred Development Plan by $97 million (2014$ @ 5.05% discount rate). A deferral in in-service dates will result in less surplus energy available for export thereby reducing export revenues. These lower revenues will be partially offset by the capital cost savings from the deferral. The decrease in NPV is attributable to lower export revenues being more than offset by the savings of delaying the capital expenditures by one year.

10.3 Other Factors which Contribute to Uncertainty

There are several other factors, in addition to those discussed in the probabilistic and sensitivity analyses, which may contribute to uncertainty in the economic analysis. The purpose of this section is to identify these other uncertainty factors, and to explain how they were considered in the NFAT submission analysis.

10.3.1 Export Market Uncertainty

As a predominantly hydro-electric system, Manitoba Hydro typically has surplus energy available to sell into the export market. It is the revenue from the sale of power surplus to the needs of Manitobans that contributes to the economic and financial benefits of all development plans, especially those with Keeyask and Conawapa G.S.

The uncertainty and risk related to the export market in terms of market access and export contract portfolio are discussed in the following sections.

10.3.1.1 Market Access

Market access risk is the potential for legal or regulatory restrictions which would limit Manitoba Hydro's surplus power from reaching the competitive marketplace free from unreasonable legal, regulatory, structural or tariff barriers.

Manitoba Hydro currently has excellent market access and sees no impending market access barriers on the horizon. Future development plans that include additional hydro development will result in increasing volumes of export energy, but a significant portion of the export energy is dependable energy which provides the basis for long-term relationships with major export customers. Such long-term relationships with major export customers reduce market access risk both as a result of the stability that long-term sales bring and as a result of stronger relationships between the major export customers, the regional power market and Manitoba Hydro.

Manitoba Hydro considers a complete loss of export markets to be a highly unlikely event, as Manitoba Hydro's products are competitively priced, energy is a significant expense for business and consumers, and there is significant political pressure in the U.S. to keep energy prices down. The North American Free Trade Agreement contains provisions designed to

prevent restrictions on trade in energy. Although a U.S. policy objective is energy independence, this policy is in the context of North America and not just the continental U.S. proper[5]. There are however, a number of technical, legal and regulatory issues that need to be monitored on an ongoing basis to minimize the potential for a negative impact on export power sales.

Due to the subjective nature of market access risk, and its low probability, quantitative sensitivity analysis was not undertaken. However, the magnitude of the impact on Manitoba Hydro were restrictions to occur is judged to be similar to that encountered in the low export price cases, which were studied as part of the probabilistic analysis. Manitoba Hydro engages in a comprehensive set of activities to monitor and address market access issues, as detailed in ***Chapter 15 – Implementation and Risk Management Plan for Preferred Development Plan***, which include maintaining industry awareness, monitoring and assessing industry developments and maintaining positive relationships with key groups in the industry.

10.3.1.2 Export Contract Portfolio

Manitoba Hydro currently has a portfolio of export customers and a number of existing long-term power sales as indicated in ***Appendix 9.3 - Economic Evaluation Documentation***. Existing export contracts will expire over time and Manitoba Hydro expects, subject to resource availability, to negotiate replacement contracts with updated commercial terms and conditions. There is uncertainty as to how these negotiations will progress, and in turn how the export contract portfolio will evolve. To assist in managing the uncertainty associated with renewing or extending contracts, Manitoba Hydro contracts have a range of expiry dates. Manitoba Hydro works to maintain positive relationships with its portfolio of export customers to understand their needs, and to help ensure Manitoba Hydro's continued presence as an attractive supply option. Uncertainty with respect to price on future contracts has been addressed in the full

[5] See "*Obama says Canada a partner in US plans to make itself less dependent on oil,* The Globe and Mail, March 30, 2011."

range of energy prices used in the probabilistic analysis discussed in Section 10.1 of this chapter.

As of August 2013, negotiations have not been finalized for the proposed contract with WPS for up to 300 MW of long-term power. Discussions with WPS for varying amounts of capacity and energy have been ongoing since a term sheet was first signed with WPS in March 2008. These discussions continue and, in the event that no agreement with WPS is reached, Manitoba Hydro will consider alternative arrangements.

Manitoba Hydro has addressed the uncertainty of the potential 300 MW WPS sale by considering a range of development plans, including plans without a sale to WPS. For example, Plan 15 (K19/C25/750MW) uses the same resources as the Preferred Development Plan but does not include the potential 300 MW WPS sale. Of the 15 development plans listed in ***Chapter 9 – Economic Evaluations – Reference Scenario*** Table 9.3, only two include the potential sale to WPS for up to 300 MW.

10.3.2 New U.S. Transmission Interconnection

In order to maximize the potential benefits of Keeyask or Conawapa, a new U.S. transmission interconnection is desirable: the Preferred Development Plan includes a new interconnection with 750 MW import and export capability. As of August 2013, Manitoba Hydro and Minnesota Power are proceeding with planning and development activities for a new interconnection as outlined in ***Chapter 6 – The Window of Opportunity***, Section 6.5.3. However there are a number of business, technical and regulatory issues that need to be resolved before a commitment to the transmission project can be made. These include the capacity of the interconnection, project financing, business model and cost allocation.

Manitoba Hydro has addressed the uncertainty associated with the new interconnection by considering a range of possibilities, including development plans that do not include an

interconnection. Of the 15 development plans considered in ***Chapter 9 – Economic Evaluations – Reference Scenario*** Table 9.3, five of the plans include a 750 MW import and export interconnection, three of the plans include a 250 MW export and 50 MW import interconnection, and seven of the plans include no new interconnection.

10.3.3 Drought Worse than the Drought of Record

As detailed in ***Appendix 4.1 - Manitoba Hydro Generation Planning Criteria***, Manitoba Hydro plans its system to ensure sufficient dependable energy is available to meet projected demand in the event of a repeat of the worst drought on the hydraulic record of approximately 100 years. There is the possibility that a drought worse than the one experienced in the last 100 years will occur.

All of the development plans Manitoba Hydro has considered satisfy the Generation Planning Criteria. However, development plans with more resources within Manitoba, and development plans with a larger interconnection, such as the Preferred Development Plan, give Manitoba access to a larger portfolio of supply resources. Should a system emergency occur as a result of a drought worse than the drought of record, Manitoba Hydro would be able to access greater amounts of emergency energy with the additional 750 MW of import capability provided by the Preferred Development Plan or any other development plans that include a new 750 MW interconnection.

10.3.4 Species at Risk Act

In November 2006, as part of the *Species At Risk Act* (SARA) process, the scientific Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed Lake Sturgeon as "endangered" in most rivers in Manitoba, triggering a Fisheries and Oceans Canada (DFO) review process to consider Lake Sturgeon for listing under the SARA. In 2010 DFO conducted more thorough assessments of population status and trends, gathering the most up-to-date information from regional fisheries managers, Aboriginal traditional knowledge, academic

researchers, and consultants. These assessments indicated that more recent population trends were notably different from those in the COSEWIC assessment and, importantly, point to initial signs of population recovery. DFO is now developing a recommendation package on whether or not to list Lake Sturgeon as endangered based on current scientific data, along with the results of consultations, socio-economic assessment, and a regulatory impact analysis statement. The DFO recommendation package is to be provided to the Governor in Council, which will have up to nine months to review to accept or reject the recommendation or to send it back to COSEWIC for review and/or updating. Based on recent experience, the internal DFO review could take more than a year before it is sent to the Minister. If the Governor in Council were to return the recommendation to the COSEWIC, it is estimated that this would add at least two more years before a listing decision would be made.

Manitoba Hydro has judged the likelihood of Lake Sturgeon being listed under SARA to be low. If it were to occur, the consequence would be the delay and if permits cannot be secured under the SARA, possible cancellation of the Keeyask and Conawapa projects.

Manitoba Hydro has dealt with the risk associated with the SARA process by evaluating the impacts of the timing of the decision as well as analyzing development plans that do not include hydro-electric development. The potential timing of a SARA listing decision has been evaluated against the terms of the export power contracts, both confirmed and under negotiation. Manitoba Hydro has also evaluated development plans that do not include new hydro-electric generation should the species be listed, and permits to construct and operate new generating stations cannot be secured. As well, Manitoba Hydro is proactively continuing and expanding its commitment to Lake Sturgeon stewardship on waterways affected by hydro-electric development to demonstrate that the species does not need to be listed as endangered under the SARA for it to be protected and for populations to recover. Further information on Manitoba Hydro's Lake Sturgeon stewardship can be found in ***Appendix 2.1 - Lake Sturgeon - Mitigation and Enhancement.***

10.3.5 Aboriginal and Community Relationships

Manitoba Hydro has benefit-sharing and adverse effects agreements with the local Cree Nations for the Keeyask Project and is committed to similar agreements for the Conawapa Project, although the exact nature of the agreements will vary. There are uncertainties associated with each project. For example, in the case of the Keeyask Project, actual financial results could be inconsistent with the projections when the Keeyask Joint Development Agreement was being negotiated. With the Conawapa Project, agreements may not be achieved between the negotiating parties.

The economic circumstances of Manitoba Hydro's major projects have changed during the past several years, due in part to lower energy prices. Manitoba Hydro and Nisichawayasihk Cree Nation, its partner in Wuskwatim G.S., are currently negotiating amendments to the Wuskwatim Development Agreement to deal with this issue. Manitoba Hydro made adjustments to the Keeyask Project development approach post-Wuskwatim. The Keeyask Cree Nations (KCNs) were always aware the Keeyask financial results modeled during negotiations were done so using the forecasting information available at that time. The availability of two investment options, common and preferred, provides the KCNs with an investment choice depending upon their risk tolerance.

Manitoba Hydro is obligated to have adverse effects arrangements in place with Tataskweyak Cree Nation (TCN), York Factory First Nation (YFFN) and Fox Lake Cree Nation (FLCN) (but not including War Lake First Nation (WLFN) and Shamattawa First Nation), under the terms of existing agreements that resolved Northern Flood Agreement (NFA) implementation and the adverse effects of the Churchill River Diversion and Lake Winnipeg Regulation projects and then existing works and power developments on the Nelson and Churchill Rivers. If negotiations are not successful, then the arrangements can be arbitrated.

There is no similar legal requirement to achieve benefit sharing agreements. Rather, benefit sharing is a corporate policy decision. Manitoba Hydro was at the forefront of such agreements in Canada when it began negotiations for the Wuskwatim and Keeyask Projects, and it views benefit-sharing as a foundational element to the successful development of its potential next major hydro-electric generation project on the Nelson River, i.e. Conawapa. Manitoba Hydro is following existing Conawapa protocols and process agreements to discuss benefit agreements with the local Cree Nations.

If negotiations on adverse effects agreements were unsuccessful, the process could be sent to arbitration in the case of TCN, YFFN and FLCN. If negotiations on benefit sharing were unsuccessful, Manitoba Hydro would have to evaluate its best course of action at that time, however it would not be subject to arbitration. In the absence of successful negotiations, there could be challenges to achieving the required licenses and approvals for Conawapa in a timely manner.

Further discussion on business risks related to the Aboriginal participation is contained in ***Chapter 15 - Implementation and Risk Management Plan for Preferred Development Plan.***

10.4 Uncertainty Analysis Summary

A summary of the drivers of uncertainty, the input affected, and how Manitoba Hydro assessed the uncertainty is provided in Table 10.15. For a summary of risk mitigation actions in support of the Preferred Development Plan, please see ***Chapter 15 – Implementation and Risk Management Plan for Preferred Development Plan,*** Section 15.7, Table 15.9.

1 **Table 10.15 Economic Evaluation - Uncertainty Matrix**

Economic Evaluation - Uncertainty Matrix			
Source of Uncertainty	**Description**	**Variable Affected**	**Method of Assessment**
Key Risk Factor - Energy Prices			
Electricity Prices	Future market price of electricity (capacity and energy)	• Electricity export price forecast • Natural gas price forecast • Manitoba thermal fuel burn cost including transportation costs • Import costs	Manitoba Hydro utilizes a consensus based forecast of independent consultants that produce high, reference and low cases. Independent price forecast consultants consider a wide number of pricing factors, including natural gas prices; carbon policy, U.S. environmental policy, new resource capital costs, and MISO load growth. The full range of energy prices from low to high is considered in the probabilistic analysis of various development sequences. Also see Section 4 of Appendix 9.3 for the Electricity Export Price, Natural Gas Price and Carbon Price Forecasting Methodology. Manitoba Hydro engages in a comprehensive set of activities to address environmental policies including monitoring policy development and working with regulators, legislators, customers and the electric industry as a whole to help maintain a presence and help maintain positive relationships with key groups.
Natural Gas Prices	Future market price of natural gas		
MISO Load	MISO market region load growth		
Carbon Policy	Uncertainty towards implementation, timing and level of carbon pricing		
Other U.S. Environmental Policies	Uncertainty towards implementing a series of proposed U.S. environmental policies, their stringency and overall impact. (MATS, ash lagoon, CO_2 for new coal, CASPR, US RPS)		
Key Risk Factor - Capital Cost			
Keeyask & Conawapa Generating Stations	Labour escalation, low productivity rates and associated indirect costs.	• Capital cost of generation	Capital cost estimating contingency derived using integrated probabilistic risk model. Management reserve provides budget provisions for labour and escalation risks. A full range of capital costs is considered in the probabilistic analysis in Section 10.1. Also see Appendix 2.4 for information on developing capital cost estimates.
	Equipment and material costs (direct costs)	• Capital cost of generation	Contingency derived using integrated probabilistic risk model with support from independent consultant. A full range of capital costs is considered in the probabilistic analysis in Section 10.1. Also see Appendix 2.4.
Thermal Generation	Commodity escalation, schedule overruns and environmental legislation.	• Capital cost of generation	In capital cost estimating process engaged independent consultants to identify appropriate manufacturer/turbine models, develop cost estimates and assess systemic risks. A full range of capital costs is considered in the probabilistic analysis in Section 10.1. Also see Appendix 9.3 Section 1.1.2 Thermal G.S. - Natural Gas Fired Generation. Manitoba Hydro engages in a comprehensive set of activities to address environmental policies including monitoring policy development and working with regulators, legislators, customers and the electric industry as a whole to help maintain a presence and help maintain positive relationships with key groups.
Wind Generation	Technology advancements, commodity escalation, and policy.	• Capital cost of generation	Capital estimate developed using industry benchmarking, with independent consultant to assess systemic risks. A full range of capital costs is considered in the probabilistic analysis in Section 10.1. Also see Appendix 9.3 Section 1.1.3. Manitoba Hydro engages in a comprehensive set of activities including monitoring policy and technical development related to wind generation.
Transmission in Manitoba	Final routing, commodity escalation, schedule overruns and environmental legislation.	• Capital cost of transmission	Detailed estimates produced by Manitoba Hydro or generic per unit estimates used stage of development. A full range of capital costs is considered in the probabilistic analysis in Section 10.1. Also see Appendix 9.3 Section 1.1.4 Transmission. Manitoba Hydro engages in a comprehensive set of activities including monitoring transmission policy development, environmental policy, and working with regulators, legislators, customers and the electric industry as a whole to help maintain a presence and help maintain positive relationships with key groups.
Key Risk Factor- Economic Indicators			
Exchange Rate (CAD/USD)	Future exchange rates	• Electricity export revenues	Utilize a consensus based forecast of major banks and independent consultants for a forecast of future rates. As part of Manitoba Hydro's foreign currency exchange risk on U.S. dollar export revenues, Manitoba Hydro maintains a natural hedge with U.S. dollar cash flows, including outflows from U.S. denominated debt. A range of domestic inflation rates is incorporated into the real discount rate. A range of discount rates from low to high is considered in the probabilistic analysis in Section 10.1. The rate for the Provincial Guarantee Fee is set by the Government of Manitoba who will balance overall social interests.
Inflation Rates (U.S. & Cdn)	Future inflation rates	• Electricity export revenues	
Long-term Canadian Interest Rate	Future interest rates	• Real discount rate	
Provincial Debt Guarantee Fee	Future provincial debt guarantee fee	• Real discount rate	
Specific Risk Factor- Drought			
Multi year drought	Extended periods of low flows in the hydraulic system	• Export volumes • Export revenues • Import costs • Adequate dependable supply of energy	Economic impact of drought is considered through use of 99 year flow record. Specific impact of a five year drought is considered in the sensitivity analysis in Section 10.2.1. Financial impact of drought considered in Chapter 11. Generation Planning Criteria provide direction in ensuring an adequate dependable supply of energy.
Specific Risk Factor- Climate Change			
Long-Term Climate Change	Impact on precipitation and temperature	• Water inflow impact on energy production • Load forecast	Sensitivity analysis of revenue impact from lower or higher flow scenarios resulting from climate change is considered in Section 10.2.2. Electric load forecast includes change to temperature as a result of climate change as a possible event.
Specific Risk Factor- Manitoba Load/ DSM			
Manitoba Load Growth	Potential for higher/lower than expected load forecast. Also potential for large load addition or subtraction	• Amount of surplus energy and capacity in the system • Need for new resources	Sensitivities to 10% and 90% Manitoba load forecast and impact on the need for new resources is considered in Section 10.2.3.
Manitoba DSM	Future Power Smart programs and customer response	• Amount of surplus energy and capacity in the system	Sensitivities to 1.5 times and 4 times 2013 PowerSmart Plan DSM levels considered in Section 10.2.3. Engaged EnerNOC to work with Manitoba Hydro to assess the 20-year potentials of energy efficiency for electricity (See Appendix 4.3)

Source of Uncertainty	Description	Variable Affected	Method of Assessment
Specific Risk Factor- In-Service Date Delays			
Delay of Plant ISDs	Delay of Plant ISDs	• Export revenues • Capital cost of generation	Sensitivity Analysis to In-service delay considered in Section 10.2.4.
Other Risk Factors			
Export Contract Portfolio	Uncertainty in the renewal of export contracts which will be the subject of future negotiations, final terms of WPS contract not determined	• Export contract prices and volumes • Export revenues	Diversity of export customers and contract terms is maintained as are positive customer relationships. A full range of energy prices is considered in the probabilistic analysis in Section 10.1. Development plans without the WPS Sale are considered.
New US Transmission Interconnection Capacity & Ownership	Final design and capital allocation among proponents	• Capital costs • Export volumes	Studies include development plans with no new interconnection, 250 MW interconnection, and 750 MW interconnection with alternative ownership models.
Drought worse than drought on record	A drought worse than the drought of record used for system energy planning occurs	• Ability to serve Manitoba load • Export revenues	Development plans with a new 750 MW interconnection can provide additional amounts of dependable energy through curtailment of exports under certain circumstances and through energy imports which together approximate 5,000 to 6,000 GWhs per year when compared to other plans. See Appendix 9.3.
Market Access	Potential for legal or regulatory restrictions which would prevent Manitoba Hydro's surplus power from reaching the competitive marketplace free from unreasonable legal, regulatory, structural or tariff barriers	• Export revenues	Impact is similar to low export prices, which are considered in the probabilistic analysis. See Chapter 10 Section 10.3.4. Additional surplus energy from development plans with hydro options can be used for long-term sales, which reduces market access concerns.
Species at Risk Act	Potential for the listing of Lake Sturgeon under the Species at Risk Act	• Delay or cancelation of Keeyask or Conawapa	The economic evaluations include consideration of development plans that are not contingent on Keeyask or Conawapa. See Chapter 10 Section 10.3.5.
Aboriginal and Community Relationships/Agreements	Uncertainty of the final form of agreements with Aboriginal communities and the ongoing relationships as impacted by the agreements	• Long-term relationships and future development potential	Benefit sharing and adverse effects agreements completed for Keeyask and in progress for Conawapa. Without such agreements, there could be barriers to Conawapa licensing and approvals. See Chapter 10 Section 10.3.6. Continued regulatory and negotiation progress will assist with Aboriginal and community support.
System reliability	Risk of loss of system capability to deliver power from the bulk power system to the load.	• System load carrying capability and cost of expected unserved load	All development plans meet reliability requirement. Plans with a new interconnection increase system reliability. See Chapter 13 Section 13.3.2 Manitoba Hydro Customer Account - Reliability.

1

Tab 93

MANITOBA
ORDER IN COUNCIL

DATE:	**April 17, 2013**
ORDER IN COUNCIL NO.:	**00128 / 2013**
RECOMMENDED BY:	**Healthy Living, Seniors and Consumer Affairs**

ORDER

1. The Public Utilities Board (the "PUB") is assigned the conduct of a Needs For and Alternatives To review (an "NFAT review") of Manitoba Hydro's proposed preferred development plan, which includes the Keeyask and Conawapa Generating Stations, their associated domestic alternative current ("AC") transmission facilities, and a new Canada-United States of America ("USA") transmission interconnection.

2. Arthur Mauro and Mel Lazareck are appointed as members of the PUB, for the purpose of participating in the NFAT review, with terms to expire on such date as the PUB has fully completed its assigned duties in respect of the NFAT review, unless their appointments are revoked before that date by the Lieutenant Governor in Council.

3. The NFAT review will be conducted in accordance with the attached Terms of Reference.

4. This Order is effective on the date it is made.

AUTHORITY

The Public Utilities Board Act, C.C.S.M. c. P280, states:

> **Membership of board**
> **4** The board shall be composed of such number of members, not less than three, as the Lieutenant Governor in Council may determine.
>
> **Appointment of members**
> **7** The members shall be appointed by the Lieutenant Governor in Council, and shall be paid such remunerations as determined by the Lieutenant Governor in Council.
>
> **Term of office**
> **9** Each member shall hold office during pleasure of the Lieutenant Governor in Council.
>
> **Power of board to perform assigned duties**
> **107** The board may perform duties assigned to it
> …
> (b) by order of the Lieutenant Governor in Council; or
> …
> and Part I, in so far as it is applicable, applies to the carrying out of duties so assigned.

BACKGROUND

1. The Government of Manitoba wishes to have the PUB conduct an NFAT review of Manitoba Hydro's proposed preferred development plan for meeting a growing provincial demand for electricity and for taking advantage of export opportunities, which includes the Keeyask and Conawapa Generating Stations, their associated AC transmission facilities, and a new Canada-USA transmission interconnection, in accordance with the attached Terms of Reference.

2. Arthur Mauro and Mel Lazareck are being appointed to provide the PUB with the necessary capacity and expertise for the NFAT review. Manitoba has requested the chair of PUB to designate these new members, under subsection 15(6) of *The Public Utilities Board Act*, as the members who will conduct the NFAT review, together with any other members of PUB as he deems necessary for purposes of the review.

Tab 94

Needs For and Alternatives To

APPENDIX 2.3

Economic Impact Assessment

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Economic Impact Assessment

Economic Impact Assessment - Overview

Economic impact analysis (EIA) provides an estimate of the total employment impacts as well as estimates of the total Gross Domestic Product, tax revenue impacts, and labour income of a project on the economies of Manitoba and the rest of Canada. It indicates not only the potential impacts generated directly by the project, but also the potential spin-off effects generated as a result of purchases on domestic goods and services and the local recirculation of increased income.

Methodology

The economic modeling framework used for estimating the economic impacts is the Manitoba Bureau of Statistics' Input-Output model. The model is based on statistical information about the flow of goods and services among various sectors of Manitoba's economy. In effect, it allows one to trace the demands placed on one industry resulting from increased activity in another. Thus the model provides estimates of direct, indirect, and induced impacts of the proposed projects on the economy of Manitoba and Canada. In summary, economic impact analysis refers to three different types of impacts:

- **Direct impacts.** These refer to the income and employment generated by the project itself.
- **Indirect impacts**. These refer to the income and employment that develop in other industries as the effects of the initial expenditures for the project work through the provincial and national economies. For example, direct expenditures on vehicles will create an indirect increase in spending on fuel and vehicle repair services.
- **Induced impacts**. As a result of the spending and subsequent re-spending of the direct and indirect income generated by the project, there will be induced impacts /effects upon the consumer goods industries as well as the industries which supply them. This leads to more spending on food, housing, entertainment, transportation, and all of the other expenses that make up a typical household budget.

Economic Impact Analysis are reported with the following data:

- **Employment** is a straightforward measure of the number of person-years of employment (full-time job equivalents) that are generated by the project, including direct employment, indirect employment with suppliers to the main project, and induced employment that is associated with the extra spending by households. **A**

Person-year is defined as one person being fully employed for one year. **Direct employment** is on-site direct employment of Manitoba Hydro (including incremental Manitoba Hydro off-site employees) and contractor employees, which are directly generated by the project; **other direct employment** is employment of **direct** suppliers to support the main project; **indirect employment** is employment of people who supply raw materials, equipment, or services to the initial direct suppliers of the project; and **induced employment** is the employment of people as a result of the spending and subsequent re-spending of the direct and indirect income generated by the project.

- **Labour Income** is the additional income earned by workers as a result of the project. Labour income is an important contributor to economic growth and is a large component of GDP. Availability of labour income enables consumers to buy products and services to support and expand local industry. Total Labour Income represents the sum of wages, supplementary labour income, and net income of unincorporated business.

- **Gross Domestic Product (GDP)**. Also referred to as "value-added," GDP represents the additional value of production that is generated by the project after removing the cost of intermediate inputs. For the purpose of this analysis, GDP at market price is reported. GDP at market price is the total value of goods and services produced in Manitoba's economy.

- **Tax Revenue**. Tax revenue is calculated for all three levels of government – federal, provincial, and local. These government revenues do not include capital tax, water rentals and any greenhouse gas taxes associated with the projects (which are considered in the MA-BCA). Tax revenues are based upon the 2012/13 Manitoba Budget and 2009 income tax data, adjusted to current rates.

The analysis is based on cost estimates as of 2012. Any changes to the cost estimates may lead to changes in the economic impacts presented in this report. The economic impact analysis does not include interest and escalation during construction, costs associated with pre-project planning, design, and training, costs associated with environmental studies, any potential local development payments, and contingency costs.

While economic impact analysis can be a useful component in decision making, it does have some limitations. Economic impact analysis differs from socio-economic benefit-cost analysis in that it is a gross, rather than net, measure of benefits and it only considers the impact of project expenditures. It does not consider the opportunity cost of labour and capital in the

project nor does it consider the revenue generated by the project. By itself, it cannot measure the profitability of the project. Thus, the results of this study should be treated as general estimates and never as absolutes.

Potential Economic Impacts for NFAT

The estimated economic impacts for the preferred development plan are summarized in Table 1. A summary of the economic impacts for the Keeyask and Conawapa are also provided in Tables 2 and 3, respectively. Descriptions of the preferred development plan, and the Keeyask and Conawapa projects, can be found in chapter 2 of the NFAT filing. Economic impacts have been calculated separately for construction and operational phases of each project. Impacts during the construction phase include cumulative employment, labour income, GDP, and tax revenue impacts generated over the entire construction period. Impacts during the operating and maintenance phase include the annual impacts (employment, labour income, GDP, and tax revenues) generated for a typical year of operation when the project is at full operation. The total person years of employment during operation and maintenance can be calculated by taking the estimate for a typical year and multiplying it by the operating life of the project.

Table 1. ECONOMIC IMPACTS OF THE PREFERRED DEVELOPMENT PLAN

Manitoba - Economic Impacts of the Preferred Development Plan[1,2]

	Keeyask		Conawapa		North-South Upgrades	750 MW Interconnection	
	Construction	O&M[3]	Construction	O&M[3]	Construction	Construction	O&M[3]
Employment (person years)							
Project Direct	2,436	39	3,238	42	171	119	1
Other Direct	2,175	2	1,831	2	164	124	0
Indirect and Induced	3,736	29	4,234	33	251	255	1
Total Employment (person-years)	8,347	70	9,303	77	586	498	2
Labour Income	$ 635,169	$ 5,921	$ 761,233	$ 6,597	$ 48,627	$ 35,195	$ 123
GDP ($millions)	$ 843,908	$ 6,872	$ 983,334	$ 7,676	$ 67,189	$ 50,209	$ 149
Tax Revenues ($ millions)							
Provincial	204,340	831	$ 256,096	$ 931	$ 13,954	$ 16,069	22
Local	40,915	162	$ 45,807	$ 182	$ 2,186	$ 2,478	$ 5
Federal	161,059	988	195,872	1,099	12,538	10,714	23
Total Tax Revenue ($ millions)	$ 406,314	$ 1,981	$ 497,776	$ 2,212	$ 28,679	$ 29,261	$ 51

Rest of Canada - Economic Impacts of the Preferred Development Plan[1]

	Keeyask		Conawapa		North-South Upgrades	750 MW Interconnection	
	Construction	O&M[3]	Construction	O&M[3]	Construction	Construction	O&M[3]
Employment (person years)							
Project Direct	2,532	-	3,915	-	-	0	-
Other Direct	3,198	1	3,448	1	219	144	0
Indirect and Induced	10,414	16	13,601	18	386	444	1
Total Employment (person-years)	16,144	17	20,964	19	605	588	1
Labour Income	$ 1,021,350	$ 648	$ 1,402,932	$ 734	$ 30,606	$ 24,977	$ 23
GDP ($millions)	$ 1,440,223	$ 1,054	$ 1,997,461	$ 1,184	$ 54,676	$ 39,642	$ 37
Tax Revenues ($ millions)							
Provincial	$ 251,927	$ 117	$ 342,663	$ 132	$ 7,546	$ 7,146	$ 5
Local	$ 66,289	$ 31	$ 90,164	$ 35	$ 1,986	$ 1,880	$ 1
Federal	$ 307,444	$ 128	$ 426,252	$ 144	$ 10,935	$ 12,437	$ 5
Total Tax Revenue ($ millions)	$ 625,660	$ 276	$ 859,080	$ 311	$ 20,467	$ 21,463	$ 12

All of Canada - Economic Impacts of the Preferred Development Plan[1]

	Keeyask		Conawapa		North-South Upgrades	750 MW Interconnection	
	Construction	O&M[3]	Construction	O&M[3]	Construction	Construction	O&M[3]
Employment (person years)							
Project Direct	4,967	39	7,154	42	171	119	1
Other Direct	5,374	3	5,279	4	383	268	0
Indirect and Induced	14,151	45	17,834	50	637	700	1
Total Employment (person-years)	24,491	87	30,267	96	1,191	1,086	2
Labour Income	$ 1,656,519	$ 6,569	$ 2,164,166	$ 7,331	$ 79,233	$ 60,173	$ 145
GDP ($millions)	$ 2,284,131	$ 7,926	$ 2,980,795	$ 8,860	$ 121,865	$ 89,851	$ 186
Tax Revenues ($ millions)							
Provincial	$ 456,268	$ 948	$ 598,759	$ 1,063	$ 21,501	$ 23,215	$ 27
Local	$ 107,204	$ 193	$ 135,972	$ 217	$ 4,172	$ 4,358	$ 7
Federal	$ 468,502	$ 1,116	$ 622,124	$ 1,243	$ 23,474	$ 23,150	$ 29
Total Tax Revenue ($ millions)	$ 1,031,974	$ 2,257	$ 1,356,855	$ 2,523	$ 49,146	$ 50,724	$ 62

[1] 2014 dollars

[2] Total may not add, due to rounding

[3] Average annual expenditures

Table 2. ECONOMIC IMPACTS OF THE KEEYASK PROJECT

Manitoba - Economic Impacts of the Keeyask Project[1]

	Infrastructure		Generation		Transmission[2]		Total[3]	
	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]
Employment (person years)								
Project Direct	277	-	2,014	38	145	1	2,436	39
Other Direct	122	-	1,887	2	166	0	2,175	2
Indirect and Induced	290	-	3,089	28	358	1	3,736	29
Total Employment (person-years)	689	-	6,990	68	668	3	8,347	70
Labour Income	$ 50,054	$ -	$ 532,748	$ 5,708	$ 52,367	$ 212	$ 635,169	$ 5,921
GDP ($millions)	$ 66,408	$ -	$ 706,393	$ 6,618	$ 71,107	$ 254	$ 843,908	$ 6,872
Tax Revenues ($millions)								
Provincial	$ 19,186	$ -	$ 171,154	$ 796	$ 14,000	$ 35	$ 204,340	831
Local	$ 3,454	$ -	$ 34,745	$ 154	$ 2,716	$ 8	$ 40,915	$ 162
Federal	$ 13,340	$ -	$ 135,280	$ 948	$ 12,438	$ 40	$ 161,059	$ 988
Total Tax Revenue ($ millions)	$ 35,980	$ -	$ 341,180	$ 1,898	$ 29,153	$ 83	$ 406,314	$ 1,981

Rest of Canada - Economic Impacts of the Keeyask Project[1]

	Infrastructure		Generation		Transmission[2]		Total[3]	
	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]
Employment (person years)								
Project Direct	69	-	2,463	-	-	-	2,532	-
Other Direct	405	-	2,644	1	149	0	3,198	1
Indirect and Induced	904	-	9,047	15	464	1	10,414	16
Total Employment (person-years)	1,378	-	14,153	16	613	1	16,144	17
Labour Income	$ 69,526	$ -	$ 925,178	$ 617	$ 26,647	$ 31	$ 1,021,350	$ 648
GDP ($millions)	$ 111,145	$ -	$ 1,285,069	$ 1,005	$ 44,009	$ 49	$ 1,440,223	$ 1,054
Tax Revenues ($millions)								
Provincial	$ 19,954	$ -	$ 225,519	$ 111	$ 6,455	$ 6	$ 251,927	$ 117
Local	$ 5,250	$ -	$ 59,340	$ 29	$ 1,698	$ 2	$ 66,289	$ 31
Federal	$ 26,236	$ -	$ 272,249	$ 121	$ 8,959	$ 7	$ 307,444	$ 128
Total Tax Revenue ($ millions)	$ 51,440	$ -	$ 557,108	$ 261	$ 17,113	$ 15	$ 625,660	$ 276

All of Canada - Economic Impacts of the Keeyask Project[1]

	Infrastructure		Generation		Transmission[2]		Total[3]	
	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]
Employment (person years)								
Project Direct	346	-	4,477	38	145	1	4,967	39
Other Direct	527	-	4,531	2	315	0	5,374	3
Indirect and Induced	1,194	-	12,135	43	821	2	14,151	45
Total Employment (person-years)	2,067	-	21,144	84	1,281	3	24,491	87
Labour Income	$ 119,580	$ -	$ 1,457,926	$ 6,325	$ 79,014	$ 243	$ 1,656,519	$ 6,569
GDP ($millions)	$ 177,553	$ -	$ 1,991,462	$ 7,623	$ 115,116	$ 302	$ 2,284,131	$ 7,926
Tax Revenues ($millions)								
Provincial	$ 39,140	$ -	$ 396,673	$ 907	$ 20,455	$ 41	$ 456,268	$ 948
Local	$ 8,705	$ -	$ 94,086	$ 184	$ 4,414	$ 10	$ 107,204	$ 193
Federal	$ 39,576	$ -	$ 407,529	$ 1,069	$ 21,397	$ 46	$ 468,502	$ 1,116
Total Tax Revenue ($ millions)	$ 87,421	$ -	$ 898,288	$ 2,159	$ 46,266	$ 98	$ 1,031,974	$ 2,257

[1] 2014 dollars

[2] Includes: Generation Outlet Transmission, Construction Power T-Line, Construction Power Station, Switching Station

[3] Total may not add, due to rounding

[4] Average annual expenditures

Table 3. ECONOMIC IMPACTS OF THE CONAWAPA PROJECT

Manitoba - Economic Impacts of the Conawapa Project[1]

	Generation		Transmission[2]		Total[3]	
	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]
Employment (person years)						
Project Direct	3,203	42	35	0	3,238	42
Other Direct	1,823	2	9	0	1,831	2
Indirect and Induced	4,191	32	42	0	4,234	33
Total Employment (person-years)	9,217	77	86	0	9,303	77
Labour Income	$ 753,486	$ 6,574	$ 7,748	$ 23	$ 761,233	$ 6,597
GDP ($millions)	$ 973,953	$ 7,648	$ 9,382	$ 28	$ 983,334	$ 7,676
Tax Revenues ($millions)						
Provincial	$ 253,873	$ 927	2,224	$ 4	$ 256,096	$ 931
Local	$ 45,499	$ 181	$ 308	$ 1	$ 45,807	$ 182
Federal	$ 193,934	$ 1,094	$ 1,938	$ 4	$ 195,872	$ 1,099
Total Tax Revenue ($ millions)	$ 493,305	$ 2,202	$ 4,470	$ 10	$ 497,776	$ 2,212

Rest of Canada - Economic Impacts of the Conawapa Project[1]

	Generation		Transmission[2]		Total[3]	
	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]
Employment (person years)						
Project Direct	3,915	-	-	-	3,915	-
Other Direct	3,430	1	18	0	3,448	1
Indirect and Induced	13,542	18	58	0	13,601	18
Total Employment (person-years)	20,887	19	77	0	20,964	19
Labour Income	$ 1,399,571	$ 730	$ 3,362	$ 4	$ 1,402,932	$ 734
GDP ($millions)	$ 1,991,780	$ 1,178	$ 5,681	$ 7	$ 1,997,461	$ 1,184
Tax Revenues ($millions)						
Provincial	$ 341,849	$ 131	$ 814	$ 1	$ 342,663	$ 132
Local	$ 89,950	$ 35	$ 214	$ 0	$ 90,164	$ 35
Federal	$ 424,846	$ 143	$ 1,407	$ 1	$ 426,252	$ 144
Total Tax Revenue ($ millions)	$ 856,645	$ 309	$ 2,434	$ 2	$ 859,080	$ 311

All of Canada - Economic Impacts of the Conawapa Project[1]

	Generation		Transmission[2]		Total[3]	
	Construction	O&M[4]	Construction	O&M[4]	Construction	O&M[4]
Employment (person years)						
Project Direct	7,118	42	35	0	7,154	42
Other Direct	5,253	4	27	0	5,279	4
Indirect and Induced	17,734	50	101	0	17,834	50
Total Employment (person-years)	30,105	96	163	0	30,267	96
Labour Income	$ 2,153,056	$ 7,055	$ 11,109	$ 27	$ 2,164,166	$ 7,331
GDP ($millions)	$ 2,965,733	$ 8,524	$ 15,063	$ 35	$ 2,980,795	$ 8,860
Tax Revenues ($millions)						
Provincial	$ 595,722	$ 1,058	$ 3,038	$ 5	$ 598,759	$ 1,063
Local	$ 135,449	$ 216	$ 523	$ 1	$ 135,972	$ 217
Federal	$ 618,780	$ 1,237	$ 3,344	$ 5	$ 622,124	$ 1,243
Total Tax Revenue ($ millions)	$ 1,349,951	$ 2,511	$ 6,905	$ 12	$ 1,356,855	$ 2,523

[1] 2014 dollars

[2] Includes GOT and Station Upgrades

[3] Total may not add, due to rounding

[4] Average annual expenditures

Tab 95

NEEDS FOR AND ALTERNATIVES TO (NFAT)

Manitoba Hydro Undertaking #70

Manitoba Hydro to describe the socio-economic benefits to non-Aboriganl northern communities and to Aboriginal communities who are non-partners of Manitoba Hydro in a matrix format, in a similar style as to what was provided for environmental effects in responses to CAC/MH 231 a).

RESPONSE:

The response to CAC/MH 231a provides a high level overview of the socio-economic effects to all Aboriginal and northern residents, including those who are members of the Partner communities. The information provided in CAC/MH-I 231a is further expanded upon in MMF/MH-II 40a, which provides further analysis on the socio-economic effects of the alternative development options in matrix and written format, including a consideration of employment and business opportunities, housing, health and resource use. The response to MMF/MH-II 40a also provides commentary, where feasible, on the differences in socio-economic effects between communities in the vicinity of the Keeyask and Conawapa Generation Projects and other Aboriginal and non-Aboriginal residents in Northern Manitoba. MMF/MH-II 40a has been reattached here for reference purposes.

The Keeyask Project is the only project within the PDP or among its alternatives for which detailed socio-economic assessments have been undertaken; as such, it is the only project for which it is possible to separate out in detail the benefits for partner communities and others in northern Manitoba.

Details on the socio-economic benefits of the Keeyask Infrastructure Project, the Keeyask Generation Project and the Keeyask Transmission Project are available in the EIS documents submitted for each of these projects and can be found primarily in the sections on Economy. The attached Table 1 summarizes these differences at a high level based on predictions made in the EIS – it is important to remember that these are predictions only and that actual benefits realized may be different.

Table 1: Keeyask Generation Project: Summary of Socio-economic Benefits for Northern Manitobans

	Keeyask Cree Nations	Northern Aboriginal Residents	Other Northern Residents
Direct Employment[1] • **Construction**	- *Infrastructure:* Up to 110 person years - *Generation:* 235 to 600 person years - *Transmission:* Not separately estimated by component; the JKDA designates the construction power station and the clearing and construction of the Construction Power Line Right of Way as Direct Negotiated Contracts. - *Other:* 35-40 person years through other project-related opportunities (e.g., participation in project monitoring)	- *Infrastructure:* up to 138 person years, including KCNs employment - *Generation:* 550-1700 person years of employment, including KCNs employment; roughly 315-1100 person of employment, excluding KCNs employment - *Transmission:* Not separately estimated by component; all components not covered by the JKDA may be directly negotiated or publicly tendered. The Transmission Line Agreement will be applicable for wages and benefits on the projects and the contract documents will set out the first preference hiring for Northern Aboriginals.	- *Infrastructure:* No separate analysis undertaken - *Generation:* No separate analysis undertaken - *Transmission:* No separate analysis undertaken
• **Operation**	All positions estimated to be located in the North. Approximately 45% of 50 positions estimated to be Aboriginal. A minimum of 182 positions have been targeted to KCNs members across Manitoba Hydro operations (not Keeyask-specific) as a commitment in the JKDA.	All positions estimated to be located in the North. Approximately 45% of 50 positions estimated to be Aboriginal.	All positions estimated to be located in the North. Approximately 45% of 50 positions estimated to be Aboriginal.
Business • **Direct Negotiated Contracts**	To date, roughly $390M negotiated with the KCNs (at time of EIS writing, this value was estimated at $203M (in 2007 $) based on the JKDA negotiations).	N/A	N/A

	Keeyask Cree Nations	Northern Aboriginal Residents	Other Northern Residents
• **Open-Tendered Contracts**	Generally prohibited from bidding on open-tendered contracts due to "insider information". See JKDA Article 13 for more information.	Manitoba Hydro's Northern Purchasing Policy would apply for tendered work. . No estimate available on the dollar value of work that could accrue.	Manitoba Hydro's Northern Purchasing Policy would apply for tendered work. . No estimate available on the dollar value of work that could accrue.
• **Sub-Contracts**	Bid-depository mechanism to facilitate sub-contracting opportunities for the KCN on the Keeyask Project. Possible opportunities to bid on sub-contract work for the Keeyask Generation and Keeyask Transmission Projects. No estimate available on the dollar value of work that could accrue.	Possible opportunities to bid on sub-contract work for the Keeyask Generation and Keeyask Transmission Projects. No estimate available on the dollar value of work that could accrue.	Possible opportunities to bid on sub-contract work for the Keeyask Generation and Keeyask Transmission Projects. No estimate available on the dollar value of work that could accrue.
Training	Funded to participated in the Hydro Northern Training & Employment Initiative (HNTEI): - KCNs: $32.7M; 1108 participants	MMF and MKO funded to participated in the Hydro Northern Training & Employment Initiative (HNTEI): - MMF: $4.8M; 149 participants - MKO: $9.7M; 1015 participants - NCN: $10.9M; 398 participants - WKTC Ops: $2.2M	N/A
Income & Governance	Through the JKDA, partners in the Keeyask Infrastructure and Keeyask Generation projects: - Can purchase up to 25% equity ownership shares (15% for Cree Nations Partners; 5% each for York Factory and Fox Lake) and will receive revenue stream based on investment - Participation in Project governance, including seats on General Partner Board of Directors and all Project-related committees. - As proponent, participation in monitoring activities, including community-specific ATK monitoring contracts and participation in technical science monitoring.	N/A	N/A

Table Notes:

1. Estimates of indirect employment have not been undertaken for each of the identified categories; overall estimates of indirect employment for Manitoba and Canada are included in CAC/MH-I 230a.

Manitoba Hydro

Needs For and Alternatives To
MMF/MH II-040a

SUBJECT: Socio-economic impacts

REFERENCE: MMF/MH I-038a

PREAMBLE: The information presented in the "Socio-economic Comparison of Resource Options" table (CAC/MH 1-231a) is not complete, or detailed enough, to allow for an understanding of the socio-economic effects of the resource options. Further, it presents very general information for all of the components of the PDP, but the same type and level of information is not provided in the NFAT submission, or to subsequent Round 1 IRs, including MMF/MH 1-004a, MMF/MH 1-004c, MMF/MH 1-038a, MMF/MH 1-039a, MMF/MH 1-046a, for the alternatives and other options.

It is still not clear whether, or how, the PDP is superior to the alternatives in even the most general socio-economic terms, and with respect to the Metis in particular.

QUESTION:

Please provide a matrix, consistent with the "Socio-economic Comparison of Resource Options" (CAC/MH 1-231a) that describes the same socio-economic parameters for each of the 15 development plans described in Chapter 8.

RESPONSE:

The response to CAC/MH I-231(a) compared the macro environmental and socio-economic effects of Keeyask, Conawapa, gas turbines, wind generation, demand-side management (DSM), the Manitoba-Minnesota Transmission Interconnection Project and the North-South Transmission Upgrade Project. Five critical environmental characteristics and five socio-economic characteristics were identified that, at a macro level, may differentiate potential effects of the various resource options from each other.

Each of the 15 development plans has various combinations of the resource options. All plans must be able to meet Manitoba Hydro's expected domestic load and existing firm export

commitments. Several development plans share similar resource options, although the timing as to when each option would be developed differs. For the purposes of this macro-level analysis, 12 of the 15 plans can be placed into three groups:

- Group A (Keeyask, Conawapa, 3 SCGTs, and North-South Upgrade): Plans 1, 2, 4, 6, 8 and 12. All but Plan 12 also include a new U.S. Interconnection.
- Group B (Keeyask, gas turbines and U.S. Interconnection): Plans 3, 5, 7.
- Group C (Keeyask or Conawapa and gas [no U.S. Interconnection]): Plans 11, 13 and 14.

The following are the plans that do not fit into a group:

- Plan 9 ('all gas' with no interconnection).
- Plan 10 (gas turbines and wind farms with no interconnection).
- Plan 15 (wind farms, Conawapa and gas turbines with no interconnection).

This response first examines employment and business opportunities. It then examines Infrastructure and Services; Personal, Family and Community Life; and Resource Use.

Table 1 (MMF/MH II-040a): Manitoba and Canada Employment

DEVELOPMENT PLAN		CONSTRUCTION (Person Years)			OPERATIONS (Person Years)			TOTAL (Construction + Operations)		
		All of Manitoba	Rest of Canada	Total – All of Canada	All of Manitoba	Rest of Canada	Total – All of Canada	All of Manitoba	Rest of Canada	Total – All of Canada
1. (PDP)	K19/C25/750MW WPS Sale & Investment in 750 MW Interconnection Gas: SCGT in '41, '44, '46	19,200	40,100	59,300	4,500	1,600	6,100	23,700	41,700	65,500
2.	K19/C25/750MW No WPS / resources same as above. Gas: SCGT in '41, '44, '46	19,200	40,100	59,300	4,500	1,600	6,100	23,700	41,700	65,500
3.	K19/Gas25/750MW WPS Sale & Investment Gas: SCGT in '25, '26, '28, '31, '33, '45, '47 (LM); CCGT in '42.	10,500	22,200	32,700	7,500	6,400	13,900	18,000	28,700	46,600
4.	K19/C31/750MW Gas: SCGT in '41, '44, '46	19,200	40,100	59,300	4,000	1,500	5,500	23,300	41,600	64,900
5.	K19/Gas 31/750MW Gas: SCGT in 2 x '31, 32, '34, '43; CCGT in '39, '45	10,700	22,900	33,700	7,800	5,800	13,500	18,500	28,700	47,200
6.	K19/C25/250MW Gas: SCGT in '40, '44, '46	19,000	39,700	58,700	4,500	1,700	6,200	23,500	41,400	64,900
7.	K19/Gas 24/250MW Gas: 'SCGT in 24, '29; CCGT in '32, '38, '41, '45	11,000	24,000	35,000	7,200	6,800	13,900	18,200	30,700	48,900

8.	K19/C31/250MW Gas: SCGT in '24, '29, '46	19,000	39,700	58,700	5,600	3,200	8,700	24,600	42,900	67,500
9.	All Gas SCCT in '22, '25, '28, ' 34, '47 (LM); CCGT in '31, '37, '40, '44	2,800	9,100	11,900	7,400	8,800	16,300	10,300	17,900	28,200
10.	Wind/Gas Gas: SCGT in '25 (2x), '28, '31, '33, '36, '38, '40, '43, '45, '47 (LM) Wind: 2 x 65 MW in '22, 23, '24; 1 x 65 MW in each year from '27 – '47			11,100			17,100			28,200
11.	K22/Gas Gas: SCGT in '29, '32; CCGT in '34, '38, '41, '45	10,750	23,800	34,500	6,400	6,000	12,400	17,100	29,800	46,900
12.	K22/C29 Gas: SCGT in '40, '44, '46	18,700	39,500	58,300	4,000	1,500	5,500	22,700	41,000	63,800
13.	SCGT/C26 SCGT in '22, '38, '41, '43, '45	10,200	24,000	34,100	4,200	3,100	7,200	14,300	27,000	41,400
14.	CCGT/C26 Gas: SCGT in '39, '42, '44, '47; CCGT in '22	10,500	25,000	35,500	4,800	4,400	9,200	15,300	29,300	44,700
15.	Wind/C26 Wind: 2 x 65 MW in '22, '23, '24 Gas: SCGT in '36, '38, '41, '43, '45			34,800			5,600			40,400

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Notes:

- Totals may not add due to rounding.
- Further info about employment estimates is available in Table 4.

Table 2 (MMF/MH II-040a): Aboriginal and Northern Employment and Local Business Opportunities

	ABORIGINAL AND NORTHERN EMPLOYMENT		LOCAL BUSINESS OPPORTUNITIES
	Construction (person years)	**Operations** (positions)	
Group A Keeyask, Conawapa, gas, N-S Upgrade (all but one plan also includes a new U.S. Interconnection)	Keeyask: 500 - 1700 Conawapa: substantial (not yet estimated) N-S upgrade: much smaller than K or C (not yet estimated) U.S. interconnection: nil for northerners; relatively small for southern Aboriginals (not yet estimated). Gas: relatively small for southern Aboriginals (not yet estimated)	Keeyask: All positions estimated to be located in the North. Approximately 45% of 50 positions estimated to be Aboriginal. A minimum of 182 positions have been targeted to KCN members across Manitoba Hydro operations. Conawapa: All positions estimated to be located in the North. Approximately 45% of 60 positions estimated to be Aboriginal. N-S upgrade and U.S. interconnection: minimal Gas: relatively small for southern Aboriginals (not yet estimated)	Keeyask: substantial ($200 million in contracts for KCN businesses) Conawapa: substantial (not yet estimated) N-S upgrade: clearing contracts, other local contracts (not yet estimated) U.S. interconnection: (not yet estimated) Gas: nil for northern businesses; local southern business opportunities (small relative to Keeyask, but not yet estimated); potential for opportunities for southern Aboriginals (not yet estimated)
Group B Keeyask, gas, U.S. interconnection	Same as A, but without Conawapa	Same as A, but without Conawapa	Same as A, but without Conawapa
Group C Keeyask or Conawapa, gas	Similar as B, but with either Keeyask or Conawapa and without U.S. Interconnection.	Similar as B, but with either Keeyask or Conawapa and without U.S. Interconnection.	Similar as B, but with either Keeyask or Conawapa and without U.S. Interconnection.
Plan 9 All gas	Relatively small for southern Aboriginals (not yet estimated).	Relatively small for southern Aboriginals (not yet estimated).	Nil for northerners; local southern opportunities; potential for opportunities for southern Aboriginals (not yet estimated).

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Plan 10 Wind farms, gas turbines	Relatively small for southern Aboriginals (not yet estimated).	Relatively small for southern Aboriginals (not yet estimated).	Nil for northerners; local southern opportunities, including benefits for southern landowners on whose property wind turbines would be located; potential for opportunities for southern Aboriginals (not yet estimated).
Plan 15 Wind and Conawapa	Conawapa: substantial (not yet estimated) Wind: Relatively small for southern Aboriginals (not yet estimated).	Conawapa: All positions estimated to be located in the North. Approximately 45% of 60 positions estimated to be Northern Aboriginal. Wind: Relatively small for southern Aboriginals (not yet estimated).	Conawapa: substantial (not yet estimated) Wind: nil for northerners; local southern opportunities, including benefits for southern landowners on whose property wind turbines would be located; potential for opportunities for southern Aboriginals (not yet estimated).

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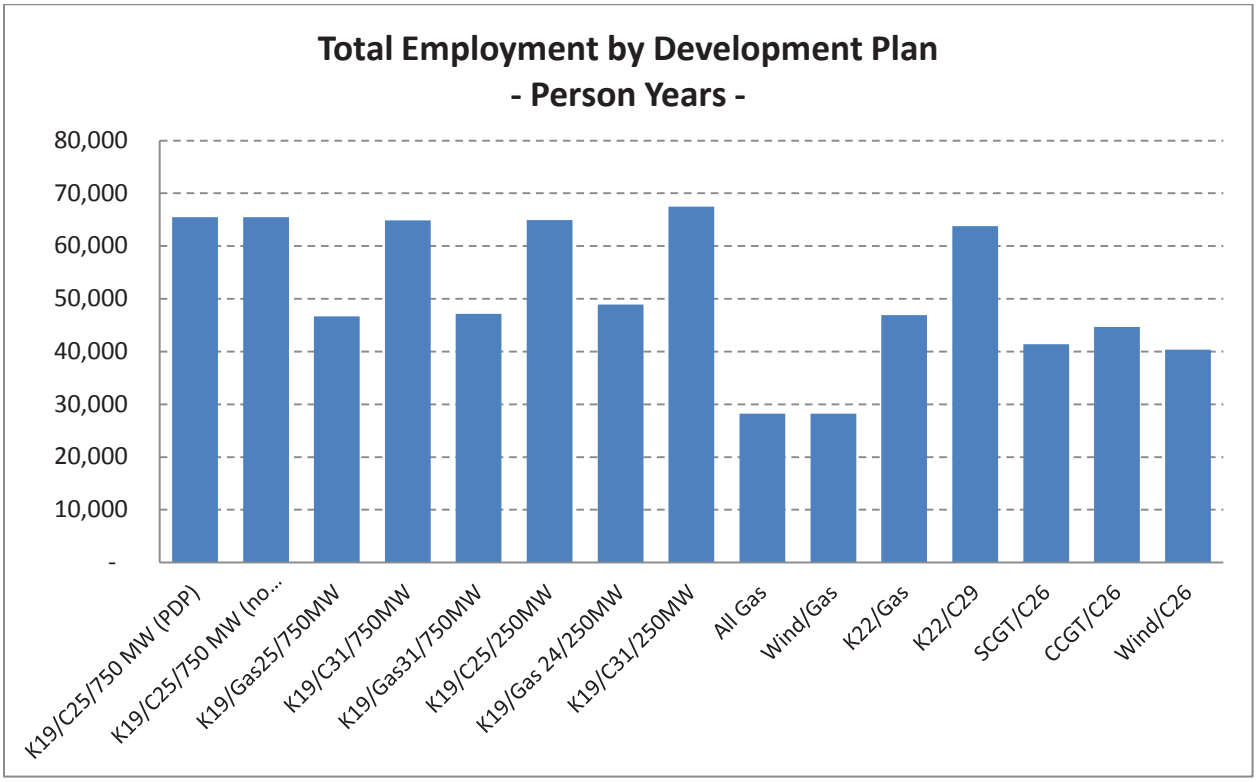
Manitoba and Canada Employment (also see Table 1)

Employment in CAC/MH I-231a was presented into two categories, construction and operations. Construction was reported in person years of employment, and operations in the number of positions per year.

In preparing the response to MMF/MH II-040a, Manitoba Hydro estimated the operational jobs in person years, in order to provide a fuller comparison between the various development plans. This was accomplished by multiplying the number of operational jobs associated with a particular resource option by the number of years the respective resource options would operate during the NFAT review's 35-year time horizon (to 2047). With construction and operational positions both estimated in person years, it was possible to estimate and compare the total employment opportunities associated with each development plan. These data are presented in Table 1 and are illustrated below in Figure 1 (MMF/MH II-040a).

Figure 1 (MMF/MH II-040a): Total Employment by Development Plan



Plans with both Keeyask and Conawapa (Group A) would result in the most employment opportunities, with employment ranging from 22,700 to 24,600 person years in Manitoba and 63,800 to 65,500 in Canada. Plans with just Keeyask but more gas turbines than plans in Group A would result in employment ranging from 18,000 to 18,500 person years in Manitoba and 46,600 to 48,900 in Canada. Employment estimates for plans in Group C (with Keeyask or Conawapa plus gas, but no U.S. Interconnection) ranged from 14,300 to 17,100 for Manitoba and 41,400 to 46,900 for Canada. For the all-gas plan (Plan 9), the estimates were 10,300 for Manitoba and 28,200 for Canada. Data were not available to break down provincial and national employment for wind-related development plans. However, total employment for Plan 15 (Conawapa, wind and gas) is estimated at 40,400 person years, and for Plan 10 (wind and gas), 28,200.

Aboriginal and Northern Employment (also see Table 2)

Group A development plans (i.e. plans with both Keeyask and Conawapa) would result in substantial Aboriginal and northern employment. Plans in Groups B and C (with either Keeyask or Conawapa, but not both) would have a corresponding decrease in Aboriginal and northern employment. Plans relying more on gas and wind would likely result in no specific benefits for northern residents and Aboriginal people.

CAC/MH I-231(a) noted that Aboriginal and Northern employment estimates have been calculated for construction of the Keeyask Project (with a range of 500 – 1700 persons), but not for any other projects. The response to CAC/MH I-231(a) also suggested Aboriginal and northern employment to construct Conawapa would be greater than with Keeyask. Upon review, Manitoba Hydro has revised that statement. Because of the current preliminary nature of the Conawapa planning process, it is more appropriate to expect that Aboriginal and northern employment on Conawapa would be substantial, rather than suggesting it would be greater than Keeyask. Aboriginal and northern people can also expect to gain employment among the 50 and 60 operating positions associated with Keeyask and Conawapa, respectively (Aboriginal workers are estimated to constitute 45% of Manitoba Hydro's northern workforce). As well, under the Joint Keeyask Development Agreement, 182 positions in Manitoba Hydro's existing operations (not necessarily only Keeyask) have also been targeted for Keeyask Cree Nation members.

Gas generating stations and wind farms, which would be located in southern Manitoba, would provide little, if any, benefit to northern residents. Whereas Aboriginal employment opportunities are greatly enhanced through preference provisions for the Keeyask and Conawapa projects, it is unknown at this time if preferences (as well as the nature of any preferences) would be provided for gas and wind projects in southern Manitoba. There would be opportunities for southern Aboriginal construction employment, but this has not been

estimated to date. The chart provided in this response has been revised accordingly from that contained in CAC/MH I-231(a).

There would be potential Aboriginal employment opportunities, similar to those in other Manitoba Hydro facilities, during the operational phase of a gas plant, but this has not been estimated to date. Employment opportunities have not yet been estimated for the two transmission projects. Some short-term jobs may be associated with the clearing contract and possibly the general contractor. Short-term opportunities would exist for northern and Aboriginal workers on the North-South Transmission Project. The response to PUB/MH II-499(a) sets out preferences for the Manitoba – Minnesota and North – South Upgrade transmission projects.

For further discussion regarding the plans' impacts on the demand for labour, including Northern and Aboriginal labour, please see Sections 13.3.4 and 13.3.6 of the NFAT submission.

Business Opportunities (also see Table 2)

Similar to the Aboriginal and northern employment opportunities, estimates have only been developed for the Keeyask Project. The Keeyask Cree Nations are expected to negotiate construction-related contracts worth over $200 million for Keeyask. The response to MMF/MH II-037(b) also notes all contracts not designated as Direct Negotiated Contracts with the KCNs will be procured through an open tender process and, as such, it is not possible to estimate the dollar amount of contracts that may be filled by northern and Aboriginal businesses other than the KCNs. All northern and Aboriginal businesses, other than the KCNs, will have the opportunity to submit tenders on this work as well as subcontracting opportunities on a number of contracts. The KCNs will have an opportunity to bid on subcontracting opportunities via the bid depository process as outlined in the Joint Keeyask Development Agreement.

The Conawapa ownership arrangement is not yet finalized, but Manitoba Hydro is committed to achieving long-term, sustainable benefits for Aboriginal communities in the vicinity of the project with a focus on income, training, employment and business opportunities.

With transmission projects, local contractors such as northern Aboriginal communities may be awarded clearing contracts.

Local southern businesses could earn modest opportunities with gas and wind projects. Local landowners could also expect to benefit from wind turbines on their land. No specific benefits associated with wind and gas projects have been identified for northern residents. In the past, wind projects have been developed through an Independent Power Producer arrangement; the wind developer would be responsible for procuring all materials and services directly. There may be business opportunities for southern Aboriginal businesses, but this has not been estimated to-date. With respect to gas projects managed by Manitoba Hydro directly, tendering documents could include local or Aboriginal preference clauses. This has not been determined to-date and would depend on the specific context of the project.

Table 3 (MMF/MH II-040a): Housing, Health and Resource Use

		Infrastructure and Services (Housing)	Personal, Family and Community Life (Health)	Resource Use
1. (PDP)	K19/C25/750MW WPS Sale & Investment in 750 MW Interconnection Gas: SCGT in '41, '44, '46	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices
2.	K19/C25/750MW No WPS / resources same as above. Gas: SCGT in '41, '44, '46	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices

3.	K19/Gas25/750MW WPS Sale & Investment Gas: SCGT in '25, '26, '28, '31, '33, '45, '47 (LM); CCGT in '42.	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices
4.	K19/C31/750MW Gas: SCGT in '41, '44, '46	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices
5.	K19/Gas 31/750MW Gas: SCGT in 2 x '31, 32, '34, '43; CCGT in '39, '45	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices
6.	K19/C25/250MW Gas: SCGT in '40, '44, '46	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. Hunting, trapping, fishing and gathering Agricultural equipment and practices
7.	K19/Gas 24/250MW Gas: 'SCGT in 24, '29; CCGT in '32, '38, '41, '45	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices

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8.	K19/C31/250MW Gas: SCGT in '24, '29, '46	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering Agricultural equipment and practices
9.	All Gas SCCT in '22, '25, '28, ' 34, '47 (LM); CCGT in '31, '37, '40, '44		Water quality	E.g. hunting, trapping, fishing and gathering
10.	Wind/Gas Gas: SCGT in '25 (2x), '28, '31, '33, '36, '38, '40, '43, '45, '47 (LM) Wind: 2 x 65 MW in '22, 23, '24; 1 x 65 MW in each year from '27 – '47		Water quality Noise Water quality	E.g. hunting, trapping, fishing and gathering
11.	K22/Gas Gas: SCGT in '29, '32; CCGT in '34, '38, '41, '45	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering
12.	K22/C29 Gas: SCGT in '40, '44, '46	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering
13.	SCGT/C26 SCGT in '22, '38, '41, '43, '45	Housing	Worker interaction with local northern residents Mercury Water quality	Hunting, trapping, fishing and gathering
14.	CCGT/C26 Gas: SCGT in '39, '42, '44, '47; CCGT in '22	Housing	Worker interaction with local northern residents Mercury Water quality	E.g. hunting, trapping, fishing and gathering
15.	Wind/C26 Wind: 2 x 65 MW in '22, '23, '24 Gas: SCGT in '36, '38, '41, '43, '45	Housing	Water quality Noise Mercury	E.g. hunting, trapping, fishing and gathering

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Housing (also see Table 3)

Housing was identified in the response to CAC/MH I-231(a) as the parameter for review under the category of Infrastructure and Services.

Workers hired to construct Keeyask and Conawapa (i.e. development plans in Groups A, B and C) would be housed in well-equipped construction camps, and infrastructure and services will be expanded to meet the growing workforce of Gillam, the operational centre for Manitoba Hydro's northern hydroelectric generating system. The use of a job referral service for the construction of these projects, rather than hiring workers directly at site, is expect to reduce in-migration of off-reserve First Nations workers into their home communities, as these potential workers do not need to relocate to be hired for work on the projects. In addition, there are limited local accommodations available and these communities are generally located some distance from the project site (note, though, that the Fox Lake community of Bird is closer than Gillam to Conawapa).

Crews constructing transmission lines, gas turbines or wind farms would likely be housed in local communities. Transmission crews may also be housed in temporary remote camps.

For further discussion about housing, please see Manitoba Hydro's response to CAC/MH I-231(a).

Personal, Family and Community Life (also see Table 3)

Health was the parameter identified for discussion under Personal, Family and Community Life in the response to CAC/MH I-231(a). Different plans (or groups of plans) will affect health differently.

Negative interactions between non-local construction workers and local residents is an important concern related to plans with Keeyask and/or Conawapa (plans in Group A, B and C). Several measures are being planned to limit such adverse effects (see the response to CAC/MH

I-231(a)). It is also possible that this may be a concern for southern developments, such as gas and wind, depending on the size of the workforce and the nature of their accommodations.

A second important health-related concern associated with Keeyask and Conawapa is increasing levels of mercury in fish, as a result of project flooding. The response to CAC/MH I-231(a) erroneously indicated that mercury is not a concern for the Conawapa project. Rather, as noted in the response to PUB/MH II-499(i), it is anticipated that, given the limited amount of upstream flooding associated with Conawapa, mercury will be of considerably less concern than it was for Keeyask. This aspect of the Conawapa project will be thoroughly assessed and reviewed with in-vicinity Cree nations and regulators, and appropriate mitigation measures will be determined based on the assessment findings. In the case of Keeyask, several mitigation measures are being planned to manage this effect (see CAC/MH I-231(a)) through long-term monitoring and the provision of relevant, accurate information so that consumers can make informed consumption decisions. Keeyask and/or Conawapa are included in all plans except 9 and 10.

The health concern associated with wind farms (i.e. Plans 10 and 15) is wind turbine sound. Health Canada is currently collaborating with Statistics Canada on an epidemiological study related to this topic.

The health concern identified in the response to CAC/MH I-231(a) related to gas turbines is not at the generating station itself, but rather “upstream” where natural gas is extracted. The United States Environmental Protection Agency is currently undertaking a study of the potential impacts of hydraulic fracturing (or ‘fracking’) on potable water. All development plans include some gas turbines. They are most prevalent in Plans 9 and 10, and least prevalent in Group A plans.

For discussion about health effects, please see the response to CAC/MH I-231(a).

Resource Use (also see Table 3)

Resource use includes domestic and commercial use of lands and resources, including hunting, trapping, fishing, gathering, mining, forestry and other activities. Typically, of primary concern are domestic hunting, trapping, fishing and gathering by Aboriginal people as these activities provide access to healthy foods and are important to many people's cultural identity. In southern Manitoba, where gas and wind are likely to be located, agriculture is a primary resource use.

Development plans that include hydropower plants have a greater potential to affect traditional resource use activities. Group A plans (Plans 1, 2, 4, 6, 8 and 12) have the most potential to affect resource use, followed by groups B, C and Plan 15. Agreements have been reached with the Keeyask Cree Nations to address Keeyask effects (for example, by providing alternative harvesting opportunities) and similar approaches are anticipated with Conawapa. The Manitoba Metis Federation is concerned programs and agreements have not been developed specifically for the Metis, although to date no evidence has been provided to indicate that this is required or that planned project-related mitigation measures available to all resource users will not be appropriate for Metis harvesters. Manitoba Hydro, on behalf of the Keeyask Hydropower Limited Partnership, has provided funding to the MMF to undertake a Metis-specific Traditional Land Use and Knowledge Study, Socio-economic Impact Assessment and historical narrative for the Keeyask region. These studies, originally to be completed by October 2013, were planned for completion in late February 2014. The Partnership has committed to review the results of these studies, once available, to determine whether additional or enhanced mitigation measures are required.

The Group A and B plans also include a new U.S. Interconnection, which has the potential to interfere with agricultural practices and other local resource users. Manitoba Hydro employs a

comprehensive site selection process to avoid or minimize potential impacts of transmission projects on people and the environment.

Wind farms (i.e. Plans 10 and 15) have the potential to affect aerial spraying of agricultural crops.

Gas turbines are unlikely to affect local resource users. However, the “upstream” exploration and production of natural gas, and transmission facilities (e.g. pipelines) may affect resource harvesting in other jurisdictions.

For more information about the effects on resource use, please see the response to CAC/MH I-231(a).

Table 4, which follows, provides the data upon which the calculations for Table 1 are based.

Table 4 (MMF/MH II-040a): Employment Estimates by Resource Option

	CONSTRUCTION PHASE			OPERATIONAL PHASE		
	Manitoba	Rest of Canada (Does not include Manitoba)	Total – All of Canada	Manitoba	Rest of Canada (Does not include Manitoba)	Total – All of Canada
Keeyask						
- Project Direct Employment	2,436	2,532	4,967	39	0	39
- Other Direct Employment	2,175	3,198	5,374	2	1	3
- Total Direct Employment	4,611	5,730	10,341	41	1	42
- Indirect and Induce Employment	3,736	10,414	14,151	29	16	45
- Total: Direct, Indirect and Induced Employment	8,347	16,144	24,492	70	17	87
Conawapa						
- Project Direct Employment	3,238	3,915	7,154	42	0	42
- Other Direct Employment	1,831	3,448	5,279	2	1	4
- Total Direct Employment	5,070	7,363	12,433	44	1	46
- Indirect and Induce Employment	4,234	13,601	17,834	33	18	50
- Total: Direct, Indirect and Induced Employment	9,304	20,964	30,267	77	19	96
SCGT						
- Project Direct Employment	45	65	110	52 (per 2 plants)	0 (per 2 plants)	52 (per 2 plants)
- Other Direct Employment	44	131	175	10 (per 2 plants)	19 (per 2 plants)	28 (per 2 plants)
- Total Direct Employment	89	197	285	61(per 2 plants)	19 (per 2 plants)	80 (per 2 plants)
- Indirect and Induce Employment	82	404	486	36 (per 2 plants)	86 (per 2 plants)	122 (per 2 plants)
- Total: Direct, Indirect and Induced Employment	171	601	771	97(per 2 plants)	105(per 2 plants)	202(per 2 plants)

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CCGT						
- Project Direct Employment	129	184	312	94 (per 2 plants)	0 (per 2 plants)	94 (per 2 plants)
- Other Direct Employment	144	375	519	14 (per 2 plants)	42 (per 2 plants)	55 (per 2 plants)
- Total Direct Employment	273	559	832	108 (per 2 plants)	42 (per 2 plants)	149 (per 2 plants)
- Indirect and Induce Employment	242	1043	1285	60 (per 2 plants)	181 (per 2 plants)	241 (per 2 plants)
- Total: Direct, Indirect and Induced Employment	515	1602	2117	168 (per 2 plants)	223 (per 2 plants)	390 (per 2 plants)
Wind (65 MW)						
- Project Direct Employment						
- Other Direct Employment						
- Total Direct Employment			58			6
- Indirect and Induce Employment			53			3
- Total: Direct, Indirect and Induced Employment			111			9
750 MW Interconnection						
- Project Direct Employment	119	0	119	1	0	1
- Other Direct Employment	124	144	268	0	0	0
- Total Direct Employment	243	144	387	1	0	1
- Indirect and Induce Employment	255	444	700	1	1	1
- Total: Direct, Indirect and Induced Employment	498	588	1,087	2	1	2
250 MW Interconnection						
- Project Direct Employment	70	0	70	1	0	1
- Other Direct Employment	63	84	146	0	0	0
- Total Direct Employment	132	84	216	1	0	1
- Indirect and Induce Employment	100	149	249	1	0	1
- Total: Direct, Indirect and Induced Employment	232	233	465	2	0	2
North-South Transmission Upgrade						
- Project Direct Employment	171	0	171	n/a	n/a	n/a
- Other Direct Employment	164	219	383			
- Total Direct Employment	335	219	554			
- Indirect and Induce Employment	251	386	637			
- Total: Direct, Indirect and Induced Employment	586	605	1,191			

Notes:

- Keeyask includes the Keeyask Infrastructure Project, Generation Project and Transmission Project; Conawapa include the Generation Project, Generation Outlet Transmission Project, and Generation Outlet Station Upgrades; North-South Upgrade includes transmission lines and switching station; 750 MW and 250 MW Interconnection includes the transmission line and switching station; SCGT and CCGT Project Direct Employment totals do not include estimated, on-site foreign staff of 6 and 17 workers, respectively.
- Project Direct Employment data for all but the wind farms are internal MH estimates; Other Direct Employment, Indirect and Induce Employment data for all but the wind farms are outputs from the Manitoba Bureau of Statistics.
- SCGT & CCGT Operation and Maintenance estimates are based on two plants per site.
- Direct employment estimate for wind farms was based on Manitoba Hydro Range of Resource Options report (Appendix 7.2 of the NFAT submission) and Indirect and Induced employment estimates were based on the report, Economic Impact of the Greenwich Wind Farm (March 2012 by the Crupi Consulting Group), available at http://www.crupi.biz/assets/files/economic-impact-of-the-greenwich-wind-farm.pdf. Accessed January 17, 2014.
- Totals may not add due to rounding.

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Tab 96

CAC Exhibit #85-1
Transcript Page #8881-8884, 8888-8894, 8942, 8954-8956

Information Accepted Subject to Check, April 28, 2014

The following information is provided in response to the information Dr. Melanie O'Gorman accepted subject to check on April 28, 2014. The original transcript pages are included in the electronic version but will not be included in the paper version.

Response:

All figures mentioned by Jack London below have been updated in a revised appendix to our report, which is attached. The only exception is the rates of return estimates for total economic benefits stemming from the project. This is provided below:

Returns to Cash Investment in the Keeyask Project for the KCN communities for each phase of the project

	Low estimate	High estimate
Construction period	$95,175 income/$2.25 million investment = 4.23%	$95,175 income/$2.25 million investment = 4.23%
First 5 years post-construction period - 1.9% equity holding	$1.06 million income/$25 million investment = 4.23%	$3.63 million income/$25 million investment = 14.52%
After 5 years, post-construction - 1.9% equity holding	$1.06 million income/$25 million investment = 4.23%	$3.8 million income/$25 million investment = 15.2%
First 5 years post-construction period - 2.5% equity holding	$1.06 million income/$25 million investment = 4.23%	$4.83 million income/$25 million investment = 19.32%
After 5 years, post-construction - 2.5% equity holding	$1.06 million income/$25 million investment = 4.23%	$5 million income/$25 million investment = 20%

We do not believe that estimates of investment returns should include benefits such as construction or operational jobs, as these benefits would occur regardless of investment by the KCN communities, as they are not only financial partners in the project. To capture total economic benefits accruing to the KCNs from their partnership in the Keeyask project, we reproduce our updated Table 6 from our report below:

Table 6: Illustrative Total Annual Economic Benefits (Direct and Indirect Benefits) for KCNs from the Keeyask Project, Assuming Preferred Unit Equity Option		
	Estimated Range of Benefit	
Period	Low estimate	High estimate
During construction phase – estimated total annual benefits	**$10.26 million/year**	**$20.67 million/year**
Construction phase total benefits per capita	**$1,616/year**	**$3,255/year**
After construction phase – 1.9% equity ownership, which includes:		
Investment income (first 5 years post-construction)	$1.06 million/year	$3.63 million/year
Investment income (6 years onward)	$1.06 million/year	$3.8 million/year
Manitoba Hydro funding for operational jobs	$1.23 million/year	$1.23 million/year
Labour income from operational jobs	$5.9 million/year	$11.8 million/year
Multiplier effect	$1.39 million/year	$3.09 million/year
Estimated Total Benefits (6 years post-construction)	**$9.58 million/year**	**$19.92 million/year**
Estimated Benefits per capita (6 years post-construction)	**$1,509/year**	**$3,137/year**
After construction phase – 2.5% equity ownership, which includes:		
Investment income (first 5 years post-construction)	$1.06 million/year	$4.83 million/year
Investment income (6 years onward)	$1.06 million/year	$5 million/year
Manitoba Hydro funding for operational jobs	$1.23 million/year	$1.23 million/year
Labour income from operational jobs	$5.9 million/year	$11.8 million/year
Multiplier effect	$1.39 million/year	$3.33 million/year
Estimated Total Benefits (6 years post-construction)	**$9.58 million/year**	**$21.36 million/year**
Estimated Benefits per capita (6 years post-construction)	**$1,509/year**	**$3,364/year**

If we did take total economic benefits for each phase of the project to be the 'return' to KCN investment, Jack London's assertion that the rates of return would be very high is correct. This is show below:

Rates of Return to Cash Investment, Assuming Investment Returns Include Total Economic Benefits		
	Low estimate	High estimate
During construction phase – estimated total annual benefits	456%	919%
Post construction phase - 1.9% equity holding (6 years post-construction)	38%	80%
Post construction phase - 2.5% equity holding (6 years post-construction)	38%	85%

Again, we do not believe it is appropriate to consider total economic benefits as investment income.

Regarding Sven Hombach's questions, I confirm that voter turnout in the last Winnipeg Mayoral election was 47.1%

(http://www.winnipeg.ca/clerks/docs/elections/2010Election/pdfs/2010ElectionOfficialResults.pdf) and voter turnout in the last Federal election was 61.1% (http://www.elections.ca/content.aspx?dir=turn&document=index&lang=e&section=ele).

Appendix 1: An Illustration of Economic Benefitsof the Keeyask Model[1]

In this section, potential economic benefits for the KCNs from the Keeyask project are estimated. The Keeyask project is expected to bring a wide range of economic benefits for the KCNs. In this section we present scenarios for the construction and operational periods of the Keeyask project, to illustrate the potential magnitude of benefits arising from the Keeyask project for KCN Members. We begin by first discussing increased employment and business opportunities during the construction period.[2]

Economic Benefits During the Construction Period

Employment Benefits – Construction Jobs

This section summarizes labour income to Keeyask communities flowing from the project. The job target for KCN Members for the construction phase of the Keeyask project is 630 person years of employment. Given an estimated total person years of employment of 4,225, KCN members would hold 15% of total projected construction jobs on the Keeyask project if the target is met.[3]

KHLP (2012) provides an estimate of the total economic benefit to job creation resulting from the construction phase of the Keeyask project (page 3-105 to 3-106), shown in Table 2 below. The low estimate corresponds to the total wage bill if the lowest wage within a job category (construction support, non-designated and designated trades) applied, while the high estimate corresponds to the total wage bill if the highest wage within a job category applied. The Partnership notes that most of the labour income stemming from the construction phase of the project will come from employment on the DNCs (KHLP (2012), page 3-105).

Employment Benefits – Operational Jobs

In the JKDA Benefits Summary (Manitoba Hydro (2013a)), it is noted that "Manitoba Hydro and the KCNs have agreed to a 20 year target for the employment of 182 Members of the KCNs in Manitoba Hydro's ongoing operations. The funding quantam agreed to in the JKDA for this initiative is $20 million and the 20-year period is 2009-2029" (page 3). This funding is included as an economic benefit in Table 2 below, referred to as Manitoba Hydro funding for Operational employment[4].

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1 Please note that calculations in this Appendix do not include the increase in capital costs for the Keeyask project reported by Manitoba Hydro at the NFAT hearings on March 10, 2014.

2 While recognizing the economic flows resulting from the Keeyask project will be reflective of the ebbs and flows of the construction schedule, for the purposes of the illustrative scenarios below we take averages of economic benefits flowing from each phase of the project.

3 There is risk that the KHLP will not meet that target. The BNA notes that "regardless of the hiring preferences in place, all employment will be conditional on each applicant having the required qualifications for the job." (http://keeyask.com/wp/the-project/employment) As noted above, 1,876 individuals were trained through the HNTEI, however this statistic includes those that have only taken one course (WKTC (2010)). After taking one course through the HNTEI, a person could still be deemed 'unqualified'.

4 Please note that the multiplier is not applied to funding for the operational employment in Table 1.

Income will also accrue to KCN members who obtain operational jobs with Manitoba Hydro. For sake of clarity I provide the detailed assumptions made by Michael Cobb (Hobbs and Associates, correspondence on May 9, 2014) regarding the magnitude of operational employment income in the table below:

*Table 1: Income from Operational Jobs**

	High estimate		Low estimate	
	Jobs filled	Total earnings	Jobs filled	Total earnings
2016-17	18	$1,123,632	9	$561,816
2017-18	36	$2,292,209	18	$1,146,105
2018-19	54	$3,507,080	27	$1,753,540
2019-20	72	$4,769,629	36	$2,384,815
2020-21	90	$6,081,277	45	$3,040,639
2021-22	108	$7,443,483	54	$3,721,742
2022-23	126	$8,857,745	63	$4,428,872
2023-24	144	$10,325,600	72	$5,162,800
2024-25	162	$11,848,626	81	$5,924,313
2025-26	182	$13,577,647	91	$6,788,824
2026-27	182	$13,849,200	91	$6,924,600
2027-28	182	$14,126,184	91	$7,063,092
2028-29	182	$14,408,708	91	$7,204,354
	Total income:	**$112,211,022**		**$56,105,511**
* Salaries are increased by the rate of inflation since 2014, assumed to be 2% per year.				

For a low estimate of income stemming from operational employment, it is assumed that KCN members will secure 9 operational jobs per year, and for the high estimate, 18 members per year are assumed to secure operational jobs. Each job has been assumed to have an annual salary of $60,000 (information from Jane Kidd-Hantscher). Included in Table 2 below is the average income for the period 2016/7-2020/1.

Business Opportunities

Construction of the Keeyask project will bring opportunities for businesses owned by KCN individuals through Direct Negotiated Contracts (DNCs). A value of $203.1 million in DNCs has been reserved for KCN contractors however total business contracts for KCN contractors are now estimated to total $450 million. This amounts to 20% of the overall value of construction (estimated at $2.2 billion (KHLP (2012), page 3-123)).[5]

[5] Assuming that profits account for 10% of business income --the rate of profit is used by InterGroup Consultants Inc. on page 3-106 of KHLP (2012)-- business profits would be $33.75 million if KCN Members owned 75% of businesses undertaking DNCs. We take this as our high estimate of business profits from DNCs. However if KCN Members owned only 50% of DNCs, then half of the $45 million profit from DNCs would accrue to KCN members ($22.5 million). We take this as our low estimate of business profits from DNCs.

Investment Income

Given the initial $2.25 million investment made by the KCNs at the beginning of the construction period, they will start to receive investment income upon Initial Closing which is assumed to be in early July 2014[6]. They will receive the Preferred Minimum Distribution over this period, which is an annual payment equal to a KCN's own cash invested multiplied by the Thirty Year Rate minus 1.5%. Hence as long as the Thirty Year Rate is greater than 1.5%, the KCNs will see a stable stream of investment income with this option.

To illustrate the magnitude of investment income, in Table 2 below we assume the Thirty Year Rate is equal to 5.73%, the average of the Thirty Year rate using the average long-term Government of Canada bond rate as a proxy for the 30 year Government of Canada bond rate, and the average long-term Provincial bond rate as a proxy for the Manitoba 30 year bond rate, both for the period 1983-2012. Subtracting 1.5% from the Thirty Year Rate of 5.73% gives a Preferred Minimum Distribution Rate of 4.23%.[7]

Multiplier effects

As more KCN Members who have been hired to work on the Keeyask project have incomes to spend, demand for goods and services in other (non-Hydro) sectors will increase in the KCNs. That is, if workers spend their incomes in the KCN communities, they will create increased demand for all goods and services in the KCNs which will lead to further employment in the KCNs, further spending, and so on. We refer to this as the multiplier effect for the Keeyask project.

The within-province total multiplier for Manitoba for 2009 was 1.4 (Statistics Canada (2009)). We decrease this multiplier to 1.2 to account for the fact that a large portion of income stemming from the Keeyask project will be spent in Gillam, Thompson and even Winnipeg . Using this multiplier, if aggregate wages and business income stemming from the Keeyask project were $55 million, an additional $11 million of economic activity would be generated through the multiplier effect. The extent to which this happens will depend on how broadly the benefits are spread. If many KCN Members obtain employment, this multiplier effect would be greater.

Investment income may be used to build housing, local roads or water infrastructure in the KCNs. It is appropriate then to calculate a multiplier effect for infrastructure spending as well. Infrastructure multipliers are used to calculate the increase in output that results from a given increase in infrastructure spending in a given geographic region. Estache (2010) notes that infrastructure multipliers may range from 1.2 – 2.0. We assume that the infrastructure multiplier equals the lower bound of this range (1.2) in the calculations below.

An illustration of total economic benefits during the construction period

In Table 2 below we sum the annual economic benefits during the construction period of the Keeyask project. It is evident that there is a great deal of variance in the expected economic benefits resulting from the Keeyask project. However even if the high estimate of Keeyask benefits were realized, total economic benefits per KCN member would depend on how such benefits were distributed between all KCN Members.

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6 The annual payment of invesmtment income during construction will be $2,250,000*0.0423=$95,175.

7 All figures for investment income reported in Tables below may be taken as final income, given that such income is tax-free according to an advance tax ruling secured by the KCNs (communication with Jack London, May 9, 2014).

A uniform distribution of the economic benefits from Keeyask is not assured by the JKDA in its present form.[8]

Table 2: An Illustration of the Economic Benefits for the KCNs from the Construction period (2014-2021) of the Keeyask Project

	Estimated Range of Benefit	
Item	Low estimate	High estimate
Total and annual labour income from Keeyask construction employment	$21.6 million (KHLP (2012), page 3-105, Table 3-25) or $3.09 million/year	$62.2 million (KHLP (2012), page 3-105, Table 3-25) or $8.89 million/year
Total and annual business profits during construction period of the project	$22.5 million or $3.21 million/year	$33.75 million or $4.82 million/year
Investment income	$95,175/year	$95,175/year
Annual labour income from Operational employment	$1.27 million/year	$2.53 million/year
Manitoba Hydro funding for Operational employment	$1.06 million/year	$1.06 million/year
Multiplier effect	$1.53 million/year	$3.25 million/year
Potential annual income for construction period of the project	**$10.26 million**	**$20.67 million**

Economic Benefits Post-Construction

Income from Operational Jobs

As above, for a low estimate of operational employment income, 9 KCN members are assumed to obtain new operational jobs with Manitoba Hydro each year in the post-construction phase, while 18 KCN members are assumed to obtain new jobs in the high estimate case. With each job assumed to have an annual salary of $60,000, average earnings stemming from operational employment during the post-construction phase is provided in Table 3 (taking 2021-29 as the post-construction phase in Table 1).[9]

Table 3: An Illustration of Income for KCN Members from Operational Jobs

	Estimated Range of Benefit	
Item	Low estimate	High estimate
Total income for 182 individuals securing operational jobs for the 20 year post-construction period	$5.9 million/year	$11.8 million/year

[8] Funds will flow to the KCNs to support the Adverse Effect Agreements (AEAs), however such funding has not been included in the calculation in this Appendix. This is because the AEAs are meant to compensate for and mitigate adverse effects of the Keeyask project.

[9] Please note that no multiplier effect has been added to estimates of investment income in Tables 3, 4 and 5 below. The multiplier effect is taken into account in Table 6.

Investment Income

The KCNs have two options for investment in the Keeyask project. The first option is for KCNs to hold their investment in the form of Common Units. As the KCNs would receive investment income proportionate to the Partnership's financial performance with this option, investment income stemming from this option would be highly uncertain. In times of low financial performance, the KCNs could receive no distributions from the project but will still be repaying loans from Manitoba Hydro, which means there is the potential for significant losses with this option. A hypothetical return for this option is very difficult to calculate given that it would depend on many factors whose expected value we are not aware of.[10]

The second option for investment in the Keeyask project is the Preferred Unit option. A KCN Investment Entity that decides to hold its investment in the form of Preferred Units will not have to repay its loans provided by Manitoba Hydro Credit Facilities. This option guarantees a return on KCN investment. In particular, this return will be the higher of the Preferred Minimum Distribution and the Preferred Participating Distribution[11].

As noted above, the Preferred Minimum Distribution is an annual payment equal to a KCN's own cash invested multiplied by the Thirty Year Rate minus 1.5%. Assuming that aggregate KCN own cash invested is $25 million , the Preferred Minimum Distribution would be $1.06 million per year.

If however revenue of the Keeyask project were high, the Preferred Participating Distribution would be the higher distribution for the Preferred Unit Option. This distribution provides an annual payment equal to the following proportions of Adjusted Gross Revenue (AGR) for each 1% share of KCN equity:
- 0.8% of AGR for AGR < $250 million
- 1.2% of AGR for $250 million <AGR < $1 billion
- 1.6% of AGR for AGR > $1 billion

Assuming that aggregate KCN own cash invested of $25 million plus revenue sharing (during commissioning of the 7 turbines) bring total KCN investment to $29,450,000 (in the case of 1.9% equity ownership), the Preferred Participating Distribution would be $3.63 million per year. This is $250 million x 0.008 x 1.9 minus $168,618.83[12]. If KCN own cash invested plus revenue sharing instead totaled $38.75 million (in the case of 2.5% equity ownership), the Preferred Participating Distribution would be $4.83 million per year ($250 million x 0.008 x 2.5 minus minus $168,618.83).

Below we illustrate investment income for the KCNs if their combined investment in the project were 1.9% (Table 4) and 2.5% (Table 5)[13]. For the low estimate of investment income in each table, we

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10 The assumption that the KCNs opt for Preferred Shares is also made in Information Request response CAC/MH 1-022 a) (Manitoba Hydro (2013b)).

11 In its NFAT submission Manitoba Hydro assumed the Preferred Unit Option – this is explained in Information Request response CAC/MH II-006 a).

12 The latter deduction occurs in the first 5 years of the post construction phase provided the KCN's preferred distribution is, after the deduction, greater than the minimum distribution. If that is not the case then the deduction is deferred until the years that preferred distributions are large enough. The amount deducted is the balance on the Common Unit Distribution Credit at Final Closing which is the sum of all distributions, plus interest charges, made during the construction period (communication with Michael Cobb, May 10, 2014).

13 This is the range of KCN equity investment assumed by Manitoba Hydro in the response to Information Request MIPUG/MH 1-017a) (Manitoba Hydro (2013b), page 59).

assume the Partnership experiences zero AGR, and the KCNs receive the Preferred Minimum Distribution for their cash invested ($25 million). For the high estimate in each table, we assume AGR of $250 million and the KCNs receive the Preferred Participating Distribution[14]. This information provided is for illustrative purposes and any distribution will naturally be a function of the magnitude of KCN investment and of the AGR in any particular year.

Table 4: An Illustration of the Investment Income for the KCNs during the Operational period of the Keeyask Project - 1.9% Preferred Equity Holding

	Estimated Range of Benefit	
Item	Low estimate	High estimate
Estimate of annual investment income (during operational period of the project)	Assuming AGR of $0: $1.06 million/year	Assuming AGR of $250 million: $3.63 million/year

Table 5: An Illustration of the Investment Income for the KCNs during the Operational period of the Keeyask Project - 2.5% Preferred Equity Holding

	Estimated Range of Benefit	
Item	Low estimate	High estimate
Estimate of annual investment income (during operational period of the project)	Assuming AGR of $0: $1.06 million/year	Assuming AGR of $250 million: $4.83 million/year

An illustration of total economic benefits during the post-construction period

We tally the illustrative direct and indirect benefits (annually) for the Keeyask project below. We include the construction benefits along with total benefits during the post-construction period for ease of comparison (Table 6). We acknowledge that if the Common Unit option were chosen, results would be significantly different.

As noted above, economic benefits from the Keeyask project for KCN members will depend on how such benefits are distributed within the KCN communities. We have no information on how benefits will be distributed within the KCN communities. However given a populaton of 6,350 KCN members (http://fnpim-cippn.aandc-aadnc.gc.ca/index-eng.asp), we can calculate estimates of annual economic benefits per capita which assumes that the distribution of benefits is uniform. This is also included in Table 6 below.

While a multiplier effect has been applied to the estimate of total salaries for KCN members who obtain operational jobs, this multiplier effect would be relatively weak if operational jobs were not in the KCN communities.

[14] We note that in the response to CAC/MH II-18, Manitoba Hydro indicates an AGR for 2022/23 of almost $250 million. Further, we note that in the response to PUB/MH I-78 b), Manitoba Hydro estimated preferred distributions declared based upon its 'most likely' economic assumptions, capital costs and export/energy prices. Distributions from 2022 through 2039 ranged from $5 million to $8 million annually. While the question asked Manitoba Hydro to assume a full equity interest subscribed by the partners, Manitoba Hydro's response does not identify the assumptions in terms of subscription.

Table 6: Illustrative Total Annual Economic Benefits (Direct and Indirect Benefits) for KCNs from the Keeyask Project, Assuming Preferred Unit Equity Option

	Estimated Range of Benefit	
Period	Low estimate	High estimate
During construction phase - estimated total annual benefits	**$10.26 million/year**	**$20.67 million/year**
Construction phase total benefits per capita	**$1,616/year**	**$3,255/year**
After construction phase - 1.9% equity ownership, which includes:		
Investment income (first 5 years post-construction)	$1.06 million/year	$3.63 million/year
Investment income (6 years onward)	$1.06 million/year	$3.8 million/year
Manitoba Hydro funding for operational jobs	$1.23 million/year	$1.23 million/year
Labour income from operational jobs	$5.9 million/year	$11.8 million/year
Multiplier effect	$1.39 million/year	$3.09 million/year
Estimated Total Benefits (6 years post-construction)	**$9.58 million/year**	**$19.92 million/year**
Estimated Benefits per capita (6 years post-construction)	**$1,509/year**	**$3,137/year**
After construction phase - 2.5% equity ownership, which includes:		
Investment income (first 5 years post-construction)	$1.06 million/year	$4.83 million/year
Investment income (6 years onward)	$1.06 million/year	$5 million/year
Manitoba Hydro funding for operational jobs	$1.23 million/year	$1.23 million/year
Labour income from operational jobs	$5.9 million/year	$11.8 million/year
Multiplier effect	$1.39 million/year	$3.33 million/year
Estimated Total Benefits (6 years post-construction)	**$9.58 million/year**	**$21.36 million/year**
Estimated Benefits per capita (6 years post-construction)	**$1,509/year**	**$3,364/year**

different results, not that they were inconsistent, and I think we've tried to present the basis -- the -- the basic results from each.

MR. JACK LONDON: I -- I'll come back to a more chronologically appropriate set of -- set of questions. But I wanted to deal with a couple of matters that are recent in the minds of the -- of the Board. And to do that, I just want to do something that -- a couple of things on the -- on the numbers.

The -- I want to clarify them. In -- in your paper of March 17, 2014...

(BRIEF PAUSE)

MR. JACK LONDON: Sorry, I lost my...

(BRIEF PAUSE)

MR. JACK LONDON: ...at page 73, Table 3. But when I first looked at this table, it struck me that it looked a bit odd because when you look down the first column and you see that at -- after the construction phase at 1.9 percent, there is a low estimate of $1.49 million a year. And at 2.5 -- 2.5 percent, which is only point-o-six (.06) more, it goes

to 6.44 million a year.

So we -- I asked those people who can do this to run those -- re-run those numbers for me and I just want to correct them so that we're dealing with appropriate numbers. And for the most part, in this particular part of the exercise, they -- what they do is to show a bit of a -- a reduced return to the -- to the Cree -- the KCNs. But the Board should have the appropriate and -- and correct information.

So let -- let me just correct those. In the -- during the -- during the construction where you've got $4.76 million a year, I don't have any quarrel with that. In the high estimate as well, the 11.64 million a year, it looks fine. After the construction phase in 1.9 percent -- 9 -- in the 1.9 percent interest you've got 1.49 million a year, which is okay. But in the high estimate the number ought not to be 1.97 million a year, but 4.56 million a year.

Would you accept that, Dr. O'Gorman?

DR. MELANIE O'GORMAN: I will definitely have to check that once I have a calculator or an Excel sheet.

MR. JACK LONDON: Subject to check?

DR. MELANIE O'GORMAN: Yeah. Yeah.

MR. JACK LONDON: And in the after

construction phase at 2.5 percent, the opposite happens. You've got 6.44 million a year, and I would suggest that it ought to be 1.97 million a year, considerably lower than what you have there and much more consistent with a 1.9 percent re -- return of 1 -- of 1.49 million.

And on the high estimate after the construction phase we have -- you've got 9 million a year. We work it out to -- to 6 million a year. And so if you'll accept that, subject to check, we can move forward.

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: Now, if we can go to...in that same document to Table 3 on page 73. Sorry, that's where we are. Okay.

I want to pull up your presentation to the CEC of a similar table. And that's at Tab 6 of the book of -- large book of documents. I have hard copies here by the way if you'd like. It'll come up on the screen, but it might be easier for you with hard copies.

DR. MELANIE O'GORMAN: That's okay.

(BRIEF PAUSE)

MS. AIMEE CRAFT: Mr. Chair, if I may, just for our information and assistance, are the numbers that are being put forward by Mr. London on -- available on the record anywhere? Is there something we can refer to for the ra -- the veracity of these numbers, or to assist us?

MR. JACK LONDON: We just took the actual evidence of what the percentages were and what the returns were and multiplied them. All the numbers are there. It -- it was -- I think they were just miscalculation errors.

(BRIEF PAUSE)

MS. AIMEE CRAFT: And have those miscalculations been clarified on the record, or is that the intent?

MR. JACK LONDON: That's my intent. My intent is to say that, for the purposes of today, Dr. Buckland's go -- going to go away. I don't want to have to de -- delay the proceedings. And if there is a -- if Dr. O'Gorman comes back and says the numbers are wrong, I -- we -- we'd be happy to accept that. So that's why I say it's subject to check.

MS. AIMEE CRAFT: Thank you.

MR. JACK LONDON: The -- when we left off -- or -- or this morning we were talking about the returns that the KCN will receive under the JKDA and from the project. And Board member Grant talked about it being a -- maybe the equivalent of a GIC investment. So if we can just spend a couple of minutes talking about that for -- for a moment and see if you'll confirm these -- these figures for me.

I don't have them in -- in any of the documents, because I didn't know that we were going to have to enter into this. But if on the assumption of a 1.9 percent preferred unit holding, which requires $25 million in cash from the KCNs, right?

You're okay with that number, the $25 million cash investment?

MS. MARLA ORENSTEIN: Yes.

MR. JACK LONDON: After construction, just looking at investment income at 1.9 percent, the low estimate is 1.25 million over a $25 million cash investment, correct?

DR. MELANIE O'GORMAN: I have 1.49 million for the post-construction, 1.9 percent equity holding.

MR. JACK LONDON: That -- that would -- that would be with the multiplier effect included?

DR. MELANIE O'GORMAN: Sorry, you're right.

MR. JACK LONDON: So without the multiplier effect, it's 1.25 million over a $25 million investment -- cash investment, which presents a 5 percent return on investment, correct, subject to check?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: And at 2.5 percent, it would be 1.64 million if my -- the number I gave you earlier is correct, over a $25 million cash investment, which would be a return of -- a cash on cash of 6.5 percent, correct?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: And in a high, the 1.9 percent return of 3.8 million over a cash investment of 25 million would indicate a return on cash investment of 15.2 percent?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: And on the 2.5 percent holding, the return would be $5 million which is the number that the Board has seen repeatedly in documents that have come before the Board on several occasions, over $25 million, which is a 20 percent return.

DR. MELANIE O'GORMAN: Yes, subject to check.

MR. JACK LONDON: So the -- the -- just to stop -- to pause there for a second, the -- the -- in a response to the IR, which I don't have in front of me, the -- there was a table -- the -- the Board was given a table of the investment -- the returns on the investment likely to be obtained by the -- by the Cree Nations, and it shows in the -- about a $5 million a year return.

With a $25 million investment, the return is 20 percent, correct?

DR. MELANIE O'GORMAN: I remember that IR, yes.

MR. JACK LONDON: And how much money do you have that you'd like to invest at 20 percent these days?

DR. MELANIE O'GORMAN: It's a pretty high return.

MR. JACK LONDON: Yeah, okay. Now, if we take it the way -- and we don't -- we don't just look at investment income, but we look at all benefits, excluding ongoing jobs and excluding the Adverse Effects Agreements. So the numbers actually would be higher, but I'm prepared to do this without even taking

into account the ongoing jobs and the Adverse Effects Agreements.

So after you include the multiplier effect of 1.20 percent, the -- subject to check, would you accept that the returns in the low case on a 1.9 percent holding would be 5.8 percent?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: On the 2.5 percent holding, it would be 7.9 percent?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: And the high case, 4.56 million over the 25 million cash would be 18.24 percent?

DR. MELANIE O'GORMAN: Subject to check, yes.

MR. JACK LONDON: Subject to check. And at 2.5 percent, the return is actually 24 percent.

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: And if you add in the hundred and eight-three (183) operational jobs, which includes $10 million of income per ann -- per annum for those jobs?

DR. MELANIE O'GORMAN: We've never heard that value before. This is the first time we're hearing a value attached to those jobs.

jobs for KCN members. That's the annual income.

--- UNDERTAKING NO. 125: MKO to Calculate the value of one hundred and eight-two (182) ongoing post-construction jobs for KCN members

CONTINUED BY MR. JACK LONDON:

MR. JACK LONDON: Now, if -- if I'm approximately correct, again subject to check and perhaps you can just include this as part of the undertaking, in the low case with a 1.9 percent holding, that would produce a return of 48.8 percent?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: Sorry, 45.8 percent. I -- I misread it, 40 -- 45.8 percent.

On a 2.5 percent holding in the low case, it would be 47.8 percent?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: In the high case it -- at 1.9 percent it would be 58.2 percent return?

DR. MELANIE O'GORMAN: Yes

MR. JACK LONDON: And at the 2.5 percent, it would be 84 percent?

DR. MELANIE O'GORMAN: Subject to check, yes.

MR. JACK LONDON: Subject to check return.

THE CHAIRPERSON: Could you enlighten me about the way you're treating those numbers as being the fruit of an investment?

MR. JACK LONDON: I'm sorry, I didn't hear.

THE CHAIRPERSON: I'm wondering how -- why you're linking the 10 million flowing from jobs as being part of the investment return. My --

MR. JACK LONDON: The question was: What is the net benefit?

THE CHAIRPERSON: And I'm trying to understand why you're taking the 10 million and -- and plugging it into the investment return on the --

MR. JACK LONDON: I'm not plugging it into an investment return, Mr. Chairman. I -- I said that the -- the second category was the total benefits --

THE CHAIRPERSON: I see.

MR. JACK LONDON: -- analysis, including the investment return and the operational jobs --

percentages, and --

DR. MELANIE O'GORMAN: Yes.

MR. SVEN HOMBACH: -- will you accept subject to check that in the last Winnipeg mayoral election the turnout was approximately 47 percent?

DR. MELANIE O'GORMAN: Yes.

MR. SVEN HOMBACH: Whereas in the last federal election it was approximately 61 percent?

DR. MELANIE O'GORMAN: Yes.

MR. SVEN HOMBACH: Assuming that those percentages are true, does that change your answer or does that put you in a better position to assess whether this was an expected level of turnout?

DR. MELANIE O'GORMAN: It puts me in a better position to understand how common that type of voter turnout is, but my overall view is that I would like to have seen a majority of individuals in the KCNs vote to be sure that that vote represented their -- their choice, because as we speculated, there are a number of reasons for why an individual might not vote. So we just lack that -- we lack quantitative knowledge on -- on the motivations behind those people.

It's interesting but I would say it wouldn't -- it wouldn't change my overall concern that we don't know how the majority of KCN members feel.

only have one (1) question.

CONTINUED CROSS-EXAMINATION BY MR. JACK LONDON:

MR. JACK LONDON: You raised the -- My -- My Learned Friend raised the -- the federal statistics, the voting statistics. So I suggest to you -- well, in a article entitled, "First Nations Candidacy and On-reserve Voting in Manitoba," and on June 2011, written by C. Adams (phonetic) from the University of Winnipeg. I'm not sure what the -- the initial stands for, but you probably know that is. So don't tell me that you're going to doubt the credibility of the article.

DR. MELANIE O'GORMAN: No.

MR. JACK LONDON: G. Poezer, P-O-E-Z-E-R, University of Saskatchewan, and L. Birdall (phonetic), University of Saskatchewan. And you can do this subject to check.

Would you agree that -- were you aware that that article found large differences between on-reserve and non-reserve pools across the province having a turnout rate of only on reserve 27.8 percent, and 58 percent at non-reserve pools?

DR. MELANIE O'GORMAN: I was not aware of that.

MR. JACK LONDON: And you are aware that the 33 percent minimum vote and the -- and the statistics that you gave was a blended vote between on and off reserve?

DR. MELANIE O'GORMAN: Yes.

MR. JACK LONDON: So that the number actually is greater -- the lowest number is greater than the 28 -- 27.8 percent on reserve?

DR. MELANIE O'GORMAN: Right.

MR. JACK LONDON: I have no other questions.

THE CHAIRPERSON: Mr. London --

MS. AIMEE CRAFT: Can Mr. London clarify, just for the record, and that's an article in relation to First Nations governance elections or band elections and not referenda.

Is that correct?

MR. JACK LONDON: I -- I don't have that -- I -- I can't answer that question, Ms. Craft. But I -- if you'd -- if you'd like I'm happy to investigate.

MS. AIMEE CRAFT: If we could have the article, that would be helpful and then we can undertake to provide a further response if -- if required.

MR. JACK LONDON: We have it -- we have it online don't we? We have it online and I'll have it sent to you.

THE CHAIRPERSON: Thank you.

MR. JACK LONDON: I didn't -- I didn't know about it in advance, actually. I hadn't done my homework.

THE CHAIRPERSON: Could you frame that as an undertaking, Mr. London? Could you frame it as an undertaking, please?

MR. JACK LONDON: We undertake to forward to you a electronic copy of the article just referenced, "First Nations Candidacy and On-reserve Voting in Manitoba."

--- UNDERTAKING NO. 127: Mr. London to forward electronic copy of the article "First Nations Candidacy and On-reserve Voting in Manitoba"

THE CHAIRPERSON: Thank you for that, Mr. London. Board member Grant has a question, or a comment.

DR. HUGH GRANT: I keep finding bees in

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13 Integrated Comparisons of Development Plans – Multiple Account Analysis

13.0 Chapter Overview

The Terms of Reference (TOR) of the Needs For and Alternatives To (NFAT) review of the Preferred Development Plan call for an assessment of its justification and its alignment with Manitoba Hydro's mandate, Manitoba's Clean Energy Strategy and the principles for sustainable development. The TOR also includes a call for an assessment of whether "the Plan has been justified to provide the highest level of overall socio-economic benefit to Manitobans and is justified to be the preferable long-term electricity development option for Manitoba when compared to the alternatives".[1]

The purpose of this chapter is to present the results of a multiple account benefit-cost analysis (MA-BCA) of Manitoba Hydro's Preferred Development Plan as compared to alternative plans with and without new U.S. interconnection capacity and new export sale commitments; and with and without new hydro generating capacity to meet domestic load growth. These alternatives, which are set out in detail in Section 13.2 below, were chosen to enable an assessment of the full range of consequences and benefits and costs to Manitobans of the key components of the Preferred Development Plan:

(i). relying on hydro to meet growing domestic load and

(ii). taking advantage of the current opportunity for new export sales agreements and the development of additional interconnection capacity with the U.S. power market.

[1] Manitoba Order in Council 00128/2013, Scope of the NFAT Review 2(f), p.3.

As explained in the next section, MA-BCA extends Manitoba Hydro's economic evaluation of the preferred and alternative development plans to take into consideration consequences for Manitobans that are not reflected in the revenues and expenditures facing Manitoba Hydro. It uses a set of evaluation accounts to move from a Manitoba Hydro perspective to a broader Manitoba social perspective. The objective is to provide a systematic, comprehensive assessment of all of the benefits and costs to Manitobans in a manner that can assist the NFAT panel address the question of overall socio-economic benefit.

13.1 Multiple Account Benefit-Cost Analysis

13.1.1 Basic Objective and Approach

Traditional cost-benefit analysis is a standard method economists use to assess the net benefits of alternative plans, projects or policies from a broad social perspective.[2] It is intended to take into account the positive and negative consequences of the alternatives being analyzed to everyone (with standing in the analysis)[3] that is affected. These would include not only commercially-valued consequences – those with well-defined market prices – but also the social and environmental consequences that people value.

[2] For a summary of the purpose and rationale of cost-benefit analysis, see Marvin Shaffer, *Multiple Account Benefit-Cost Analysis: A Practical Guide for the Systematic Evaluation of Project and Policy Alternatives*, University of Toronto Press, 2010, pp.3-15. A standard text with details on principles and methods is: A. Boardman et. al., *Cost-Benefit Analysis: Concepts and Practice*, 3rd ed., 2006. For guidelines on the application of cost-benefit analysis in relation to regulatory proposals, see Treasury Board of Canada Secretariat, *Canadian Cost-Benefit Analysis Guide: Regulatory Proposals*, 2007.

[3] 'Standing' is defined by the jurisdiction or parties for which the analysis is being done. For an assessment of the public interest in Manitoba, all people within the province would be considered to have standing.

With its broad scope, cost-benefit analysis attempts to calculate an overall bottom line to determine which of the alternatives is socially preferred, based on the value that people place on what is produced (what people in principle would be willing to pay for all of the positive consequences) relative to the cost people assign, or compensation they in principle would require, to pay for the inputs and offset the negative consequences.

MA-BCA is a variation of traditional cost-benefit analysis. It adopts the same broad scope and the same basic valuation principles. However, MA-BCA recognizes that not all consequences can meaningfully or reliably be monetized in order to calculate an overall bottom line. Furthermore it recognizes that an overall bottom line can mask important distributional considerations. It is not just overall net benefits but also the nature and distribution of those benefits and costs that can govern what is "preferred" from a broad social or public interest perspective.[4]

Accordingly, the objective of MA-BCA, like traditional cost-benefit analysis, is to identify the full range of positive and negative consequences of the alternatives and to assess their significance. However, the assessment does not have to be entirely in dollar terms and the consequences all aggregated to a bottom line. The results are presented in a matrix form for a disaggregated set of evaluation criteria or accounts. The purpose is to identify the advantages or disadvantages of

[4] One of the first government agencies to adopt a multiple account approach to project assessments in North America was the U.S. Water Resources Council, *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, 1983. For a recent review and explanation of the multiple account approach see Marvin Shaffer, *Multiple Account Benefit-Cost Analysis* (2010).

the alternatives and the key trade-offs for the different parties and interests that are affected, information with which judgments about the preferred alternatives can be made.[5]

13.1.2 The Evaluation Accounts

A standard way to conduct cost-benefit analysis is to start with the valuation of the project's inputs and outputs based on market prices – the net revenues or return on investment from the perspective of the proponent. Then the analysis proceeds by identifying and assessing positive and negative consequences – social benefits and costs – that the market valuation does not reflect. The MA-BCA of Manitoba Hydro's preferred and alternative resource plans follows that basic approach.

Similar to the cost-benefit assessment of the Wuskwatim project[6], the MA-BCA of Manitoba Hydro's preferred and alternative resource development plans starts with the incremental revenues and expenditures for Manitoba Hydro and its project partners. Then the MA-BCA addresses consequences for Manitoba Hydro customers, Manitoba taxpayers, the economy, the environment and affected communities that this market valuation does not capture or adequately reflect.

[5] MA-BCA is similar to multi-criteria or multi-attribute analyses that are commonly used in project and policy evaluations. In such analyses, a broad set of criteria and indicators of relative advantage or impact are established for the assessment of the alternatives. However, in multi-criteria analysis, criteria and indicators are established by the analyst or stakeholder group governing the evaluation process. In MA-BCA, the accounts and indicators are based on the principles of traditional cost-benefit analysis. They are designed to take into account impacts on everyone with standing that is affected, and to reflect the values of those affected. Unlike multi-criteria or multi-attribute analysis, MA-BCA is not an alternative to traditional cost-benefit analysis, but rather a variation of it. See Marvin Shaffer, *Multiple Account Benefit-Cost Analysis* (2010), pp 43-47.

[6] Marvin Shaffer & Associates Ltd., *Social Net Benefits of Advancing the Wuskwatim Project*, prepared for Manitoba Hydro, August, 2003, and *Social Net Benefits of Wuskwatim vs. Wind Development*, prepared for Manitoba Hydro, February 27, 2004.

Specifically, the MA-BCA assesses the preferred and alternative plans in terms of the following criteria or evaluation accounts:

Market Valuation

This account assesses the net benefit or cost of the preferred and alternative plans to Manitoba Hydro and its project partners. It analyzes the incremental revenues generated by the surplus electricity supply in the different plans, relative to the incremental capital and operating expenditures incurred. The present value difference between the incremental revenues and expenditures measures the net market value or cost of the investment in new electricity supply in each plan.

This market valuation account relies on the assessment of the economics of the different plans from a Manitoba Hydro perspective as presented in previous chapters. The same annual revenue and expenditure cash flows and residual asset values as estimated for the resource plan analysis are used here.

In this MA-BCA, however, the present values of the incremental revenues and expenditures are different. Present values are calculated here by applying a real discount rate that reflects the social opportunity cost of capital. A real rate of 6% is used, based on recent research on discounting in cost-benefit analysis.[7] In the previous resource planning economic analysis, a

[7] In their recent study, Burgess and Zerbe calculated a discount rate range of 6.6% to 7.3% real based on their estimates of the social opportunity cost of capital in the U.S. M. Moore *et al.* argue that rate is too high, and estimate the social opportunity cost of capital to be 5% real. The 6% rate used in this study is roughly mid-point between these estimates. Also, the 6% rate is more consistent with a provincial Manitoba perspective than the somewhat higher rate that Burgess and Zerbe might suggest. The social opportunity cost of capital is calculated by weighting and then summing the cost of the different potential sources of capital: savings, borrowing from outside

somewhat lower discount rate was used to reflect the estimated weighted average cost of capital from a corporate perspective.[8]

Manitoba Hydro Customer

This account assesses the consequences of the different plans for Manitoba Hydro customers. It relies on the financial analysis in Chapter 11 that provides estimates of the rate increases in the short to medium and long term that would be required to recover net system costs and meet corporate financial targets. It also addresses the extent and significance of differences in the reliability of supply under abnormal weather, water condition and other contingencies because of the different mix of assets and interconnection capacity in the different plans.

To provide consistency in the assessment of rates in the preferred and alternative plans, revenue requirements were calculated to achieve common financial targets. The even annual rate increases required to achieve a 75:25 debt/equity ratio by the 20th year of the planning period were calculated for each plan. After year 20 the rates were adjusted each year to maintain an interest coverage ratio of 1.2.

the jurisdiction, and displacement of other investment. The weights reflect the relative importance of each source. From a provincial perspective there will tend to be more outside borrowing than displacement of other investment within the provincial economy. The greater the weight of outside borrowing relative to displacement of other investment, the lower will be the discount rate. See D. Burgess and O. Zerbe, "Appropriate discounting for benefit-cost analysis", *Journal of Benefit-Cost Analysis*, 2(2), 2011 and M. Moore et al, "More appropriate discounting: the rate of social time preference and the value of the discount rate, *Journal of Benefit Cost Analysis*, 4(1), 2013.

[8] In Manitoba Hydro's financial analysis of rate impacts, a discount rate based on time preference is used. This time preference rate is lower than the social opportunity cost of capital used in this MA-BCA and Manitoba Hydro's weighted average cost of capital used for resource planning. The time preference rate is used in the rate analysis because the purpose of the discount rate in that analysis is simply to assign weights (discount factors) to present versus future rate impacts based on the trade-offs people would willingly make (e.g., as they do when they save, deferring present consumption for future consumption opportunities). It is important to note that in the financial analysis, the cost of capital is already reflected in the calculation of revenue requirements and rates; therefore it would in effect be double counting to apply a cost of capital-based discount rate.

While based on the same surplus sale revenues and capital and operating expenditures as in the market valuation account, this Manitoba Hydro customer account is different in that it indicates the impacts over time, not just an overall net present value; it takes into account the effect of partnership arrangements which affect the net revenues to Manitoba Hydro separate from its project partners; and it calculates rate impacts based on Manitoba Hydro's forecast actual cost of capital, as opposed to the discount rate used to calculate the present value net benefit or cost in the first account.

The rate impact assessment in this Manitoba Hydro customer account does not attempt to measure a social benefit or cost in addition to what is estimated by the market valuation. Rather, it serves to indicate a key distributional effect – how the net benefit or cost estimated in the market evaluation account is shared or borne by Manitoba Hydro's domestic customers through impacts on rates over time.

The assessment of system reliability, on the other hand, does address additional benefits or costs not captured in the market valuation. While all of the plans are designed to meet Manitoba Hydro and industry-standard reliability criteria, they differ in terms of their ability to meet load under all possible weather, water conditions, forced outage and other contingencies.

Differences in the estimated loss of load probability and consequently load carrying capability are used to indicate differences in the system reliability in the different plans. To illustrate the value of the different reliability in the different plans, estimates of the expected unserved energy are multiplied by an estimated cost of supply interruptions to calculate differences in the expected costs of the very infrequent, but nonetheless potentially very disruptive bulk system failures to meet demand.

Manitoba Government

This account assesses the net benefit or cost of the different plans to the Manitoba government and therefore Manitoba taxpayers. It analyzes the incremental net revenues accruing to the government. The present value of the incremental net revenues measures the net benefit from the point of view of taxpayers.

The construction and operation of the different projects in Manitoba Hydro's plans have a wide range of direct and indirect impacts on government tax revenues. There are the taxes and fees paid by Manitoba Hydro directly; there are income and sales taxes paid by those directly and indirectly employed by the projects, or by firms directly and indirectly supplying goods and services for the projects.

Many of these tax impacts, however, do not constitute incremental net revenues for government. The income and sales taxes paid by Manitobans who would otherwise be employed elsewhere would not be incremental to the extent those taxes would be paid in any event. The income and sales taxes paid by in-migrants (attracted to the province as a result of the increased economic activity due to the projects) may be incremental revenues but would not be incremental *net* revenues to the extent they are offset by the increased costs government must incur to supply the infrastructure and service they and their families need.

In order to ensure this account captures net benefits as opposed to gross impacts, and to avoid double counting benefits addressed in the Manitoba economy account,[9] only direct incremental taxes and fees paid by Manitoba Hydro net of incremental government costs or risks are included. In this analysis this is conservatively limited to the water rentals and capital taxes paid in each plan. They are clearly incremental revenues that government would not otherwise receive; and they are not offset by incremental expense. These incremental net governmental revenues are not captured as net benefits in the market valuation account. They simply appear as costs to Manitoba Hydro.

There are other taxes and fees that Manitoba Hydro pays to government. For example, there are debt guarantee fees. However, given that the provincial debt guarantee fee is provided in exchange for this guarantee, the multiple account analysis has excluded the debt guarantee fees from the analysis of net benefits to the Manitoba government. It is assumed that these fees serve to offset the risk of higher borrowing costs and consequently may not constitute net benefits for government. There are also sinking fund administration fees, but it is assumed they are intended to pay for incremental administration costs, again not constituting a net benefit for government.

Coal taxes and the carbon charges assumed to be paid by Manitoba Hydro are also reported, but not included as net benefits in the government account. First, the carbon charges may not be manifested in a tax; they could arise, for example, from the purchase of permits in a cap and trade system. Second, even if carbon tax payments were made (like the existing coal tax), these

[9] The Manitoba economy account assesses the incremental income due to the increased employment and economic activity generated by the different plans. The estimated benefits are measured pre-tax and therefore capture both the benefit to the affected individuals and government.

are clearly intended to reflect part of the cost to society of carbon emissions. They are not a net benefit per se.[10]

Manitoba Economy

This account assesses the consequences of the different plans for the Manitoba economy. It analyzes the amount of employment and wages generated by the projects in each plan and estimates the potential incremental income that employment offers for Manitobans. The present value of the incremental income is an indicator of the employment net benefit generated in the different plans.

It is important to note that this account is different from economic impact analyses that serve to estimate the direct, indirect and induced demand for labour generated by a project's expenditures. Economic impacts do not indicate incremental employment or wages – they indicate gross effects. They are useful for understanding how a project may affect total economic activity and employment in different industries and regions, but not what net benefits that entails. The purpose of this analysis is to assess net benefits in accordance with the principles of cost-benefit analysis.[11]

[10] In the environmental account discussed below, the social cost of GHGs is measured by the externality they entail – the estimated social cost of GHGs less the carbon charges assumed in the market valuation. If the carbon charges were included as a benefit to government, the GHG cost in the environmental account would have to be correspondingly larger to include the total social cost of the GHG emissions. The net overall effect would be the same.

[11] For a discussion of the limitations of economic impact analysis and its difference from cost-benefit analysis see, P. Grady and R. Muller, "On the Use and Misuse of Input-Output Based Impact Analysis in Evaluation", *Canadian Journal of Program Evaluation*, 3(2), 1988, pp.49-61.

This account focuses on employment as opposed to purchases of goods and services because of the assumption that it is in the labour market where there is greatest potential for net benefits or "economic rents" to be earned – i.e., where there may be a significant difference between what is paid and the minimum compensation required to offset the incremental or opportunity costs of what is provided.[12] As in the Manitoba government account, the intent here is to capture the net benefit, not the total impact.

Employment net benefits are measured by the wages that are paid less the minimum amount the workers would have to receive to take the jobs: what those workers would otherwise have earned or the value of the activity they otherwise would have engaged in. In well-functioning economies, the incremental income (or in economic terms, the "economic rent") will be relatively small. People are paid more or less what is required to attract them from what they would otherwise be doing.

However, there are circumstances and regions where the net benefits can be significant – in particular, in regions where there is involuntary unemployment, limited alternative opportunities and limited willingness or ability to move to regions with better employment prospects. Here the net benefits from new job opportunities can be significant and, like the net benefit to taxpayers, they are not reflected in the market valuation account. The wages paid to construction and operating workers are simply costs from Manitoba Hydro's perspective.

[12] In competitive markets, the incremental income (or in economic terms, the 'economic rent') from sales will generally be small. Offsetting the gross revenues firms receive are the costs they must incur to provide the goods and services they sell. There would be some net return, but over the long run and under normal market conditions, one could expect that the net return is what is needed to attract capital – in other words it would reflect the cost of capital in the affected industries.

The assessment of the employment net benefits in the different plans is based on the amount and regional location of the jobs, and the estimated origin of the persons filling the available positions. No Manitoba net benefit is assigned to the jobs estimated to be filled by in-migrants because of the provincial perspective taken in this MA-BCA.

Environment

This account addresses the consequences of the different plans for the environment. It considers impacts on GHG emissions in Manitoba and elsewhere, criteria air contaminant (CAC) emissions in Manitoba, and bio-physical effects associated with the construction and operation of the projects in the different plans. The focus of this account is not the impacts in themselves, but rather the externality they represent – the external net benefit or cost to Manitobans not reflected in the market valuation or other accounts.

With respect to GHG emissions, what is measured is the estimated social cost of emissions in excess of the carbon taxes or charges assumed to be paid by Manitoba Hydro and therefore already taken into account. The social cost of GHG emissions in theory should reflect the maximum amount Manitobans would be willing to pay to reduce carbon emissions as part of the global effort to avoid serious, potentially catastrophic effects of climate change. The precise value of that willingness to pay is difficult to determine. However, there is considerable evidence that it is much greater than the carbon taxes or charges assumed in the market valuation account.[13] Estimates of the social cost of GHG emissions based on Environment

[13] Rough calculations indicate that the cost of the measure to phase out coal-fired generation in Manitoba was well in excess of $100/tonne of CO_{2e} when first introduced and remains well over $50/tonne of CO_{2e} at current coal and natural gas prices.

Canada and U.S. government reports[14] are used in this analysis to indicate the potential external costs associated with GHG emissions in the different plans.

With respect to CAC emissions, estimates of damage costs associated with nitrogen oxide (NO_x) and particulate matter (PM) emissions that have been developed in other jurisdictions are used to illustrate the potential magnitude of the external cost they entail for Manitobans.

With respect to biophysical effects, the issue is whether there are residual impacts despite the mitigation and compensation built into the projects' plans and costs. Summaries of the major impacts identified in the Keeyask EIS and preliminary descriptions and assessments for other projects in the plans are presented and the nature and extent of any residual effects – i.e., remaining externality – are discussed.

Social

This account addresses consequences of the different plans for aboriginal and non-aboriginal communities as well as other social effects not addressed in the other accounts.

One of the social consequences analyzed in this account is the net return and other benefits for Manitoba Hydro's project partners. This is not an additional net benefit to what is already

[14] See Environment Canada, *Heavy Duty Vehicle and Engine Greenhouse Gas Emissions Regulation,* section 7.3.3, Feb.22, 2013 (http://gazette.gc.ca/rp-pr/p2/2013/2013-03-13/html/sor-dors24-eng.html#footnoteRef.82118), and U.S. Interagency Working Group on Social Cost of Carbon, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866*, May 13, 2013.

estimated in the market valuation, but rather an important distributional consequence. It indicates the share of the economic return that will accrue to the project partners.

This account also considers other impacts on communities affected by the projects in the different plans. As with the environmental account the focus here is not the impacts in themselves, but rather the externality they represent: the external net benefit or cost to affected communities as a result of impacts on services, infrastructure or well-being not avoided or offset by mitigation and compensation plans – i.e., not reflected in the market valuation.

Finally, this account addresses other consequences not considered elsewhere such as the long-term sustainability attributes of the different plans – in particular the heritage value of assets remaining at the end of the planning period. The issue analyzed here is whether the "bequest value" Manitobans place on the assets they leave for future generations is fully captured by the discounted present value of the residual asset values taken into account in the market valuation.[15]

[15] The economic concept of bequest value was first raised in a seminal article by John Krutilla ("Conservation Reconsidered", *American Economic Review*, Vol. 57, no. 4, September 1967) who argued that the main reason people are willing to allocate considerable resources (or forego immediate development benefits) for conservation is because of their desire to preserve important environmental attributes for the benefit of future generations. While developed with regard to the value of preserving natural resources, the concept of bequest value more generally recognizes a willingness to pay or allocate resources today for the benefit of future generations. It is a fundamental factor underlying the argument for greater investment in measures that will reduce the risk of climate change many years into the future.

Risk

The estimated consequences of the preferred and alternative plans depend on a number of factors including capital costs, energy prices and economic variables. The assessments under each account are done initially for a reference scenario set of assumptions in order to determine the advantages and disadvantages of the different plans under these mid-range assumptions. However, given the underlying uncertainties, the range of possible outcomes the different plans entail are important considerations in the overall assessment.

In this account, the probability of different net cost and rate implications are used to depict the extent of uncertainty in the relative advantages for the different plans. The potential effect of modifying the plans at key decision points is then considered to indicate how the different downside risks in the different plans can be mitigated.

Summary

Table 13.1 summarizes the multiple account framework. It shows the criteria, nature of analysis and indicators that are used to evaluate and compare the preferred versus alternative development plans.

Table 13.1 SUMMARY OF MULTIPLE ACCOUNT FRAMEWORK

Account	Purpose	Analysis	Indicators
Market Valuation	Net benefit to Manitoba Hydro and project partners.	Incremental revenues from surplus sales less incremental capital and O&M expenditures.	Present value of net revenues or cost (market valuation of investment).
Manitoba Hydro Customer	Consequences for customers in short to medium and long term.	Rate increases required to recover costs and meet MH financial targets. System reliability.	Average annual and cumulative rate increases over the planning period. Load carrying capability and cost of expected unserved load.
Manitoba Government	Net benefit to taxpayers.	Incremental government net revenues. Amount of additional Manitoba Hydro debt guarantee.	Present value of incremental revenues to government, net of incremental costs (including consideration of risk of debt guarantee).
Manitoba Economy	Consequences for the economy.	Employment generated and incremental income earned.	Present value of incremental income.
Environment	Consequences for emissions and natural and bio-physical effects.	Impact on GHGs in Manitoba and elsewhere. Manitoba CAC emissions Biophysical impacts.	Present value of social cost of Manitoba GHGs in excess of carbon charge. Present value of CAC damage costs. Nature and extent of residual biophysical impacts.
Social	Consequences for aboriginal and non-aboriginal communities. Other social impacts not addressed elsewhere.	Benefits to project partners. Impacts on affected communities. Value people place on assets remaining at end of planning period.	Nature and significance of partner benefits. Nature and extent of residual community impacts. Potential bequest value of remaining assets.
Risk	Nature and significance of key assumptions.	Range of possible consequences. Risk mitigation potential.	Probability distribution of system net revenues and rates.

13.2 The Resource Development Plans

The MA-BCA assesses the preferred and three alternative resource development plans. Two of the alternative plans assume no new U.S. interconnection or firm export sales: one based on the development of new gas-fired thermal generation as required to meet growing domestic

loads; and one based on hydro – specifically the development of Keeyask G.S. The other alternative resource development plan assumes a new interconnection and firm export sales, but on a smaller scale than in the Development Plan with a 250 MW (230kV) as opposed to a 750MW (500kV) interconnection.

13.2.1 Manitoba Hydro's Preferred Development Plan

Manitoba Hydro's Preferred Development Plan combines the development of new hydro generation to meet growing domestic load with new access to the U.S. market and new firm export sales in order to enhance the value of the new hydro development and existing hydro system, and thereby reduce the long-term cost for customers. This plan would see the development of the Keeyask generating station (G.S.) and related transmission for 2019/20; Conawapa generating station (G.S.), related transmission, and north-south network upgrades for 2025/26; a new 750 MW interconnection with the U.S. for 2020/21; and new export sales with Minnesota Power (250 MW from 2020-2035) and Wisconsin Power Service (108 MW from 2014-2021, 100 MW from 2021 to 2027 and 300 MW from 2026-2036) as well as an expansion of the Northern States Power export sale (125 MW from 2021-2025). It is assumed that toward the end of the planning period (starting in 2041), Manitoba Hydro would add simple cycle gas thermal units as required to meet currently forecast domestic load growth.

In terms of the pathway[16] this plan represents, it is a commitment to the development of Keeyask G.S., the 750 MW interconnection and new export sales. While the pathway anticipates the development of Conawapa G.S. for 2025/26, the decision on that is not required

[16] The concept of pathways is developed in the next chapter where it is recognized that long term development plans may be modified in the future as new information becomes available. In this sense the pathway defines what is set and what adjustments to the plan may be considered after initial decisions and commitments are made following the NFAT process.

at this time, and the precise in-service date could be deferred if warranted by load growth, market or other conditions. What is done toward the end of the planning period will be determined in the future, depending on precise needs and opportunities available at that time. The assumption of gas plants starting in 2041 is simply a method used in all of the plans to ensure the forecast load can be met in a manner consistent with Manitoba Hydro's planning criteria through the end of the planning period.

13.2.2 The Smaller Interconnection Alternative (K19/Gas24/250MW)

Like the Preferred Development Plan, this smaller interconnection alternative combines the development of hydro generation to meet growing domestic requirements with new interconnection and export sales in the U.S. However, the interconnection in this case would only be 250 MW and the firm export sales commitments would be less. This plan also does not include the development of the Conawapa G.S. and related transmission and network upgrades. Gas-fired thermal generation is added as required to meet growing load after the development of Keeyask G.S.

The specific planning assumptions for this alternative are as follows:

- The construction of the Keeyask generating station and related transmission with an in-service date of 2019/20.
- The construction of a new 250 MW transmission interconnection with the U.S. with an in-service date of 2020/21.
- New export sale commitments of 250 MW with Minnesota Power from 2020-2035, 100 MW with Wisconsin Power Service from 2021-2027, and 125 MW with Northern States Power from 2021-2025.
- New SCGTs starting in 2024/25 and CCGTs starting in 2032/33.

This smaller interconnection alternative serves to indicate the advantages or disadvantages of following a similar strategy as in the preferred case, but with smaller capital cost and export commitments. It also represents a fallback option if the 750 MW (500 kV) line does not receive regulatory approval or the firm export sales are not all satisfactorily concluded.

In terms of the pathway this plan represents, it commits to the development of Keeyask G.S. and a small interconnection. What transpires after the development of Keeyask G.S., however, could change. One variant for example, would be to develop Conawapa G.S. instead of gas plants when required to meet domestic load.

13.2.3 Keeyask with No New Interconnection (K22/Gas)

This plan assumes that Manitoba Hydro would develop Keeyask G.S., without a new interconnection, solely as required to meet domestic load growth. The plan assumes that there would be a relatively small new firm export commitment to absorb some of the surplus that Keeyask G.S. would generate when first developed. It further assumes the development of gas-fired thermal generation after Keeyask G.S. as required to meet growing domestic demand.

The specific planning assumptions for this alternative are as follows:

- The construction of the Keeyask generating station and related transmission with an in-service date of 2022/23.
- New export sale commitments of 100 MW with Wisconsin Power Service from 2023-2027.
- New SCGTs starting in 2029/30 and CCGTs starting in 2034/35.

This plan serves to indicate the advantages or disadvantages of retaining a preference for hydro to meet growing load, but without the new interconnection and export sales opportunity currently available to Manitoba Hydro.

In terms of the pathway this plan represents, it commits to the development of Keeyask G.S. and abandons the opportunity for and benefits of the current new interconnection opportunity. As with the previous plan, what transpires after the development of Keeyask G.S. could change. Again one variant would be to develop Conawapa G.S. instead of gas plants when required to meet growing domestic load.

13.2.4 Gas Thermal with No New Interconnection (All Gas)

This plan assumes that Manitoba Hydro would not develop a new interconnection or any new firm export sales with the U.S. and would rely on gas-fired thermal generation to meet growing load. Based on the current load growth forecast, Manitoba Hydro would develop SCGTs starting in 2022/23 and CCGTs starting in 2031/32.

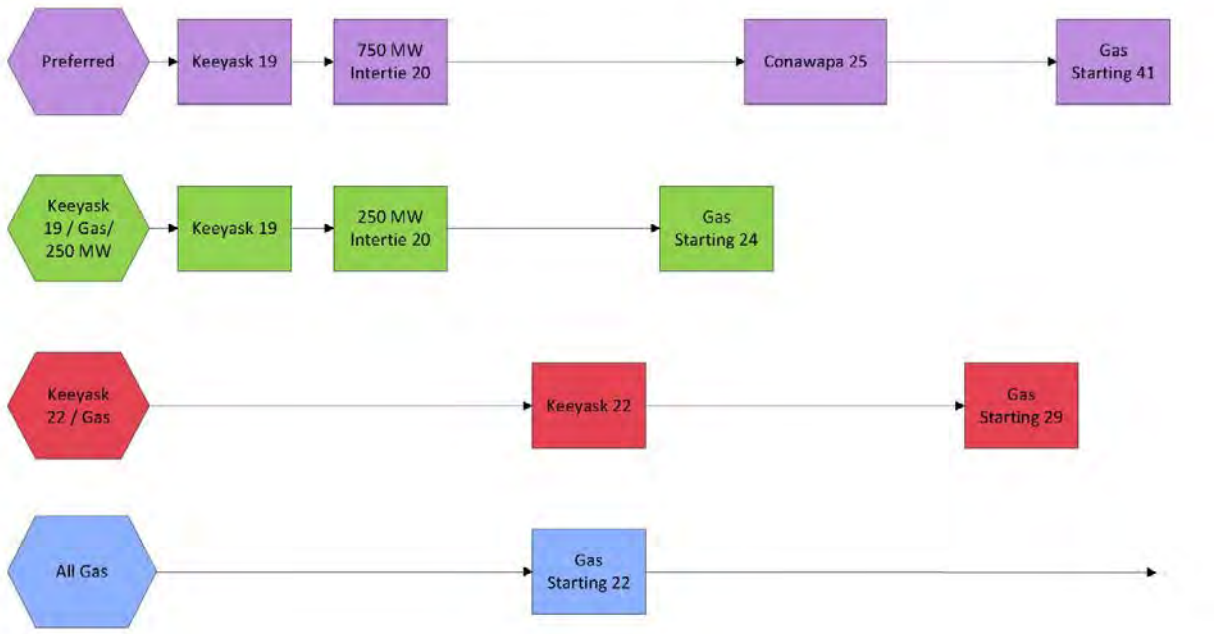
This plan serves to indicate the advantages or disadvantages of relying on gas thermal instead of hydro for the foreseeable future. It is the lowest capital cost alternative and the one with the least facility and export commitments.

In terms of the pathway this plan represents, it abandons the development of Keeyask G.S. for the foreseeable future, and the current opportunity for and benefits of a new interconnection. It could, however, see the development of new hydro in the future if warranted by unfolding conditions.

13.2.5 Summary

The specific components in the preferred and alternative plans assessed in this MA-BCA are shown in Figure 13.1 below.

Figure 13.1 PREFERRED AND ALTERNATIVE DEVELOPMENT PLANS



13.3 Evaluation by Account

13.3.1 Market Valuation Account

The total present value expenditures and revenues for the preferred and the alternative plans under the reference scenario set of assumptions are shown in Table 13.2. The present values are based on the estimated annual incremental capital and system operating expenditures and revenues over the 2014-2047 planning period presented in previous chapters. The residual asset values reflect the present value of the estimated net benefit that the assets remaining at the end of the planning period would provide in subsequent years relative to the costs Manitoba Hydro would be facing in the all gas development plan.[17] The present values are calculated at a 6% real discount rate, a rate intended to reflect the weighted average social opportunity cost of capital from a provincial perspective.

[17] The zero value shown for the all gas plan does not mean there would be no assets remaining at the end of the planning period. It is simply that the residual values were calculated relative to that case.

Table 13.2 MARKET VALUATION OF PREFERRED AND ALTERNATIVE PLANS

	Preferred Development Plan	K19/G24/ 250MW	K22/Gas	All Gas
Incremental capital exp.	7,373.9	3,812.1	3,338.0	1,158.9
Less: residual asset value (relative to all gas)	[1,933.3]	[804.6]	[849.6]	0.0
Fuel exp (excl tax)	307.7	856.3	767.6	1,151.2
Imports	971.0	893.0	847.7	1,030.9
O&M, other (excl tax)	2,220.5	2,227.6	2,170.3	2,171.2
Taxes and carbon charge	3,008.1	2,729.8	2,676.7	2,445.2
Total Expenditures	**11,947.9**	**9,714.1**	**8,950.7**	**7,957.4**
Firm export sales	4,513.6	2,685.1	1,606.0	1,331.7
Spot / opportunity sales	4,818.5	4,430.2	4,458.4	3,355.8
Total Revenues	**9,332.1**	**7,115.3**	**6,064.4**	**4,687.5**
Net Cost	**2,615.8**	**2,598.8**	**2,886.3**	**3,269.9**
Difference from Development Plan	**0**	**(17.0)**	**270.5**	**654.1**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS OF 2014$)

As shown in the table, the preferred and the smaller interconnection plans exhibit the lowest net costs, followed by the plan with Keeyask G.S. but no new interconnection. The all gas plan with no new interconnection exhibits the highest net costs.

The Preferred Development Plan entails much higher capital expenditures than the others, but these are offset by the much higher firm export sale revenues and a much higher residual value of the assets, with Conawapa G.S. as well as Keeyask G.S. remaining at the end of the planning period. The Preferred Development Plan also incurs much lower fuel costs, most notably as compared to the all gas plan.

13.3.2 Manitoba Hydro Customer Account

Rate Impact

The present value net costs of the different plans indicates their relative advantage to Manitoba Hydro and its customers over the long term, but the impacts on rates in the short to medium versus longer term depend as much on the mix of expenditures as their total amount.

Capital-intensive plans give rise to more marked rate impacts in the short to medium term, as revenue and cash flow requirements have to increase to achieve debt-equity and other financial targets. Fuel-intensive plans give rise to more marked rate impacts in the longer term with their relatively large ongoing and escalating annual costs.

Under the reference scenario assumptions the short to medium term rate increases required for the Preferred Development Plan would be greater than with the three alternative plans. With the Preferred Development Plan, a projected even annual rate increase of 3.95% would be required to achieve a target 75:25 debt/equity ratio by year 20 of the planning period.[18] The projected cumulative rate increase by 2031/32 would be 108%. For the three alternative plans projected even annual rate increases in the 3.4 to 3.5% range would be required to achieve the target 75:25 debt/equity ratio by year 20. The projected cumulative rate increase to year 2031/32 is estimated at 90% for the all gas and small interconnection plans and 92% for the plan with Keeyask G.S. but no interconnection – approximately 16 to 18 percentage points less than the Preferred Development Plan.

[18] This and all other rate increases discussed in this section are expressed in nominal dollars, that is, including the effect of the general rate of inflation. The real increases, after adjusting for inflation, would be approximately 1.9% per year less.

The higher rates with the Preferred Development Plan would be needed in the short to medium term to raise revenues and cash flow to achieve the target debt-equity ratio. However, the higher rates would be an investment for the long term. Upon completion of the intensive capital investment period and the achievement of the target debt/equity ratio in year 20, there would be reduced inflationary pressure on costs with the predominately hydro system in place. At that point the cumulative rate increases with the Preferred Development Plan would fall below those in the other plans within a relatively short time frame.

Under the NFAT reference scenario assumptions, the projected cumulative rate increase with the Preferred Development Plan would be 106% by year 50 (2061/62) virtually the same as the cumulative increase to year 20 (2031/32). The projected cumulative long term rate increase for the two plans with Keeyask G.S. would be between 140% (Keeyask G.S. with no interconnection) and 143% (Keeyask G.S. with the small interconnection), approximately 34 to 37 percentage points more than with the Preferred Development Plan. The projected cumulative long term rate increase for the all gas plan would be 176%, approximately 70 percentage points more than the Preferred Development Plan.

Reliability

The different development plans are all designed to ensure Manitoba Hydro has sufficient resources to be able to meet its peak and annual load, even under a wide range of forced outage, extreme weather and other circumstances. Manitoba Hydro's planning criteria provide for a very high degree of system reliability – there is a very high probability of being able to meet system requirements under all contingencies. Nevertheless, system reliability is never 100%. There generally will be some combinations of adverse circumstances under which

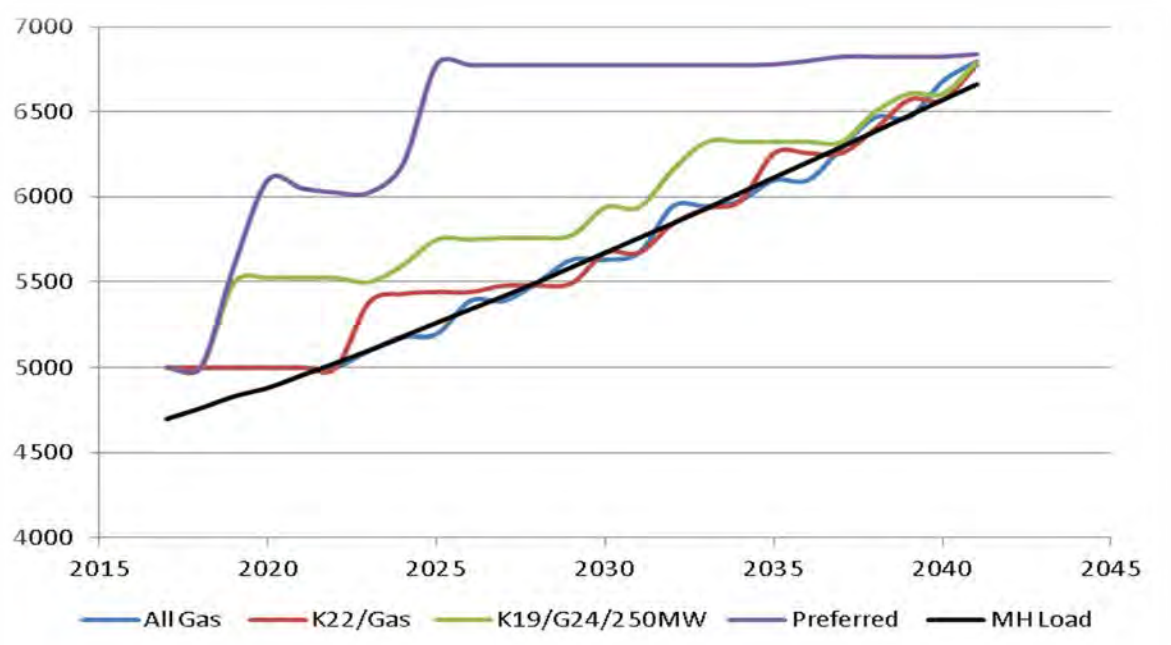
Manitoba Hydro's generating and bulk transmission capacity would not be sufficient to meet the system load.

The degree of system reliability can be measured by what planners call the "loss of load expectation" – the average number of days per year that the load could not be fully met. A common industry standard is .1 days per year, or an inability to meet system load one day every 10 years. The lower the loss of load expectation, the greater is the system reliability. This can equivalently be expressed in terms of the system's load-carrying capability. With greater reliability the system can reliably carry or meet a greater amount of peak load.

Figure 13.2 shows the estimated load-carrying capability of the Manitoba Hydro system (at the industry standard loss of load expectation of .1 day per year) with the preferred and alternative plans.[19] As shown in the figure, the load-carrying capability of the Preferred Development Plan is significantly greater than the others. The interconnection combined with the additional hydro resources contributes to much higher reliability. For the same reason, though to a lesser extent, the alternative with the smaller interconnection and Keeyask G.S. has a greater load-carrying capability than the two alternatives without a new interconnection.

[19] See Appendix 13.1, Reliability Evaluation, August 1, 2013.

Figure 13.2 PEAK LOAD CARRYING CAPABILITY (MW)



With greater reliability, customers could expect less failure of bulk supply and consequently less unserved load. While failures in bulk supply would be very infrequent, they can have major consequences. To indicate the potential significance of the differences in unserved load, the expected unserved energy costs were estimated based on an outage value of $10,000/MWh. The expected unserved energy cost for the all gas and Keeyask/gas alternatives would be greater than for the Preferred Development Plan by $101 million and $105 million in present value, respectively, over the planning period. The expected unserved energy cost for the small interconnection alternative would be less, but still some $56 million greater than with the Preferred Development Plan.

While the precise outage value is uncertain and would depend on the timing and nature of the outages, the estimates serve to indicate the relative advantage of the large interconnection

over the smaller one and the advantage of both of those compared to the two alternatives without a new interconnection.

In addition to this reliability benefit, the Preferred Development Plan offers customers more security against the risks of extreme drought. The import capability with the large new interconnection plus the advancement of hydro generating capacity for export would provide Manitoba Hydro greater access to back-up supply and flexibility to manage extreme droughts than with the other alternatives, particularly those without any new interconnection.

Summary of Customer Account

In sum, the Preferred Development Plan would result in greater rate increases than the other plans in the short to medium term, with the projected cumulative rate increase approximately 16 to 18 percentage points more than the alternatives by 2031/32. However, the Preferred Development Plan would result in the lowest rates over the longer term. By 2061/62 the projected cumulative rate change in the Preferred Development Plan would be approximately 34 to 70 percentage points less than the other plans.

The Preferred Development Plan would benefit customers with its greater system reliability and significantly lower expected cost of unserved load, as well as its greater ability to manage extreme drought.

13.3.3 Manitoba Government Account

Included in the annual expenditures and financing costs that Manitoba Hydro incurs, and that are reflected in its rates, are taxes and other fees and charges paid to the provincial

government. These include the capital taxes and water rental fees that constitute a significant component of the annual expenditures captured in the market valuation account; the debt guarantee and sinking fund administration fees that add roughly 1% to Manitoba Hydro's cost of capital, and thereby directly affect rates; and the coal taxes and assumed carbon charges[20] that add to the cost of thermal power operations.

In Table 13.3 below the amount of these payments that would be made in the preferred and alternative development plans are shown. As shown in the table, the total payments are substantial, ranging from $4.3 to $5.6 billion in present value over the planning period. The largest amount of payments arises with the Preferred Development Plan – some $660 to $770 million greater than the two plans with Keeyask G.S., and $1.27 billion greater than the all gas plan.

Table 13.3 DIRECT MH PAYMENTS TO MANITOBA GOVERNMENT

	Preferred Development Plan	K19/G24/250MW	K22/Gas	All Gas
Capital Tax	1,457.1	1,202.7	1,188.0	991.9
Water Rentals	1,512.4	1,413.3	1,385.6	1,303.4
Debt Guarantee Fee	2,597.5	2,218.3	2,162.1	1,894.9
Sinking Fund Admin Fee	7.1	6.3	5.9	4.4
Coal Tax	10.3	10.3	10.3	10.3
Potential Carbon Charges	28.3	103.4	92.8	139.6
Total Payments	**5,612.7**	**4,954.3**	**4,844.7**	**4,344.5**
Difference from Preferred Development Plan	**0**	**[658.4]**	**[768.0]**	**[1,268.2]**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS OF 2014$)

[20] The carbon charges are included to indicate their potential contribution to the total payments to government, but they may or may not be manifested as a tax, depending on the policy government were to adopt to implement such charges.

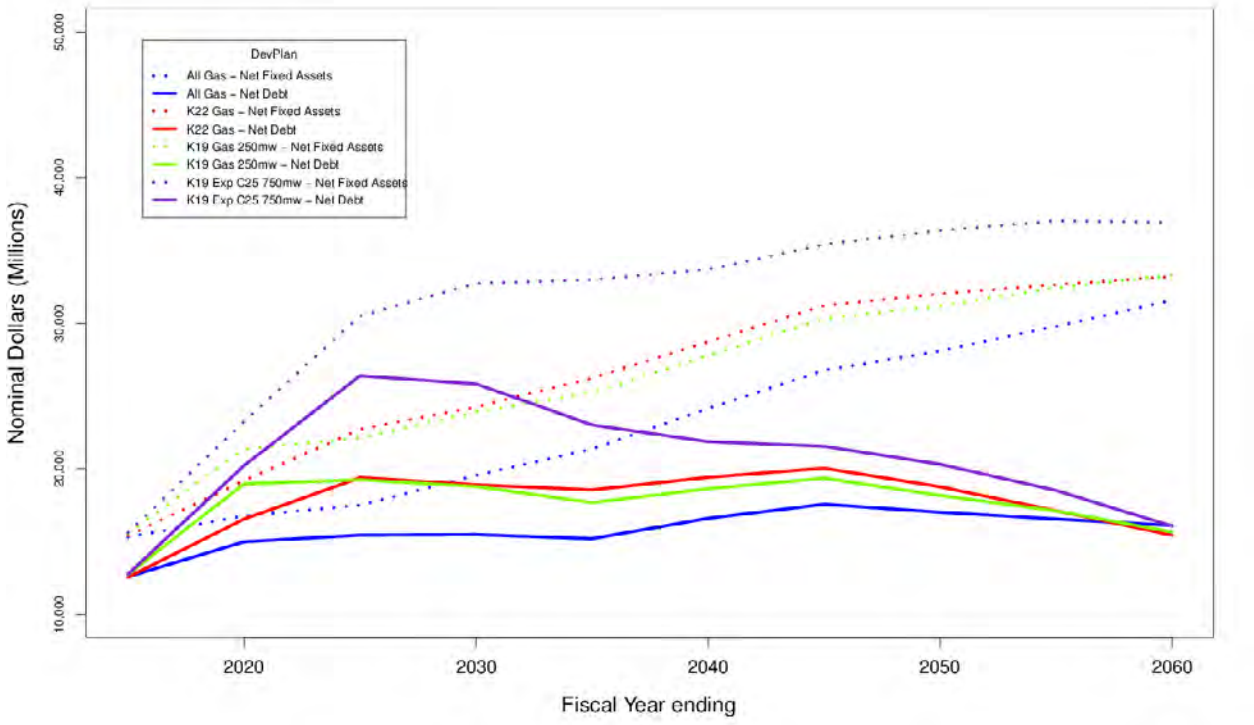
In terms of the economic significance of these payments to government, and therefore Manitoba taxpayers, the question is what net benefit do they provide. To what extent do they constitute incremental revenues for government not offset by incremental costs or risks?

The coal taxes and carbon charges do not offer net benefits. As explained in section 2, the carbon charges may not result in direct payments to government, for example in a cap and trade system, and in any event would be intended to internalize at least part of the social cost of GHG emissions. The sinking fund administration fee also would not constitute a significant net benefit for government, on the assumption that the fee serves to compensate government for the administration costs it incurs.

The debt guarantee fees are substantial, but so too is the amount of debt that government would be guaranteeing. Figure 13.3 shows the projected balances of net fixed assets and net debt with the preferred and the alternative plans. As shown in the figure, there would be an increase in the total amount of Manitoba Hydro's debt with all of the plans, but particularly in the Preferred Development Plan with its development of both Keeyask G.S. and Conawapa G.S.

Figure 13.3 MANITOBA HYDRO'S PROJECTED BALANCES OF NET DEBT AND NET FIXED ASSETS – NFAT REFERENCE SCENARIO ASSUMPTIONS

(MILLIONS OF NOMINAL$)



The level of net debt must be considered in the context of the entire balance sheet, including the associated net assets that are under construction or in service. In the medium term, while net debt levels are the highest with the Preferred Development Plan, that plan also has the overall highest capital investment, fixed assets and retained earnings.

The Province of Manitoba provides a flow through credit to Manitoba Hydro and guarantees the vast majority of its debt. Given that the provincial debt guarantee fee is provided in exchange for this guarantee, the multiple account analysis has not included the debt guarantee

fees as part of the net benefits to the Manitoba government. It is assumed that the fee does not provide a net benefit. Under this assumption, the net benefits for government (and taxpayers) would arise only from the capital taxes and water rentals that Manitoba Hydro pays.

Accordingly, the estimated net benefit to government is shown in Table 13.4 for the preferred and alternative plans.[21]

Table 13.4 NET BENEFITS TO MANITOBA GOVERNMENT

	Preferred Development Plan	K19/G24/ 250MW	K22/Gas	All Gas
Capital tax	1,457.1	1,202.7	1,188.0	991.9
Water rentals	1,512.4	1,413.3	1,385.6	1,303.4
Total net benefit	**2,969.5**	**2,616.0**	**2,573.6**	**2,295.3**
Difference from Preferred Development Plan	**0**	**[353.5]**	**[395.9]**	**[674.2]**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS 2014$)

As shown in the table, while smaller than the total payments Manitoba Hydro would make to government, the total net benefit from capital taxes and water rentals is substantial, ranging from $2.3 to almost $3.0 billion in present value over the planning period. The net benefits are greatest for Manitoba Hydro's Preferred Development Plan – some $350 to $400 million

[21] No expenditures are shown in the calculation of net benefits as there are no significant incremental expenditures that government would incur as a result of the different plans. The provincial government has contributed to training programs for Keeyask and as well road improvements in the area. However, these expenditures have already been incurred and no significant further expenditures are expected.

greater than the two alternative plans with Keeyask G.S., and $670 million greater than the all gas plan.

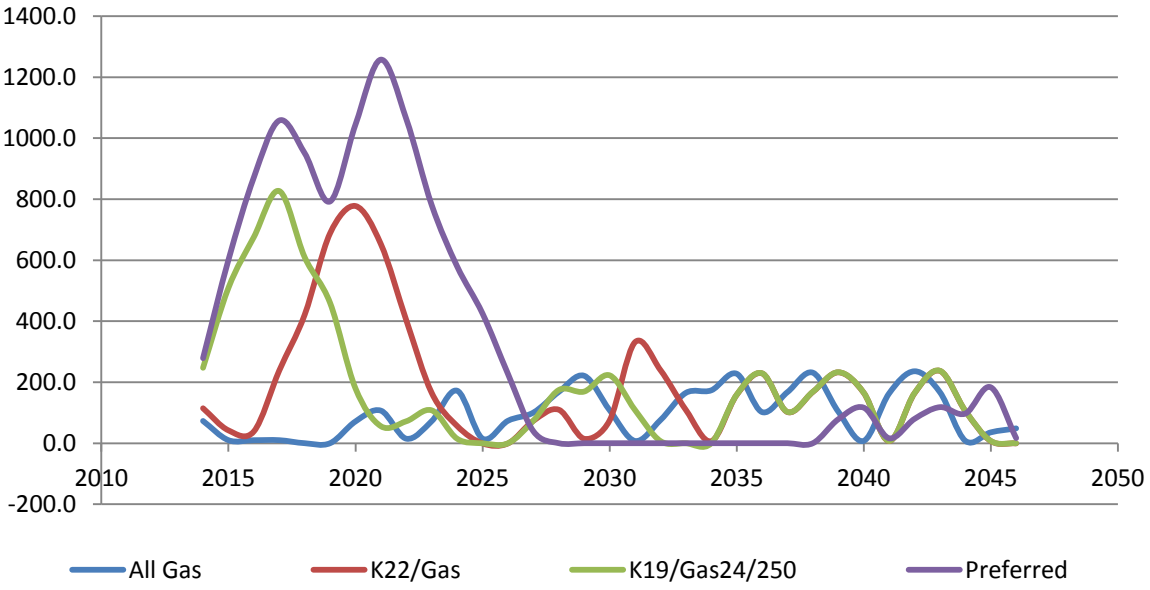
13.3.4 Manitoba Economy Account

Manitoba Hydro's Preferred Development Plan will significantly affect the Manitoba economy as a result of the demand for goods, services and labour generated by the construction and operation of the different projects in the different plans. As explained in section 2, of particular interest in this MA-BCA are the impacts on the demand for labour. That is where there is greatest potential for "economic rents" or net benefits to be generated.

As shown in Figure 13.4, there is a marked difference in the level and pattern of capital investment in the preferred and the alternative plans. The difference is most pronounced in the first part of the planning period, through to the completion of Conawapa G.S. in the Preferred Development Plan. During that initial period the Preferred Development Plan exhibits the greatest level of spending, followed by the two alternatives that include the development of Keeyask G.S. (which differ in the timing but not significantly in the amount of capital spending). The all gas alternative has the least amount of capital spending in the first part of the planning period, with only small amounts invested for thermal power plants starting in the 2020s. Later in the planning period, capital spending is relatively low in all of the plans, but least with Manitoba Hydro's Preferred Development Plan because of the limited need for additional generating capacity once Conawapa G.S. is built.

Figure 13.4 ANNUAL CAPITAL EXPENDITURES - NFAT REFERENCE SCENARIO ASSUMPTIONS

(MILLIONS OF 2014$)

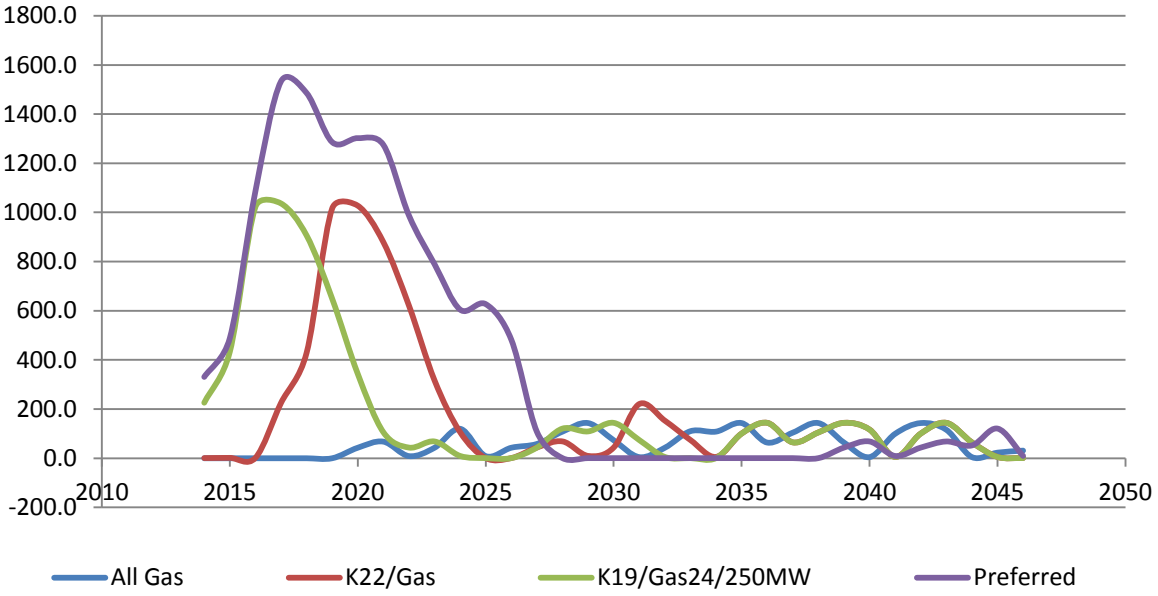


These differences in capital spending carry over into the demand for labour. Figure 13.5 shows the total annual employment directly required for the construction of the generating and transmission projects in the different plans.[22] The largest amount of construction employment is generated by the Preferred Development Plan, again followed by the two plans that include Keeyask G.S. The all gas alternative generates the least amount of construction employment, far less than the other plans.

[22] Employment and wage estimates in this section are based on project data in Manitoba Hydro, Range of Resource Options, Appendix 7.2.

Figure 13.5 ANNUAL EMPLOYMENT FOR PROJECT CONSTRUCTION

(PERSON YEARS)



The demand for labour in operations and maintenance (O&M) is different. Figure 13.6 shows the total annual O&M employment directly required for the projects developed in the preferred and the alternative plans. All of the plans generate an increasing amount of annual O&M employment. Toward the end of the planning period, however, the three alternatives without Conawapa G.S. generate more annual employment than the Preferred Development Plan because of the need to add more thermal plants to meet growing load.

Figure 13.6 ANNUAL EMPLOYMENT FOR PROJECT OPERATIONS AND MAINTENANCE

(PERSON YEARS)

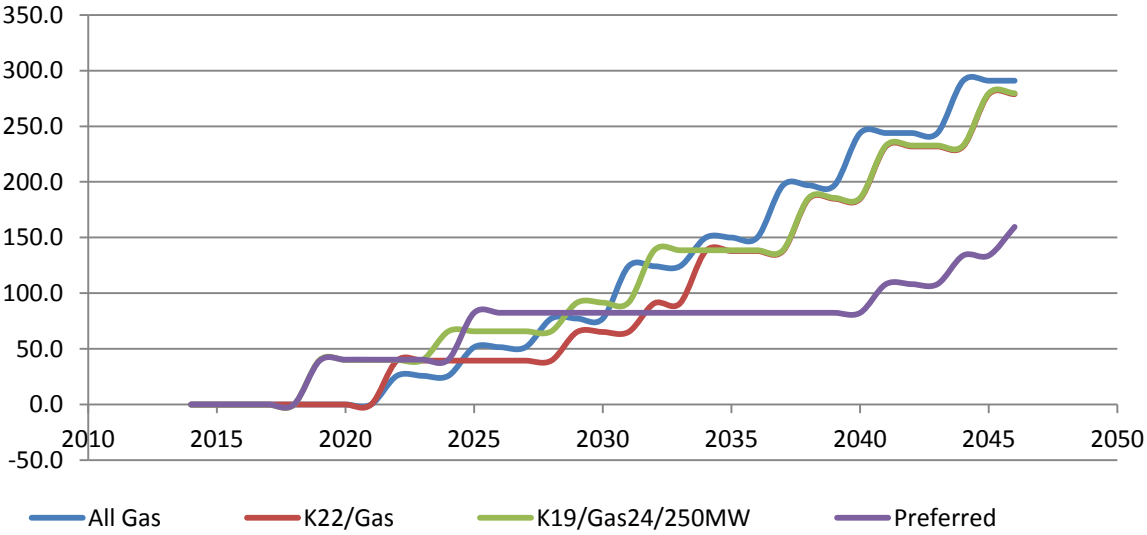


Table 13.5 shows the present value of the gross wages generated by the direct employment in project construction and O&M in the preferred and alternative plans. The wages are shown separately for the employment that takes place in northern versus southern Manitoba.

Table 13.5 GROSS WAGES FOR CONSTRUCTION AND O&M

	Preferred Development Plan	K19/G24/250MW	K22/Gas	All Gas
Construction – N. Man.	1,317.4	599.9	503.9	--
Construction – S. Man.	142.0	95.0	72.0	62.6
Total Construction	1,459.4	694.9	575.9	62.6
O&M – N. Man.	85.0	49.6	40.5	--
O&M – S. Man.	4.2	47.4	37.3	71.5
Total O&M	89.2	97.0	77.8	71.5
Total Gross Wages	1,548.6	791.9	653.7	134.1
Difference from Preferred Development Plan	0.0	(756.7)	(894.9)	(1,414.5)

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS 2014$)

As shown in the table the total gross wages directly generated by the Preferred Development Plan would be much greater than with the other plans and more heavily concentrated in northern Manitoba.

The net benefits derived from the employment on Manitoba Hydro's projects, however, are measured not by the gross wage impact, but rather by the incremental income or other benefits Manitobans would realize. That would depend on the *increase* in income or other benefit that Manitobans would earn in relation to what they would otherwise be doing. And that in turn would depend on where the workers originate from and what alternative opportunities they would have.

Significant net benefits would only be realized to the extent that the jobs provide opportunities for Manitobans which are better than what would otherwise be available. That is most likely in regions where there are high levels of unemployment, or when there are complementary programs and other measures enabling workers to upgrade their skills and earning potential, or where the jobs simply offer better wages or benefits than available elsewhere.

There will not likely be widespread unemployment over the long term in Manitoba as a whole without these projects. Labour force data indicate that the unemployment rate in Manitoba is relatively low and growing demand for labour combined with the impact of "baby boomer" retirements are expected to maintain low rates of unemployment, with shortages in some occupations.[23] The net benefit from new jobs will generally be limited to the advantage they offer relative to alternative sources of employment – the amount required to attract the workers away from what they would otherwise do.

At the same time, however, it is important to recognize that there has been chronic unemployment in northern Manitoba, particularly in Aboriginal communities, with limited alternative prospects and with social and cultural barriers to migration to areas where employment prospects are better.[24] Jobs opportunities created in northern Manitoba,

[23] See Manitoba Government, *Manitoba Government Labour Force Trends* and Manitoba Construction Sector Council, *Construction Looking Forward 2012-2020 Key Highlights*.

[24] Statistics Canada data indicated that the 2001 unemployment rate for Keeyask Cree Nations was 40% and for the northern Manitoba Aboriginal population [Census divisions 19,21,22 and 23] it was 28% compared to 6.1% for Manitoba as a whole. While the rates have no doubt changed since 2001 (in part because of the Wuskwatim project), the relative pattern and vulnerability to unemployment is likely the same. See Keeyask Hydropower Limited Partnership, *Environmental Impact Statement-Response to EIS Guidelines*, Chapter 6, Environmental Effects Assessment, June 2012, p.6-143.

combined with training and other measures to enable northern Manitobans to fill those positions, can provide significant net benefit.

For this assessment it is assumed that the net benefits of the jobs filled by Manitobans would generally be in the order of 15% of the gross wages. That is consistent with a study of the relationship between wages and the social opportunity cost of labour (what the workers would otherwise have earned) for a major project developed when labour markets were generally tight, as one could expect in this case.[25] However, the net benefit for northern Aboriginal employment, supported by training, recruitment and retention policies and programs, is assumed to be in the order of 50% of the gross wages paid. Again this is consistent with estimates of the relationship between wages and the social opportunity cost of labour where alternative opportunities are more limited.[26] With respect to in-migrants it is assumed the net benefits would be zero from a Manitoba perspective. The in-migrants would pay income and other taxes, but it is conservatively assumed these would be offset by the cost of services that government would have to provide for them.

With respect to the origin of the workers filling the jobs generated in the different plans, it is assumed that for the northern projects 40 to 45% of the construction positions would be filled by Manitobans, and of the Manitobans, 50% would be northern Aboriginal. The Manitoba share of the construction employment is less than what has been observed for the Wuskwatim Project and may be conservative, but reflects the larger size of the projects. The northern aboriginal share (50% of the Manitoba workers or 20 to 22.5% of the total number of jobs) is

[25] See Chun-Yan Kuo, "Evaluating the Social Cost of Job Creation", *Canadian Journal of Program Evaluation"*, Special Issue, 1997, pp. 67-82.

[26] Ibid.

within the range for northern aboriginal construction employment estimated in the Keeyask EIS.[27]

With respect to the southern construction jobs, it is assumed that Manitobans would fill just over 50% of the gas plant related employment and almost all of the tie-line and head office related employment. The share of gas plant jobs going to Manitobans is based on consulting reports indicating that they require a large amount of specialized work combined with the fact that Manitoba has not undertaken such projects in recent years.

With respect to the O&M jobs in the north and the south, it is assumed all would be filled by Manitobans. For the northern O&M jobs it is assumed that at least 45% would be filled by northern Aboriginal people based on current shares of northern operations employment and targeted measures expected with Keeyask G.S.[28]

Based on these employment assumptions—plus an estimate that the average wages for the mix of construction jobs filled by northern Aboriginal people would be approximately 75% of the total project average wages—the net benefits of construction employment in the north would equal 12.2 to 12.4% of the total gross wages paid; for construction employment in the south

[27] For a breakdown of the person-years of employment on the Wuskwatim project through to November 2012 see Manitoba Hydro, *Wuskwatim GS Employment, November 2012 Monthly Report*, p.11. In the Keeyask EIS it was estimated that northern aboriginal would fill between 13 and 40% of the direct construction employment for Keeyask. See Keeyask Hydropower Limited Partnership, *Environmental Impact Statement,* Chapter 6 p.6-434.

[28] Northern Aboriginal people currently account for 42% of northern operations employment. The Joint Keeyask Development Agreement calls for the placement of 182 Keeyask Cree Nation members in operating jobs throughout the hydro system. That would be equivalent to more than 100% of the O&M jobs that would be created by Keeyask and Conawapa combined. The 45% assumption is conservative, recognizing it may take some time until the target can be reached.

net benefits per dollar of gross wages paid would range from 7.8% (for the all gas case where a large number of the workers would be from out-of province) to 14.6% (for the preferred case for which most of the southern employment would be filled by Manitobans). The net benefits of O&M employment in the north would be 30.8% of the total gross wages paid; for O&M employment in the south net benefits would be 15% of the total gross wages paid. In Table 13.6 the resulting employment net benefits generated by the preferred and alternative plans are shown.

Table 13.6 EMPLOYMENT NET BENEFITS FOR PROJECT CONSTRUCTION AND O&M

	Preferred Development Plan	K19/G24/ 250MW	K22/Gas	All Gas
Construction – N. Man.	160.7	74.4	62.5	--
Construction – S. Man.	20.7	10.8	7.6	4.9
Total Construction	**181.5**	**85.2**	**70.1**	**4.9**
O&M – N. Man.	26.2	15.3	12.5	--
O&M – S. Man.	0.6	7.1	5.6	10.7
Total O&M	**26.8**	**22.4**	**18.1**	**10.7**
Total Net Benefits	**208.3**	**107.6**	**88.2**	**15.6**
Difference from Preferred Development Plan	**0.0**	**(100.7)**	**(120.1)**	**(192.7)**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS 2014$)

As shown in the table, the employment net benefits, though much smaller than gross wages, would still be significant in the plans that include northern hydro development. Those plans generate a significant number of jobs, a large proportion of which would be in a region where they would be particularly beneficial. The employment net benefits would be greatest with the

Preferred Development Plan - $100 to $120 million greater than the two plans with Keeyask G.S. and over $190 million greater than the all gas plan.

Clearly the assumptions used to develop these estimates are rough, and arguably conservative for purposes of estimating the net benefits from the employment and other economic activity generated by the projects in the different plans. Nevertheless, they do serve to indicate the relative magnitude of the employment net benefits and the advantage of the Preferred Development Plan.

13.3.5 Environment Account

The preferred and alternative development plans differ in terms of the impacts they would have on GHG emissions; NO_x and other local CAC emissions; and terrestrial and aquatic habitat and natural resource impacts.

GHG Emissions

The development plan that Manitoba Hydro undertakes will affect GHG emissions both within and outside Manitoba. Within Manitoba, the plan will determine the amount of thermal generation that would be used to meet growing load and backup low-water conditions, and consequently affect thermal power-related GHG emissions. It will also govern the development of new hydro reservoirs, generating stations and transmission lines, and therefore the production of associated lifecycle GHG emissions. With respect to GHG impacts outside Manitoba, the plan will determine Manitoba Hydro's exports and imports of power, and consequently affect the amount of thermal power generation and related GHG emissions in the

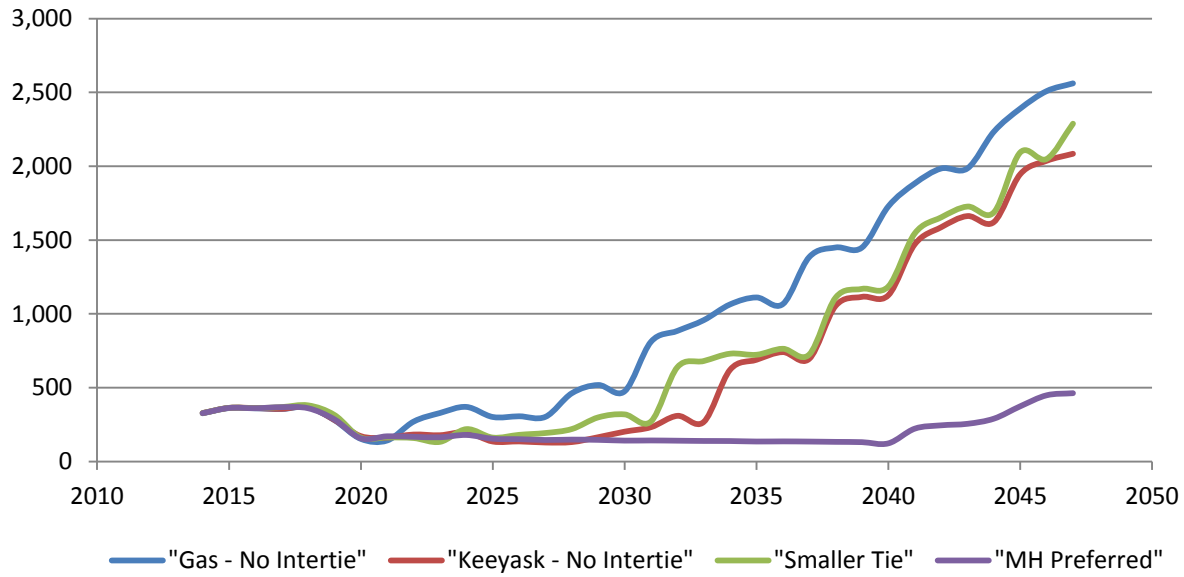
interconnected jurisdictions. There are also lifecycle GHG impacts outside Manitoba associated with the project development plans.

Figure 13.7 shows the estimated amount of Manitoba Hydro thermal generation-related GHG emissions associated with the preferred and alternative plans. As shown in the table, emissions are lowest with the Preferred Development Plan.[29] Unlike the alternatives, the Preferred Development Plan incorporates the development of both Keeyask G.S. and Conawapa G.S., and consequently entails far less thermal generation than the others. The highest level of emissions is with the all gas plan. By the end of the planning period the annual emissions in that plan would be some 2 million tonnes (CO_{2e}) per year greater than with the Preferred Development Plan.

[29] The Preferred Plan is the only plan which emissions are lower than Manitoba Hydro's annual greenhouse gas emissions target of 520 kilotonnes of CO_2e throughout the planning horizon.

Figure 13.7 MANITOBA HYDRO THERMAL GENERATION-RELATED GHG EMISSIONS

('000 TONNES CO_{2E})



In the market valuation of the different plans, it was assumed that Manitoba Hydro would pay a charge for its carbon emissions from natural gas-fired thermal generation as well as a tax on the coal used in the single remaining coal-fired unit. The timing and level of charges depend on future policies in Manitoba and Canada with respect to new emission taxes or membership in a cap and trade system. In the absence of defined policies at this time, the carbon pricing from other regions was considered and judgment applied to create a plausible range of future GHG-emission charges. For the reference scenario analysis, the GHG emissions charge for natural gas-fired thermal generation was assumed to be approximately \$5/tonne CO_2 in 2015 rising to approximately \$25/tonne CO_2 by 2048 (in constant 2012\$).

These assumed charges, however, do not reflect the full social cost of GHG emissions – i.e., the maximum amount people would be willing to pay to reduce emissions in order to reduce the expected costs and risks of global warming and climate change.

Recent estimates of the social cost of GHG emissions are much higher than the assumed carbon charge. Environment Canada has estimated that the social cost of GHG emissions, based on the present value of expected climate change costs is currently over $28/tonne CO_2, rising to almost $60/tonne CO_2 by 2050 (in constant 2011$).[30] Including consideration of the willingness to pay to avoid uncertain, but potentially catastrophic, climate change impacts raises the estimated cost to over $112/tonne CO_2. Similarly, a U.S. government inter-agency team recently estimated the social cost of GHG emissions at $38/tonne CO_2 in 2015 rising to $71/tonne CO_2 in 2050 (in constant 2007$ US),[31] and recognized that the cost would be much greater the more that people are willing to pay to avoid damages in the future (the lower the discount rate), and the more that people are willing to pay to avoid uncertain, catastrophic risks.[32]

For purposes of estimating the external cost of the Manitoba GHG emissions in the different plans – the difference between the estimated social cost of GHG emissions and the carbon charges plus coal taxes included in Manitoba Hydro's estimated expenditures – it is assumed that the social cost of GHG emissions would be $40/tonne CO_2 in 2014, rising to $80/tonne CO_2 by 2048 (in constant 2012$). This is somewhat higher than Environment Canada's estimate of GHG damage costs, but less than its estimate of the willingness to pay to avoid the risks of uncertain but catastrophic effects. It is broadly consistent with the most recent U.S. estimates, again without any provision for the willingness to pay to avoid uncertain, catastrophic risks.

[30] In constant 2012$ that would be over $28.50 rising to almost $61/tonne.

[31] In constant 2012$ Cdn that would be $42 rising to $78/tonne.

[32] See Environment Canada, *Heavy Duty Vehicle and Engine Greenhouse Gas Emissions Regulation,* section 7.3.3, Feb.22, 2013 (http://gazette.gc.ca/rp-pr/p2/2013/2013-03-13/html/sor-dors24-eng.html#footnoteRef.82118), and U.S. Interagency Working Group on Social Cost of Carbon, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866*, May 13, 2013.

Table 13.7 shows the estimated present value of the external GHG costs from the Manitoba thermal generation in the different plans based on these assumptions.

Table 13.7 EXTERNAL COST OF MANITOBA THERMAL GENERATION-RELATED GHG EMISSIONS

	Preferred Development Plan	K19/G24/ 250MW	K22/Gas	All Gas
Estimated social cost of GHG emissions	188.8	472.6	427.6	620.4
Estimated coal tax and carbon charge payments	38.6	113.8	103.1	149.9
External Cost of GHG Emissions	**150.2**	**358.8**	**324.5**	**470.5**
Difference from Preferred Development Plan	**-------**	**208.6**	**174.3**	**320.3**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS 2014$)

As shown in the table, the estimated external costs of the Manitoba thermal generation-related GHG emissions in the Preferred Development Plan are significantly less than the alternatives. As compared to the all gas case, the present value external cost in the Preferred Development Plan is an estimated $320 million less.

In addition to thermal generation-related GHG emissions there would be the emissions associated with the development of reservoirs, generating stations and transmission lines. Estimates are not available for all of the project development impacts in all of the plans. However, the largest GHG emission impacts within Manitoba would likely result from the Keeyask and Conawapa Projects, with the clearing, flooding and construction-related impacts they would have.

A lifecycle GHG assessment for the Keeyask Project[33] indicates that land-use changes including reservoir clearing and flooding would result in an estimated 496,000 tonnes CO_{2e} of emissions. Construction activities, including building materials and manufacture, transportation and on-site construction activities, would result in approximately 454,000 tonnes CO_{2e} (an estimated 40% of which would occur within Manitoba). In total the lifecycle development impacts for Keeyask G.S., including provision for future maintenance and refurbishment activities and decommissioning, would amount to some 979,000 tonnes CO_{2e} of emissions. Approximately 700,000 tonnes CO_{2e} would occur within Manitoba. The development of the Conawapa Project would also generate some GHG emissions, though less than Keeyask Project because of the much more limited flooding it entails.

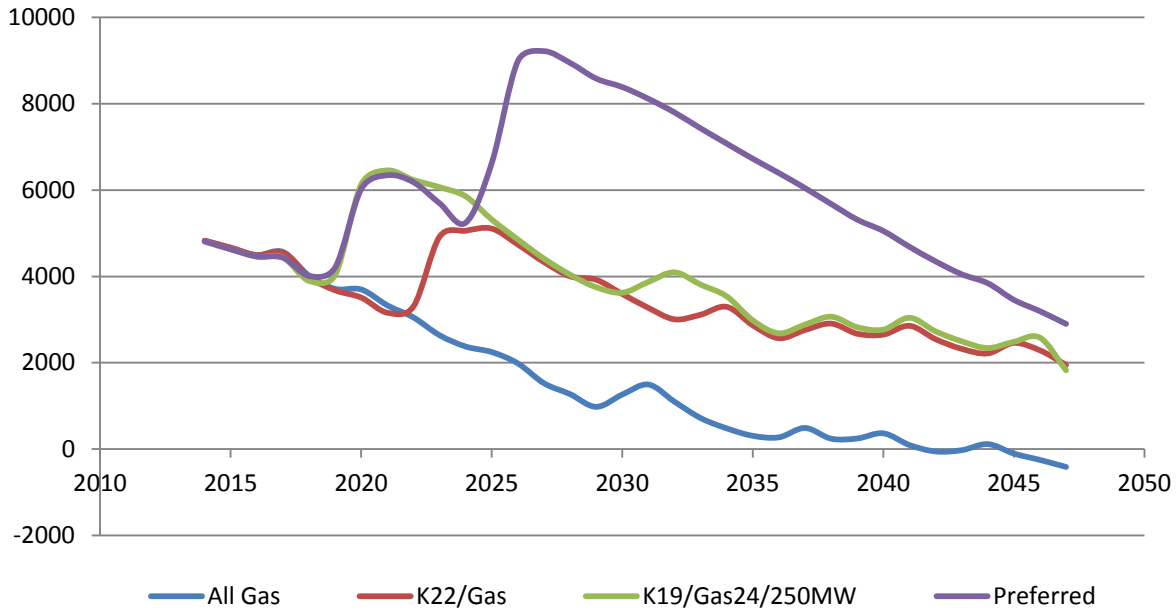
Taking into account the social cost of the emissions resulting from the development of Keeyask G.S. would reduce the GHG advantage of the plans with Keeyask G.S. relative to the all gas plan. However, the impact would be relatively small. The Keeyask G.S. emissions would be some two orders of magnitude less than the emissions from the thermal operations they displace. Similarly, taking into account the emissions from the development of Conawapa G.S. would reduce the GHG advantage of the Preferred Development Plan relative to the others. But the impact here would also be relatively small, especially with Conawapa G.S. emissions even less than Keeyask G.S.

Moreover, whatever GHG emissions impacts would result from the development of Keeyask G.S. and Conawapa G.S., they would be more than offset by the very significant positive impact those projects have on global displacement of GHG emissions. Figure 13.8 shows the estimated

[33] Appendix 7.3: Life Cycle Greenhouse Gas Assessment Overview.

impact of the different development plans on GHG emissions outside Manitoba due to Manitoba Hydro's exports and imports, and consequently on thermal power generation outside the province.

Figure 13.8 REDUCTION OF THERMAL GENERATION-RELATED GHG EMISSIONS OUTSIDE MANITOBA
('000 TONNES OF CO_{2E})



As shown in the figure, the plans with Keeyask G.S. would all significantly reduce GHG emissions in the U.S. The Preferred Development Plan with Keeyask G.S. and Conawapa G.S. would have an even greater impact. In some years the annual displacement of GHG emissions outside Manitoba with the Preferred Development Plan would exceed 8 million tonnes. This single-year impact is many times larger than the total 100-year lifecycle GHG impacts of these projects. Overall, the Preferred Development Plan, and to a lesser extent the Keeyask-gas and smaller interconnection alternatives, would make very significant contributions to the reduction of global GHG emissions.

Local CAC Emissions

In addition to GHG emissions, thermal generation in Manitoba produces emissions of nitrogen oxide (NO_x), fine particulates (PM_{10}) and other criteria air contaminants (CACs). Figures 13.9 and 13.10 show the estimated tonnes of NO_x and PM_{10} emissions in Manitoba in the different plans. As shown in the figures, the all gas alternative has the greatest amount of emissions, followed by the two alternatives that include the development of Keeyask G.S. The Preferred Development Plan, with the development of both Keeyask G.S. and Conawapa G.S. has significantly less CAC emissions than the others.

Figure 13.9 NO_x Emissions in Manitoba in Preferred and Alternative Plans

(Tonnes)

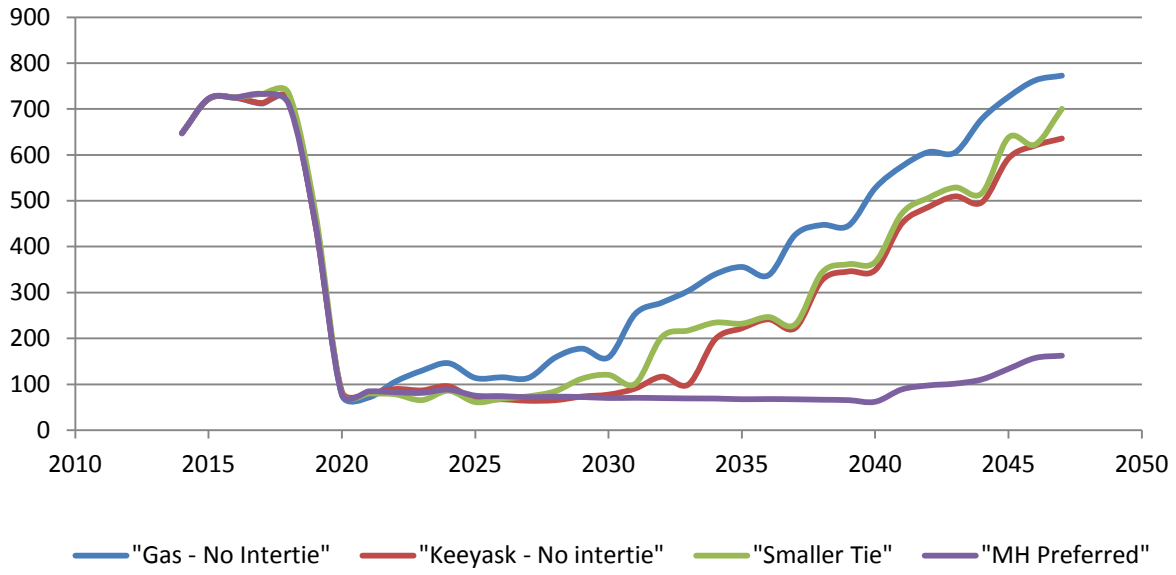
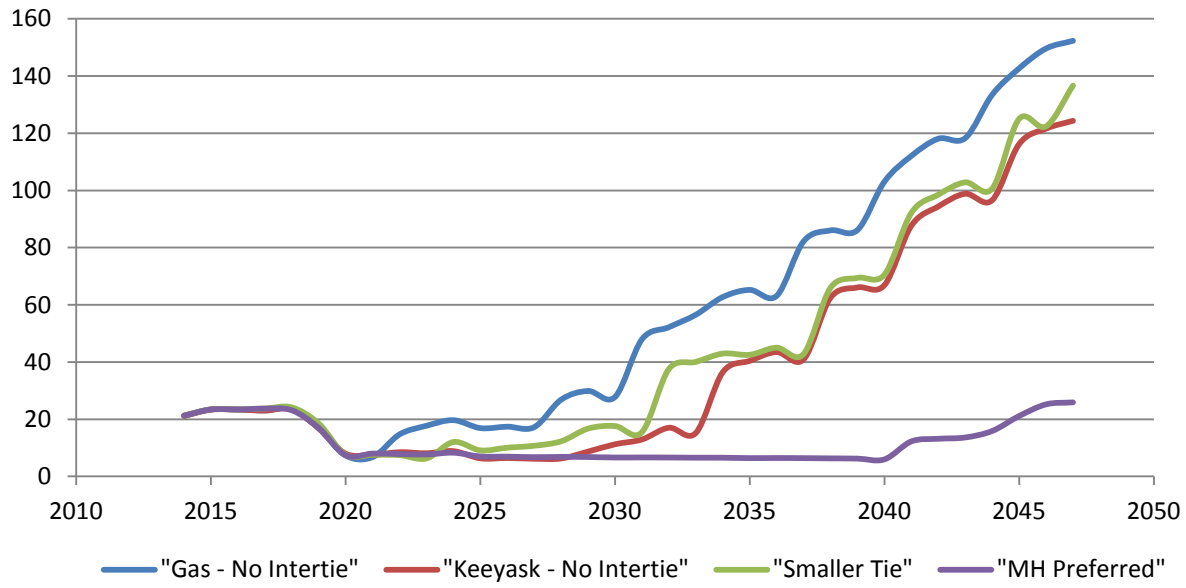


Figure 13.10 PM_{10} EMISSIONS IN MANITOBA IN PREFERRED AND ALTERNATIVE PLANS

(TONNES)



These emissions are of concern because of the health and other adverse impacts they can have. A measure of the cost they entail is their total damage costs – the estimated costs of the illness and premature death, as well as any agricultural or other adverse resource impacts they may have.

The exact damage costs associated with these emissions depend on many factors, including meteorological conditions, topography, and the size, proximity and demographics of exposed populations. External cost studies undertaken for the European Commission (2005) show estimates of the damage costs of NO_x emissions ranging from 1,000 euros/tonne to over 9,000 euros, and damage costs of PM ranging from just over 4,000 euros/tonne to over 60,000 euros

per tonne.[34] Higher ranges are reported with higher assumed values for the willingness to pay to reduce the risk of loss of life years. A key factor governing the costs is nearby population, as human exposure to the pollutants is critical in determining the incidence of illness and death due to the emissions.

For purposes of illustrating the potential damage costs of the CAC emissions in the preferred and alternative plans, damage cost values of $3,000/tonne for NO_x and $20,000/tonne for PM_{10} are assumed (2012$ Cdn). These are in the lower end of the range of the EU study, which is appropriate for relatively small southern population centres like Brandon and Selkirk where much of the thermal generation would likely take place.

Table 13.8 shows the total present value costs of the CAC emissions in each plan based on these damage cost estimates. As shown in the table, the total costs and differences from the referred plan are relatively small. While arguably the costs estimates are conservative[35], the fact remains that with appropriate siting and modern pollution control technology, the pollution-related external costs of thermal generation can be minimized. There are advantages in avoiding CAC emissions, but they are relatively small compared to GHG impacts and other consequences of the different plans.

[34] See European Commission publication, *Damages per tonne of emissions of $PM_{2.5}$, NH_3, NO_x and VOCs from each EU25 Member State (excluding Cyprus) and Surrounding Seas*, March 2005.

(http://ec.europa.eu/environment/archives/cafe/activities/pdf/cafe_cba_externalities.pdf)

[35] The European PM damage cost estimates are for $PM_{2.5}$. One could expect higher costs for finer particulates (PM_{10}) because of the greater health hazard they present. Also the damage cost estimates could increase over time. See U.K. Department of the Environment, Air Quality: economic analysis, May 10, 2013 (www.gov.uk/air-quality-economic-analysis) where it is recommended to assume an increase in the real value of damage costs over time due to an expected increased willingness to pay to reduce the risk of loss of life as incomes rise. It is also recommended to use a lower discount rate (3.5% real) as compared to the 6% real rate used to calculate present values in this study.

Table 13.8 CAC DAMAGE COSTS FROM MANITOBA THERMAL GENERATION IN PREFERRED AND ALTERNATIVE PLANS

	Preferred Development Plan	K19/G24/250MW	K22/Gas	All Gas
Estimated damage cost of NO_x emissions	13.4	16.9	16.3	18.9
Estimated damage cost of PM emissions	4.1	9.2	8.3	11.9
Total CAC Damage Costs	**17.5**	**26.1**	**24.6**	**30.8**
Difference from Preferred Development Plan	**-------**	**8.6**	**7.1**	**13.3**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS OF 2014$)

Bio-physical Impacts

The development of new generation and transmission facilities in the different plans would have a wide range of physical, aquatic and terrestrial environmental impacts.

In the Preferred Development Plan, there would be the impacts associated with the development of the Keeyask and Conawapa hydro stations, related transmission and network upgrades; a new 750 MW interconnection with the U.S.; and some 600 MW of simple cycle gas turbine capacity should that capacity be needed toward the end of the planning period (2041-46) to meet requirements.

In the smaller-interconnection alternative there would be the impacts of the development of Keeyask G.S. and related transmission; a 250 MW interconnection to the U.S.; and over 1,600 MW of simple and combined cycle gas turbine capacity. The Keeyask-gas alternative would give rise to the same development impacts, except for the interconnection to the U.S. which would

not be built in that case. With the all gas alternative there would be the impacts associated with the development of gas turbine capacity – some 900 MW of simple cycle capacity and 1,540 MW of combined cycle capacity.

As discussed in ***Chapter 2 – Manitoba Hydro's Preferred Development Plan Facilities,*** Manitoba Hydro and its Cree Nation partners have undertaken a detailed environmental assessment of the Keeyask generation project. The assessment sets out the scope of the project, its potential effects, plans to avoid and mitigate adverse effects and an evaluation of residual effects (i.e. those that remain after mitigation).[36]

The project would entail the flooding of 45 km^2 of land initially, increasing another 7 or 8 km^2 over time. There would be increases in water levels upstream and flow impacts up to 3 km downstream. There would as well be clearing of land for construction, access and transmission line right of ways.

Among the aquatic impacts, there would be some loss of spawning and foraging habitat as well as some blockage of fish passage. Extensive mitigation measures have been planned to minimize and offset these effects. These include plans in construction and for turbine design to minimize impacts; development of new habitat and fish passage; and implementation of a fish stocking program. While some short term declines in fish populations are expected, no declines are expected over the long term, and lake sturgeon populations in the region are expected to

[36] Keeyask Hydropower Limited Partnership, *Environmental Impact Statement-Response to EIS Guidelines*, Chapter 6, Environmental Effects Assessment, June 2012.

increase with the stocking and stewardship programs despite the loss of habitat due to the project.[37]

The federal government is considering whether to list lake sturgeon in the Nelson River as endangered under the *Species at Risk Act (SARA)*. Manitoba Hydro's planning is based on the assumption that this will not occur, particularly given the stocking and stewardship programs that are being developed and implemented. Were listing under *SARA* to occur the Keeyask and Conawapa Projects could be delayed or cancelled. If Manitoba Hydro (and in the case of Keeyask the partnership) decided to proceed with the projects, federal permits would be required.

The development of Keeyask G.S. would result in an increase in methylmercury concentrations in fish peaking 3 to 7 years after impoundment. It is expected the methylmercury concentrations would revert back to original levels after 30 years. Monitoring and communication programs, as well as funding of offsetting programs to support harvesting in alternative locations are planned to mitigate these effects.

Among the terrestrial impacts is the loss of habitat, including wetland areas, affecting mammals, birds and waterfowl. There would also be impacts due to sensory disturbance, increased traffic and human presence, and greater access to and pressure from hunting. For birds there could as well be impacts from wire strikes. Mitigation measures include careful

[37] Manitoba Hydro has been working on stewardship activities with provincial and federal regulators, academic institutions, First Nations and stakeholder organizations such as the Nelson River Sturgeon Board and the Saskatchewan River Sturgeon Management Board. The objective is to develop a comprehensive set of programs designed to protect and enhance lake sturgeon populations. See NFAT, Appendix 2.1 for details.

siting of infrastructure facilities away from sensitive sites, such as caribou calving habitat and regionally rare habitat types. New wetland habitat and nesting areas would be developed. Cumulative effects for all priority habitat types would be maintained below 10%, a key indicator of ecosystem sustainability. An access management and hunting control plan would also be implemented.

Manitoba Hydro is of the view that these mitigation measures combined with offsetting programs and the compensation provided for in the adverse effects agreements, plus the fact that from the very outset a low-level development option was selected to minimize flooding and the increase in water levels upstream, would serve to ensure that the residual impacts would be relatively small.

The economic measure of the cost of any residual impact on environmental resources and attributes is the compensation required by those people who would be adversely affected to willingly accept the impacts and risks. The acceptance and participation of the KCNs in the Joint Keeyask Development Agreement suggests that the cost (for social as well as natural resource and environmental effects as they affect local residents) would be largely internalized in the design, plans and agreements governing the project development. There would be no major *external* cost to take into account.

Detailed environmental assessments have not been undertaken for the other projects in the preferred and alternative plans. Preliminary assessments indicate, however, that the impacts of the Conawapa Project would be similar in nature to the Keeyask Project, except the flooding and related aquatic impacts would be much less. It would entail only 5 km^2 of flooding as compared to 45 km^2 for Keeyask G.S. There would be less linear development to connect

Conawapa generation to the system than for Keeyask G.S. – five 7-km lines would be required to connect the generating station to the converter station. However, the combined development of Keeyask G.S. and Conawapa G.S. would require upgrades to the HVDC collector system as well as upgrades to some 470 km of the north-south 230 kV AC transmission system.

At this point, and subject to the findings in project-specific environmental assessment reviews, Manitoba Hydro is of the view that preliminary project designs and cost estimates for Conawapa G.S. and the related upgrades provide for sufficient mitigation to minimize residual adverse effects to acceptable levels. It is also expected that some form of local agreements would be entered into to ensure whatever residual biophysical impacts or risks remain, they would be addressed. Thus, as with the Keeyask Project, it is not anticipated there would be significant external environmental costs from the projects' impacts on aquatic or terrestrial habitat and resources as they affect local residents.

The same general conclusion applies to other projects in the different plans. Careful siting, construction methods, and right-of-way maintenance provisions would be used to minimize the environmental impacts of the U.S. interconnection. With respect to gas thermal plants, the land requirements are small (some 2.8 hectares for a 320 MW CCGT plant and 1.7 hectares for a 216 MW SCGT, and linear development of 2 to 55 km depending on the exact site). New terrestrial impacts could be minimized further with brownfield development at existing power station sites. There would be some steam and cooling water requirements, but these would be minimized with efficient water recycling design.

Some residual impacts could occur with these projects, but they would be the subject of detailed environmental reviews and arrangements with directly affected individuals or

communities. It is anticipated that most, if not all of the costs, would be internalized in the measures that would be undertaken in securing easements and land, and in the project construction and operations.

In summary, while the bio-physical impacts would differ across the different plans, there would not appear to be a major difference in the external costs they give rise to. For the most part the impact-related costs have been internalized with the project designs and plans, and consequently are already reflected in the revenues and expenditures in the market valuation account.

13.3.6 Social Account

The project developments in the preferred and alternative plans would have a wide range of social and economic effects for project partners, local and regional communities, and Manitobans as a whole.

For partners there would be the expected returns and other benefits from their investment and participation in the projects. For affected communities there would be employment and business impacts, as well as potential impacts on traditional and commercial resource activity. There would also be potential impacts on population, housing, infrastructure and services; transportation; family and community well-being; health and safety; and culture and heritage resources. For Manitobans generally, there would be potential impacts on widely held values, including the long-term sustainability or bequest value people in principle may be willing to pay for.

Project Partners

In the preferred and alternative plans that include the development of the Keeyask Project, the investment, employment, direct contract award and other provisions of the JKDA would take effect. These would generate significant benefits for the four Cree Nations (KCNs) that would partner with Manitoba Hydro in the development of the project.

In the Keeyask Environment Impact Statement (EIS) it was estimated that the project would generate between 235 and 600 person-years of construction employment for the KCN partners. There would as well be direct negotiated contracts generating employment and profits from the provisions of camp services, clearing and site preparation, road construction, and other work. For the longer term, there would be a target placement of 182 KCN members in operating positions in Manitoba Hydro.[38]

The investment provisions would enable KCN to acquire an equity interest up to 25% in the project, with the potential of generating significant net returns from their investment. Agreements have not yet been reached for Conawapa, but it is expected for that project, too, there would be benefit-sharing arrangements with local First Nations in the vicinity of the project, as well as a range of local and regional employment, training and business opportunities.

As for the other projects in the preferred and alternative plans, in particular the thermal projects that would be developed, there are no plans to enhance local employment

[38] Keeyask Hydropower Limited Partnership, *Environmental Impact Statement* Chapter 6, pp. 6-434 to 6-439.

opportunities as in the JKDA and no investment participation or direct income benefit arrangements are envisaged at this time.

The net returns to Manitoba Hydro project partners and other direct income beneficiaries would be significant in all of the plans with Keeyask G.S., but particularly if it is built in conjunction with new sales and a new interconnection. That enhances the average export price and participant returns. The largest benefits would be realized with the Preferred Development Plan because of the larger interconnection and sales it includes and because of the benefit-sharing agreement that Conawapa G.S. is assumed to entail.

Local and Regional Community Impacts

A detailed socio-economic impact assessment has been undertaken for the Keeyask Project, but not for the other projects in the preferred and alternative plans.

The Keeyask G.S. assessment has indicated that there would be significant employment benefits throughout the region, and spin-off business benefits in Gillam and Thompson. Gillam would realize longer-term benefits because of the permanent jobs that would be located there to support Keeyask operations. While there are concerns about wage pressure and cost-of-living impacts that could result, these are not expected to be significant because of an anticipated business closure and consequent weakness elsewhere in the regional economy.

There are expected to be some adverse impacts on domestic resource use and commercial trapping due to disturbance to fish and wildlife resources and habitat. However, they would be

limited and offset by the provision of alternative harvesting opportunities and compensation arrangements. Licensed trapline holders would be eligible for compensation.

There could be some in-migration to local and regional communities during construction, with consequent pressures on housing, recreational and other facilities, and community services. The impacts are expected to be limited, in part because the existing housing shortage in nearby local communities would discourage project workers from returning to those communities. However, the impacts would be monitored and mitigation measures taken as required. Additionally, plans are being developed to address infrastructure and service requirements in Gillam, with an expected increase in its permanent population.

Concerns about transportation have been expressed, including impacts due to increased traffic on provincial roads. Impacts on provincial roads would be mitigated by improvements to PR 280, and impacts on winter road access and ferry landings would be monitored.

As with other major projects in remote areas, there would be both positive and negative potential impacts on families and community well-being. The increased income and employment opportunities can significantly benefit families, but at the same time they can give rise to undesirable activities such as drug and alcohol abuse. Undesirable interaction between construction workers and local residents would be expected to be much reduced compared to previous experiences, but this issue would remain a priority of Manitoba Hydro, the communities, RCMP and other local service providers to monitor and address. Similarly, monitoring and mitigation measures would be implemented to address other community and health concerns, in particular with regard to increased methylmercury levels in fish after impoundment.

Overall, while there would be some adverse effects, for the most part they would be mitigated and limited in duration. Some concerns would no doubt remain, but again, the KCNs support and participation in the project suggest that local adverse effects would be offset by the positive impacts and expected benefits.

Detailed assessments for the other projects in the preferred and alternative plans have not been undertaken. The impacts and mitigation plans for Conawapa G.S. would be similar to Keeyask G.S., with similar net effects. The impacts for thermal power plant developments would be different, but again it could be expected that siting and mitigation plans would minimize residual adverse effects. Transmission line development through private lands raise different social issues, including disputes about the compensation paid for easements. For the transmission lines associated with generation-related, network upgrade and interconnection projects, siting would be carefully done to minimize impacts, and fair market value paid for access to or purchase of private land. In most instances the number of parties and amount of money involved would be relatively small. Nevertheless, while not necessarily significant from a broad provincial perspective, any residual impacts could be quite important from the perspective of those directly affected.

In sum, there would be the full range of positive and negative impacts major projects can have on nearby communities and affected property owners. For the most part, adverse impacts would be minimized or offset with careful project planning, siting, monitoring, mitigation and compensation arrangements. However, some negative residual effects could still occur for some individuals and families.

Manitobans as a Whole

For Manitoba as a whole, the cost-benefit question is whether there are social benefits or costs – consequences that people in principle value positively or negatively – not reflected in the other accounts. There could be some broad community support for the engagement with Aboriginal Communities in the plans with northern hydro development. There could as well be strong preference for development plans that rely on renewable as opposed to non-renewable fossil-fuel resources. For some Manitobans there may be a willingness to pay for such consequences or attributes that go beyond what is already reflected in Manitoba Hydro's aboriginal partnership agreements and in the costing of GHG emissions already taken into account, though it is not clear how significant that would be from a broad provincial perspective.

One aspect of the plans, however, that may be more broadly significant and that may not have been fully recognized in the other accounts, is what one could describe as a bequest value – the value of the assets that will benefit future generations of Manitobans over the very long term.

The residual value of the assets at the end of Manitoba Hydro's planning period was included in the present value calculations in the market valuation account. This was done by projecting and comparing for the different plans the capital and O&M costs net of export revenues required to maintain the system from 2047 through to 2090. The residual value of the hydro generating and related assets in the preferred and two alternative plans with Keeyask G.S. was then calculated by calculating the long-term net cost saving relative to the all gas plan, with its greater need for replacement investment, greater O&M and lower export revenues.

The calculated residual values for the hydro assets remaining at the end of the planning period were significant, as one would expect given their long life and minimal operating cost. However, their 2047 residual value was calculated at a real discount rate of 5.05% reflecting Manitoba Hydro's weighted average cost of capital; and its 2014 present value in this MA-BCA was calculated with a 6% real discount rate reflecting the weighted average social opportunity cost. The question is whether those discount rates give adequate weight to the future benefits – whether they truly reflect what people would be willing to pay today for benefits passed onto future generations.

Discount rates of 5.05% and 6% (real) are lower than the rates that private industry would use to calculate the present value significance of residual assets remaining at the end of the planning period. However, that is because private industry typically assigns much greater weight to the more immediate consequences of its decisions. It is precisely because of that, it has been Crown Corporations that have undertaken the major hydro developments in Canada in the past. As a matter of public policy and with government support Crown Corporations were able to give much greater weight to the long-term value of their investments. In effect, they applied much lower discount rates in the assessment of their investment decisions; and as can be seen with the very low electricity prices in Manitoba, Quebec and British Columbia as compared to other jurisdictions, that has served this present generation very well.

In recent years, a number of economists specializing in cost-benefit or related analyses argue that traditional cost of capital-based discount rates do not give adequate weight to the intergenerational consequences of investment and policy decisions. Some economists advocate and some government cost-benefit guidelines have in fact adopted declining real discount rates

over time to give greater weight to intergenerational impacts in the distant future.[39] This has been particularly important in the assessment of climate change concerns; it is also relevant to any long-lived assets providing benefits into the very distant future.

The application of lower, intergenerationally sensitive discount rates would increase the weight or present value significance of the assets remaining at the end of the planning period and increase the advantage of the plans with Keeyask G.S. and especially the Preferred Development Plan with Keeyask G.S. and Conawapa G.S. as compared to the all gas plan. In economic terms it would add an important bequest value to these plans, over and above what has already been taken into account. No attempt is made in this assessment to quantify the magnitude of that potential value; it is simply recognized as a potentially important qualitative consideration to take into account in the overall assessment of the relative merits of the different plans.

13.3.7 Summary of Reference Scenario Assessment

In Table 13.9, the assessment of the preferred and alternative development plans under the market valuation, customer, Manitoba government, Manitoba economy, environment and social accounts are summarized. The dollar values show the estimated present value difference from the Preferred Development Plan under Manitoba Hydro's NFAT reference scenario set of assumptions, with positive values indicating a net advantage (higher net revenue/benefit or lower net cost) relative to the Preferred Development Plan; negative values indicate a net disadvantage (higher net cost).

[39] See e.g. M. Weitzman, "Why the Far-Distant Future Should be Discounted at Its Lowest Possible Rate", *Journal of Environmental Economics and Management*, Vol.36, 1998, pp.201-8; P. Portnoy and J. Weyeant, *Discounting and Intergenerational Equity*, Resources for the Future, 1999; and U.K. HM Treasury, *The Green Book: Appraisal and Evaluation in Central Government*, p.26.

As shown in the table, the market valuation – the incremental revenues and expenditures for Manitoba Hydro and its project partners – shows that the plan with Keeyask G.S. and no new interconnection is preferable to the all gas plan and that the plans with a new interconnection (large or small) are preferable to the two alternatives without one. As between the Preferred Development Plan and the one with the smaller interconnection, there is little difference. The smaller interconnection is slightly better with its estimated present value net revenues (at a 6% real discount rate) $17 million greater than with the Preferred Development Plan.

In summary, from a long-term Manitoba Hydro perspective it is advantageous to develop Keeyask G.S. (as opposed to gas thermal) and even more advantageous when developed in conjunction with a new interconnection and firm export sales to the U.S.

As one moves from a strictly Manitoba Hydro to broader social or public interest perspective, the long-term advantage of the plan with Keeyask G.S. and particularly Keeyask G.S. with a new interconnection relative to all gas, become even more pronounced. There are significant advantages for customer reliability, government, the economy, and in relation to GHG emissions for the plans with Keeyask G.S. as compared to all gas. And with these broader net benefits taken into account there is a significant advantage of the Preferred Development Plan relative to the plan with the smaller interconnection. The estimated present value of the monetized net benefits of the Preferred Development Plan is $654 million greater than the plan with the smaller interconnection; $967 million greater than the plan with Keeyask G.S. and no interconnection; and $1.855 billion greater than the all gas plan.

Table 13.9 SUMMARY OF REFERENCE SCENARIO ASSESSMENT

	Preferred Development Plan	K19/G24/250MW	K22/Gas	All Gas
Market Valuation Net revenues (cost) to MH and partners	--	17.0	(270.5)	(654.1)
Customer Account Cumulative rate increase	Preferred Development Plan has highest rate increases in first 20 years (cumulatively 16 to 18 percentage points more than the alternative plans) but has lowest rate increases over long term (cumulatively by year 50 approximately 34 to 37 percentage points less than the two alternatives with Keeyask G.S. and 70 percentage points less than the all gas plan).			
Reliability	Preferred Development Plan and to lesser extent the alternative with the smaller interconnection provides greater load carrying capability, lower expected loss of unserved energy and greater ability to manage extreme drought			
Government Incremental revenues net of costs/risk	--	(353.5)	(395.9)	(674.2)
Manitoba Economy Employment net benefits	--	(100.7)	(120.1)	(192.7)
Environment Manitoba GHG external cost	--	(208.6)	(174.3)	(320.3)
Global GHG impact	Preferred Development Plan and to lesser extent the two plans with Keeyask G.S. would contribute to a reduction in global emissions by displacing thermal generation in US.			
Manitoba CAC damage cost	--	(8.6)	(7.1)	(13.3)
Residual biophysical	Aquatic and terrestrial impacts with hydro projects in Preferred Development Plan and plans with Keeyask G.S.; subject to detailed environmental hearings, residual effects and local external cost expected to be relatively small with initial design, extensive mitigation, monitoring, compensation and benefit-sharing arrangements.			
Social Partner net return	Significant net returns from up to 25% interest in Keeyask G.S. and income benefits from Conawapa G.S. in Preferred Development Plan; significant benefits from up to 25% interest in two alternatives with Keeyask G.S., greater with new sales and interconnection.			
Community impacts	Wide range of potential impacts on local employment and business; population, infrastructure and service; social and community well-being; owners of land needed for rights of way and easements; major commitments and plans to minimize adverse residual effects with extensive mitigation, monitoring, compensation and partnership arrangements.			
Other Manitoba	Potentially significant bequest value from the hydro assets remaining at end of planning period; greatest with Preferred Development Plan and to a lesser extent in the alternatives with Keeyask G.S.			
Overall Monetized Net Benefit (Cost)	**--**	**(654.4)**	**(967.5)**	**(1,854.6)**

NFAT REFERENCE SCENARIO ASSUMPTIONS (2014 PRESENT VALUE IN MILLIONS OF 2014$)

There are important distributional and non-monetized impacts that the monetized net benefit numbers do not show. A key distributional issue is the pattern of rate impacts over time. The Preferred Development Plan exhibits the lowest rate increases over the long run, but the largest increases in the short to medium term. On the other hand the Preferred Development Plan offers the greatest bequest value for future generations – a value that may not be fully captured by the residual value in Manitoba Hydro's assessment of net system costs.

This distributional trade-off calls for careful consideration of short to medium versus long-term interests. A long-term perspective strongly supports the Preferred Development Plan with its development of Conawapa G.S. as well as Keeyask G.S. A shorter-term perspective will favour less capital expenditure, though the results would still indicate an advantage for the plans with Keeyask G.S., and especially Keeyask G.S. and a new interconnection over the all gas plan. There is not the same short to medium versus long term trade-off when comparing the Keeyask/gas or Keeyask/small tie alternatives versus the all gas plan as there is with the Preferred Development Plan.

The main non-monetized issues concern the environmental and social impacts of the projects in the different plans. The assessment does not indicate that there would be major residual effects or trade-offs to consider given the extensive monitoring, mitigation and other measures that are planned, but this will be addressed in detail in the environmental hearings the projects require.

13.3.8 Uncertainty and Risk

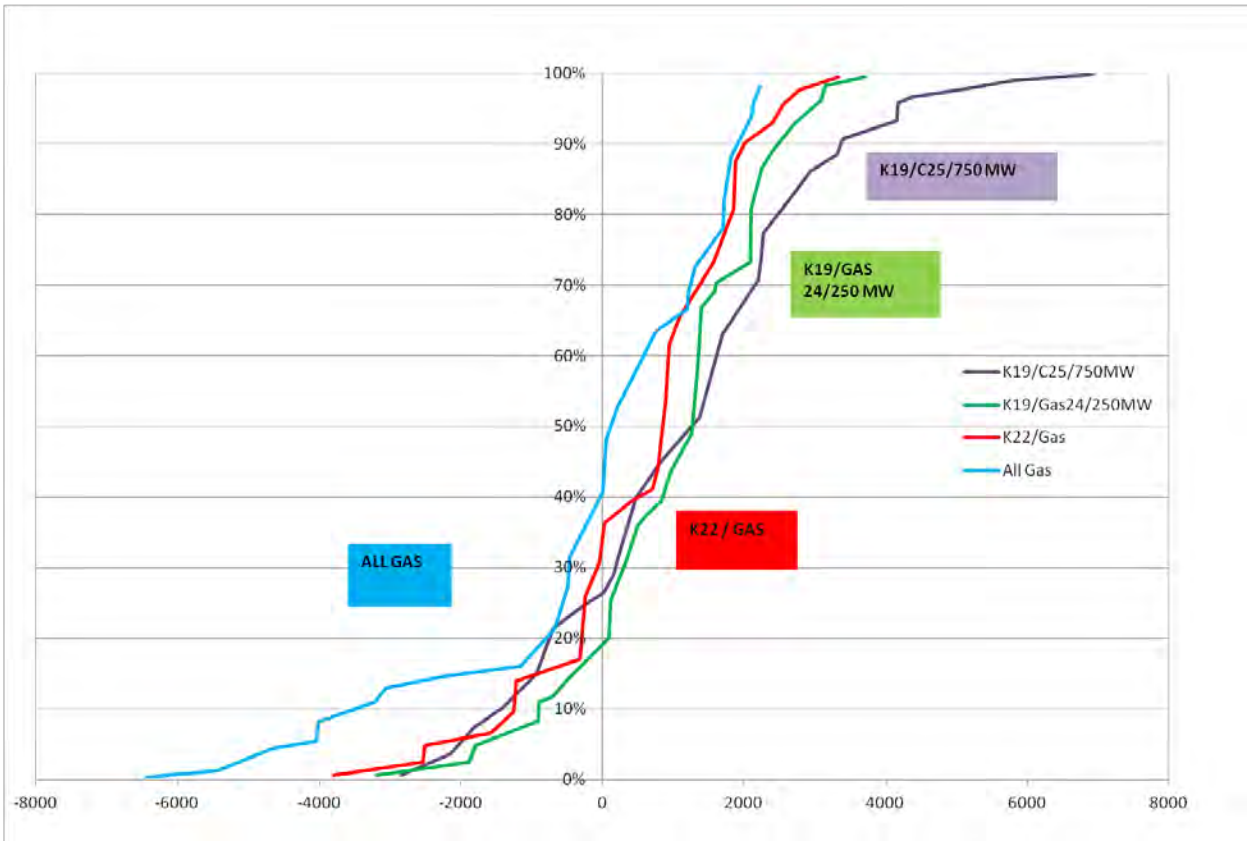
The benefits and costs estimated with Manitoba Hydro's reference scenario set of assumptions indicate that the development of Keeyask G.S. offers significant advantages over gas; that the

development of Keeyask G.S. is more advantageous with a new interconnection and firm sales than without; and that the Preferred Development Plan, which includes the development of Conawapa G.S. and a large new interconnection, is the best overall from a broad provincial perspective over the long term.

However, there is uncertainty in the reference scenario assumptions and therefore in the consequences of the different plans for Manitoba Hydro revenues and expenditures and customer rates. It is not just the consequences of the Preferred Development Plan, but rather of all the plans that are subject to considerable uncertainty. The question thus arises, does the uncertainty favour some plans over others – is there a risk trade-off that could change the relative advantage of the different plans based on the reference scenario analysis.

To address this question, the revenue and expenditure and consequent rate implications of the different plans were analyzed under a wide range of assumptions. With probabilities attached to the different underlying assumptions, probability distributions of the range of outcomes were calculated. In Figure 13.11 the probability distribution of the net present values of the preferred and alternative plans are shown. They are presented as “S-curves” which show the cumulative probability values. A given point on the curve indicates there is a percentage value (from the y-axis) chance that the net present value (calculated relative to the all gas reference scenario result) will be less than or equal to the corresponding amount of the x-axis.

Figure 13.11 MANITOBA HYDRO NET REVENUE S-CURVES



2014 PRESENT VALUE IN MILLIONS OF 2014$

The curves show that there is a wide range of outcomes for all of the plans. However there are differences. Manitoba Hydro's Preferred Development Plan would appear to offer the greatest upside potential. The all gas plan, on the other hand, exhibits the greatest downside risk. With respect to the Preferred Development Plan versus the alternative with the smaller interconnection there is a trade-off. There is a 50% chance the small-interconnection alternative would be better than the Preferred Development Plan and it generally has less downside risk. The Preferred Development Plan however has an equal chance of being better with greater upside potential.

The S-curves shown in Figure 13.11 are based on set development plans. In the all gas case, for example, the plan assumes a continuation of gas plant development even in scenarios where gas and energy prices rise above what is currently expected. In the Preferred Development Plan Conawapa G.S. is developed for 2025 even if low market prices or high interest rates would favour delaying the in-service date. As discussed in the next chapter, each development plan represents a pathway which preserves some flexibility to make changes depending on unfolding events. And that flexibility can serve to mitigate certain downside risks.

For example, some of the downside risk of the all gas plan can be mitigated by shifting back to hydro or other sources if fuel and carbon prices rise to the point where gas-fired thermal is clearly uneconomic. Similarly, up until the commitment date for Conawapa G.S., some of the downside risk of the Preferred Development Plan can be mitigated by deferring development expenditures should it become apparent that project development would not be economic with the currently planned early in-service date.

With these mitigation opportunities, the differences in the extent of the downside risk greatly diminish. The all gas plan could become gas followed by Keeyask G.S. or Conawapa G.S. as opposed to Keeyask G.S. followed by gas. The Preferred Development Plan could be Keeyask G.S. without Conawapa G.S. or Keeyask G.S. with Conawapa G.S. at a later date.

What differentiates the plans is not so much the extent of the downside risk due to unfolding future events, but what is retained or foregone by the initial decisions. The all gas alternative retains the opportunity to have a no hydro future, but it foregoes the benefit and upside potential with the early development of Keeyask G.S., and in particular the development of Keeyask G.S. with the current export and interconnection opportunity. As for Keeyask G.S.

without a new interconnection, it foregoes the expected benefit and potential upside from the current export and interconnection opportunity. And as for the Keeyask G.S. with a small tie, it foregoes the benefit and potential upside of the larger sales and early development of Conawapa G.S.

Overall, there is little reason to reconsider the broad conclusions concerning the relative long term (net present value) advantage of the different plans suggested by the reference scenario analysis. The plan with Keeyask G.S. is better from an expected and risk point of view to the all gas plan, and the plans with a new interconnection are better than the ones without.

As with the reference scenario findings, the rate implications in the short to medium term versus long term are a different matter. Figure 13.12 shows the probable range of the projected cumulative rate impacts of the different plans after 20 years; Figure 13.13 the probable range of the projected cumulative rate increases over 50 years.

The rate impact ranges in these figures reinforce the short to medium term rate versus long term trade-off identified in the reference scenario analysis. Over the long term (by year 50) the rate impact with the Preferred Development Plan is lower with a narrower band of uncertainty than the others, but the opposite is true in the short to medium term. The rate impact with the Preferred Development Plan is cumulatively greater and more uncertain than the others.

These projected rate impact figures are based on the set development plans as opposed to the pathways they represent. Cumulative rates with the pathways would show narrower ranges for

all of the plans. However, the general pattern and short to medium term versus long-term trade-off would remain much the same.

Figure 13.12 PROJECTED MANITOBA HYDRO CUMULATIVE NOMINAL RATE INCREASES TO 2031/32

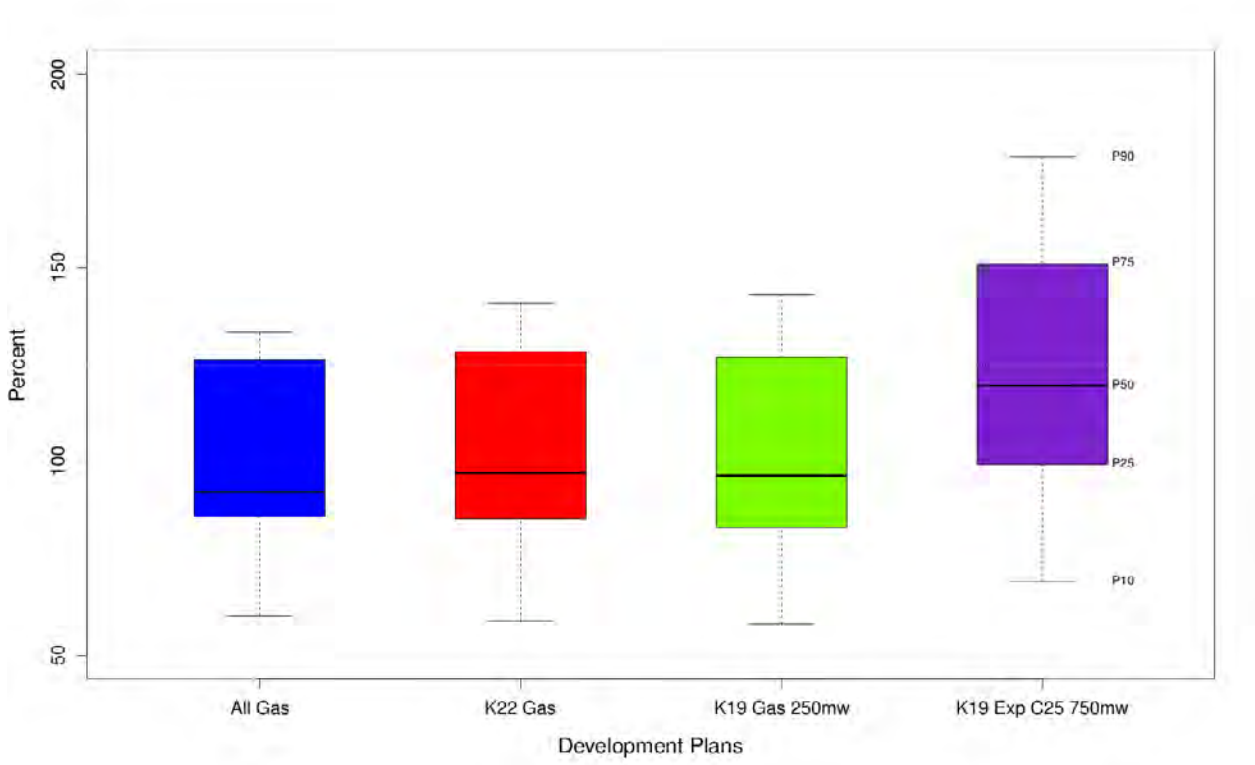
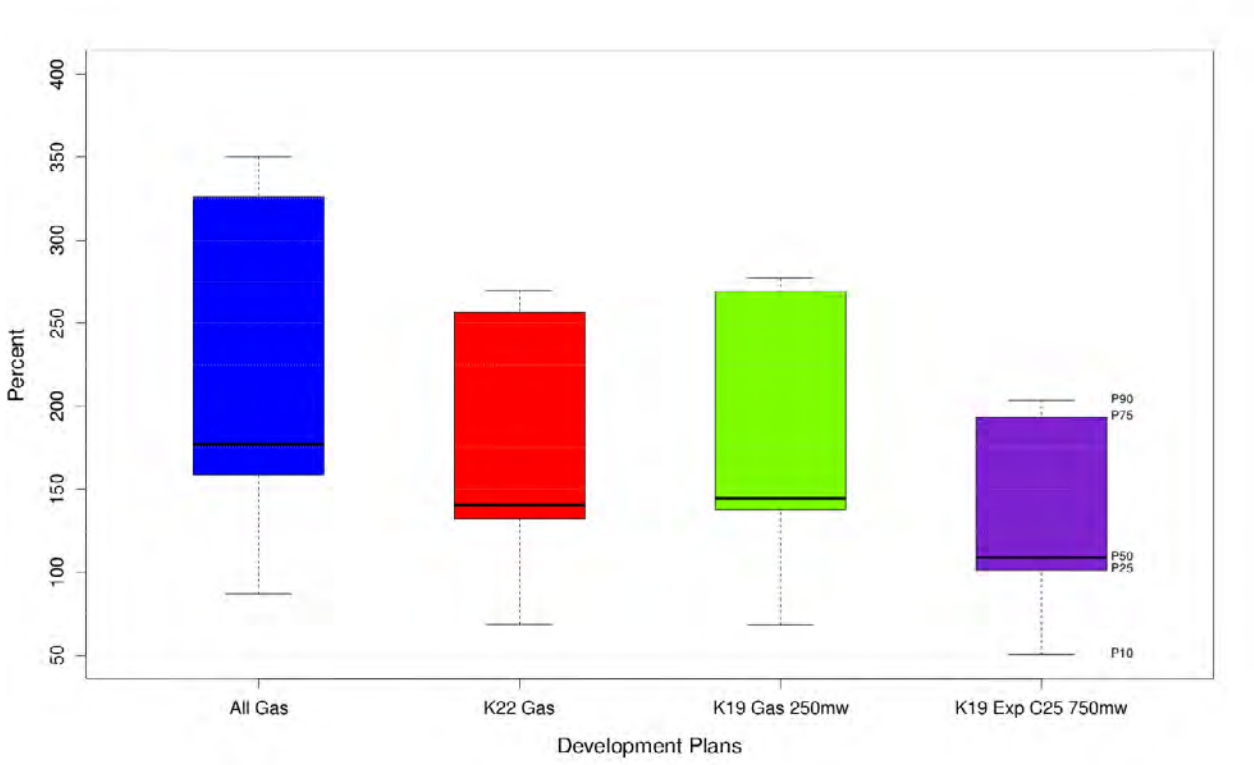


Figure 13.13 PROJECTED MANITOBA CONSUMERS CUMULATIVE NOMINAL RATE INCREASES TO 2061/62



13.4 Conclusions

The purpose of a multiple account benefit-cost assessment is not so much to determine which of a set of alternatives is best, but rather to identify their advantages or disadvantages and the key trade-offs from a broad social or public interest perspective.

This multiple account benefit-cost assessment of Manitoba Hydro's Preferred Development Plan and alternative plans with and without Keeyask G.S. and with and without a new interconnection and firm sales with the U.S. indicate that there are key trade-offs that require

careful consideration, most notably between a strictly Manitoba Hydro and broader social perspective and between customers in the short to medium versus long term.

The main findings are as follows:

- Developing Keeyask G.S. to meet domestic load offers significant net benefits relative to the all gas plan not only for Manitoba Hydro but also more broadly to society as a whole; developing Keeyask G.S. offers significant tax, employment, GHG and social benefits that go beyond the benefits to Manitoba Hydro and its partners.
- Plans that include a new interconnection offer significant net benefits compared to those that do not include a new interconnection. These plans significantly enhance the net benefits for Manitoba Hydro and its partners.
- The alternative with the 250 MW interconnection and the development of Keeyask G.S. but not Conawapa G.S. offers similar expected net benefit to Manitoba Hydro and its partners as the Preferred Development Plan, without the short to medium term rate trade-off that the Preferred Development Plan gives rise to. At the same time this alternative with a smaller interconnection and Keeyask G.S. only does not offer the same long-term legacy value or upside potential as the Preferred Development Plan. Nor does it offer the same long term rate, customer reliability, tax, employment, GHG and social benefits as the Preferred Development Plan.
- The Preferred Development Plan offers the lowest projected rate impacts for the long term and significantly greater benefits to society as a whole than the smaller interconnection alternative. It does, however, require higher projected rate increases in the short to medium term than the other plans. The more weight one places on the broader public interest consequences and the longer-term effects, the more one would favour this plan.

Tab 98

Whitfield Russell Associates Report on the NFAT for the MMF

Whitfield Russell Associates

May 13, 2014

WRA Presentation Focuses on:

- Lack of transparent data
- Study Period of 78 years is too long
- Export revenues forecasts unavailable, risky
- Exports will not recover the full costs of Keeyask/Conawapa
- Hydro's analysis and conduct indicates a predisposition to build hydro
  - Bipole III's $3.3 billion costs is deemed sunk and ignored in economic comparison analysis
  - Other sunk costs for Keeyask and Conawapa similarly prejudice analysis
  - 78-year study period favors hydro
- Reliability analysis that Hydro relied on to expand the HVDC system
- An additional transmission line to the U.S. will lower costs and risks and improve reliability for Manitoba

The Lack of Transparent Data

- Much of the data on financial and economic risks of the PDP, transmission planning and export contracts has been restricted as commercially sensitive information.
- Many questions asked by the IECs were similar to those that MMF would have asked. And many of the answers came as follows:
  - "This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro."

TOR Lacks Bipole III Review

As noted in the TOR at page 4, the scope of the NFAT does not include the Bipole III high voltage direct current (HVDC) transmission line and converter station project. This portion of the TOR caused the parties to treat future investments in Bipole III as sunk costs (even though much of that investment has not yet been made and some of that investment may be avoidable). This element of the TOR distorted the analyses to favor hydro-centric alternatives.

The 78-Year Study Period Is Too Long

1. Is longer than typical even for Manitoba Hydro which uses a 20-year projection for its Financial Forecast and a 35-year period for its Power Resource Plan.
2. Favors high-risk, hydro-centric plans that have near-zero energy costs but add generating capacity in large capacity blocks, require export sales of surpluses until needed by domestic loads (thus exposing MH to a risk of suppressed export prices), require large capital investments, take a long time to build and are projected to generate savings only after much of their initial cost is paid down through depreciation.

The 78-Year Study Period Is Too Long

3. Makes plans susceptible to difficult-to-predict structural changes such as those that could alter relative costs of assets and lower domestic demands (e.g., from DG and new technology) and export prices.
4. Masks the need for near-term rate increases (and the associated burdens) to support hydro projects before they begin to generate savings and achieve lower costs decades from now. MH showed that 26 years must elapse before the PDP lowers cumulative rates to Manitoba consumers. This creates inter-generational inequity.

Risk Associated with Export Revenue

The net benefits claimed for plans involving Keeyask and Conawapa are highly dependent upon the magnitude of future exports and the future level of export prices. Publicly available data on the historical magnitude of exports and the average price per kWh sold revealed a disturbing trend of considerable volatility (particularly in opportunity sales volumes and prices) and a decline in export prices since 2006/7.

Reduced Export Revenues/MWH

NFAT PUB/MH I-008 Revised

TOTAL U.S. SALES

	U.S. Dependable Sales			U.S. Opportunity Sales			Total	Weighted
Year	GWh	CAD $M	AvgPrice	GWh	CAD $M	AvgPrice	GWh	AvgPrice
2000/01	4,895	199	40.69	4,511	167	36.95	9,406	38.90
2001/02	4,767	263	55.15	5,083	247	48.66	9,850	51.80
2002/03	4,947	277	56.09	2,713	115	42.30	7,660	51.21
2003/04	5,245	259	49.45	507	35	69.42	5,752	51.21
2004/05	5,633	290	51.44	3,218	171	54.48	8,851	52.55
2005/06	4,044	240	59.25	8,879	401	45.12	12,923	49.54
2006/07	3,654	218	59.67	5,877	270	46.24	9,531	51.39
2007/08	3,921	209	53.22	6,618	289	44.19	10,539	47.55
2008/09	4,087	233	57.12	5,622	237	43.24	9,709	49.08
2009/10	3,263	186	56.99	7,224	160	22.28	10,487	33.08
2010/11	3,377	172	51.09	6,062	146	24.44	9,439	33.97
2011/12	3,742	175	46.79	5,616	117	21.13	9,358	31.39
2012/13	3,636	177	48.69	4,690	113	23.62	8,326	34.57

Risk Associated with Export Revenue Forecasts

The overall forecast of weighted average export prices has dropped in each successive forecast since 2009, often by large amounts.

IFF Forecasts of Revenues/MWH

Price/Volume Components for Unit Revenues for Total Export Sales														
(Nominal Canadian Dollars/MWh)														
IFF-09 to IFF-10														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**						
IFF 09 ($/MW.h)	66.9	71.7	74.0	90.9	92.3	95.0	105.3	105.6						
IFF 10 ($/MW.h)	58.7	62.0	66.8	81.1	86.4	91.1	95.6	108.4						
% Total Change	-12%	14%	-10%	-11%	-6%	-4%	-9%	3%						
Total Change ($/MW.h)	-8.3	-9.7	-7.2	-9.7	-6.0	-3.9	-9.7	2.8						
Change due to Price ($/MW.h)	-9.8	-11.4	-9.1	-12.7	-12.7	-13.9	-12.7	-9.9						
Change due to Volume ($/MW.h)	2.4	2.6	3.0	3.6	3.8	7.0	-0.7	9.5						
Change due to Other ($/MW.h)	-0.8	-1.0	-1.2	-0.7	2.9	3.0	3.7	3.3						
IFF-10 to IFF-11														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**					
IFF 10 ($/MW.h)		62.0	66.8	81.1	86.4	91.1	95.6	108.4	111.2					
IFF 11 ($/MW.h)		42.5	50.4	61.9	68.8	75.3	81.1	88.1	94.3					
% Total Change		-31%	-24%	-24%	-20%	-17%	-15%	-19%	-15%					
Total Change ($/MW.h)		-19.5	-16.3	-19.3	-17.6	-15.7	-14.5	-20.3	-16.9					
Change due to Price ($/MW.h)		-16.4	-13.9	-15.2	-12.8	-10.7	-9.1	-7.6	-7.5					
Change due to Volume ($/MW.h)		-1.1	-2.1	-4.0	-4.8	-5.0	-5.5	-12.7	-9.5					
Change due to Other ($/MW.h)		-2.0	-0.3	-0.1	0.0	0.0	0.1	0.0	0.2					
IFF-11 to IFF-12														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**	**2024/2025**	**2025/2026**
IFF 11 ($/MW.h)			50.4	61.9	68.8	75.3	81.1	88.1	94.3	96.4	99.8	102.5	110.6	106.3
IFF 12 ($/MW.h)			41.4	48.1	52.4	57.2	61.8	66.5	76.5	82.0	85.6	89.6	93.2	90.6
% Total Change			-18%	-22%	-24%	-24%	-24%	-25%	-19%	-15%	-14%	13%	-16%	-15%
Total Change ($/MW.h)			-9.1	-13.7	-16.4	-18.1	-19.4	-21.6	-17.8	-14.5	-14.2	-12.9	-17.4	-15.8
Change due to Price ($/MW.h)			-6.6	-10.5	-12.0	-13.1	-13.8	-14.6	-13.6	-11.3	-10.6	-9.1	-11.0	-11.2
Change due to Volume ($/MW.h)			-1.7	-2.2	-2.4	-2.9	-3.1	-4.3	-2.5	-1.6	-1.9	-1.9	-4.0	-2.4
Change due to Other ($/MW.h)			-0.8	-1.0	-2.0	-2.1	-2.5	-2.7	-1.8	-1.6	-1.6	-1.9	-2.4	-2.2
IFF-12 to NFAT														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**	**2024/2025**	**2025/2026**
IFF 12 ($/MW.h)			41.4	48.1	52.4	57.2	61.8	66.5	76.5	82.0	85.6	89.6	93.2	90.6
NFAT ($/MW.h)			40.3	46.7	49.8	53.0	55.5	59.2	72.0	77.9	80.5	82.4	84.8	80.8
% Total Change			-3%	-3%	-5%	-7%	-10%	-11%	-6%	-5%	-6%	-8%	-9%	-11%
Total Change ($/MW.h)			-1.1	-1.4	-2.6	-4.2	-6.3	-7.4	-4.5	-4.0	-5.2	-7.2	-8.4	-9.8
Change due to Price ($/MW.h)			-2.1	-3.5	-5.0	-6.6	-9.1	-11.0	-5.8	-4.3	-5.2	-7.2	-8.2	-9.4
Change due to Volume ($/MW.h)			0.5	1.4	1.7	1.6	2.0	2.5	0.3	-0.6	-0.8	-0.9	-1.2	-1.1
Change due to Other ($/MW.h)			0.5	0.6	0.7	0.8	0.8	1.2	1.0	0.8	-0.8	0.9	1.0	0.7
Source: PUB/MH I-058														

MH's Intent to Build Hydro

- Manitoba Hydro's selection of the PDP seems to reflect a predisposition to build high-cost hydro resources largely for export in the initial period of the life of those resources.
- The market for firm exported power is primarily determined by the marginal cost of alternative thermal resources which presently tend to have capital costs ($750/kW for SCGTs and $1350/kW for CCGTs) far below those of hydro ($9000/kW for Keeyask before the recent escalation).

Export Revenues Will Not Fully Recover Costs of New Hydro

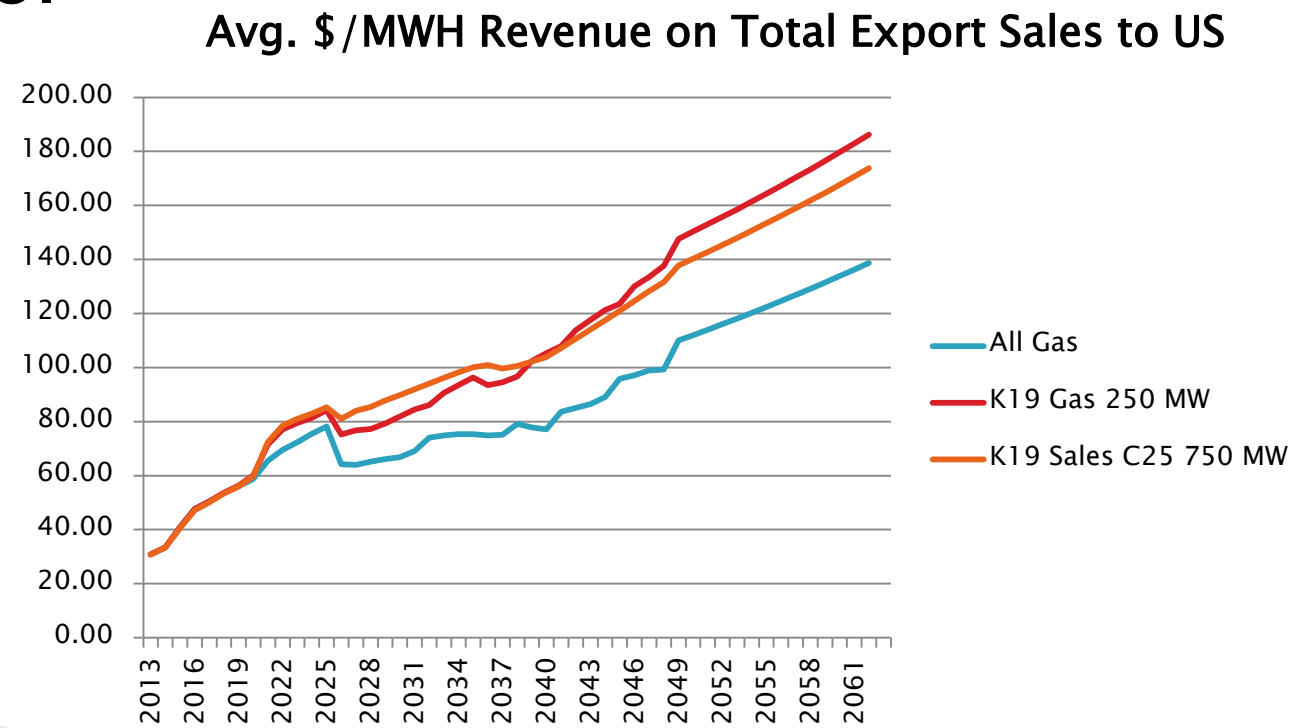
There is a substantial gap between:

- The high initial in-service annual revenue requirement to recover the cost of power for Wuskwatim, Keeyask and Conawapa (approximately $100/MWH or 10¢/kWh – See BO 5/12 at 8, 54) and

- The much lower prices at which MH can expect to sell its firm and surplus hydro power in export markets (resulting in unit sales prices of no more than 6-7¢/kWh on average for firm sales and opportunity sales combined – See BO 5/12 at 55).

PDP and Other Plans Revenue/MWH

The weighted average forecast of firm exports and opportunity sales is below 10¢/kWh until 2038.



Impact of Prices and Study Length

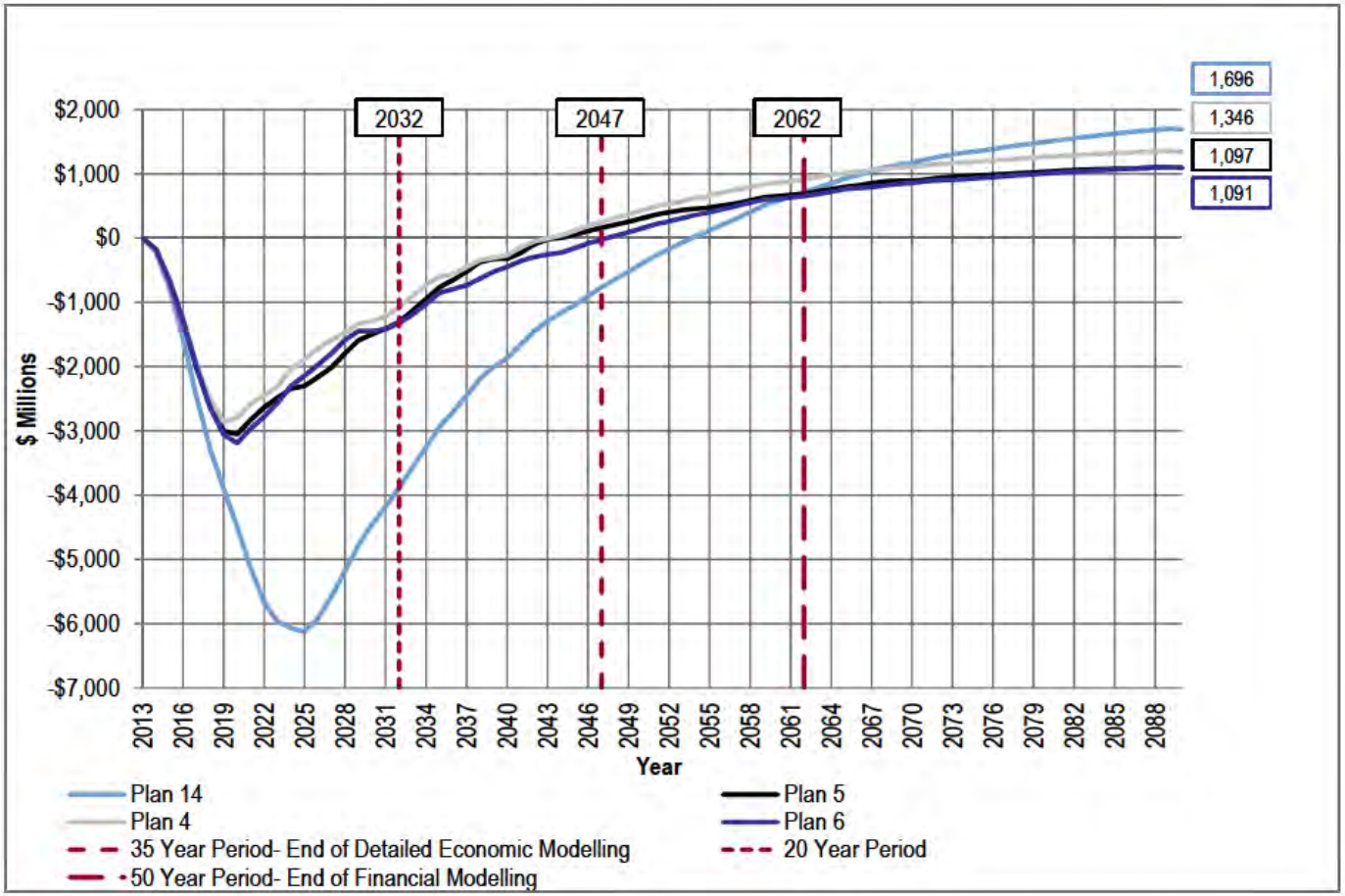
MH has an incentive to maximize firm exports and lock in pricing for firm exports, but is constrained by buyer resistance and the cost of alternatives. As costs escalate and forecasts of export prices fall, the point in time at which export revenues recover increased costs is pushed farther into the future. This set of constraints has provided a powerful incentive to lengthen the study period.

PDP Benefit is Long in Coming

As Keeyask and Conawapa are depreciated over their 67-year useful lives, their costs will decline to a level that is projected to fall below the market price of exports, but that crossover will not happen for a long time. In the meantime, losses on exports will accumulate before eventually being reduced. In comparison to the All-Gas benchmark case, LaCapra's analysis showed negative cumulative NPVs for the first 30 years for Plans 4, 5 and 6, and for the first 41 years for the PDP.

LCA Figure 9-17 Corrected

. Figure 9-17 *Incremental CPV Plan 4, 5, 6 and Plan 14 Relative to All Gas Case*
Changed 20 year period to end at 2032 rather than 2033 and the 35 year period to end at 2047 rather than 2048.



Increased Costs Will Reduce Benefits of Exports

- MH's failure to incorporate up-to-date cost estimates in its analyses and negotiation of export contracts harms ratepayers (BO at 65).
- The recent increase in the estimated capital costs of Keeyask and Conawapa were apparently not known at the time MH negotiated the Term Sheets and export contracts.

Erosion of Benefits Impacts Plan Choice

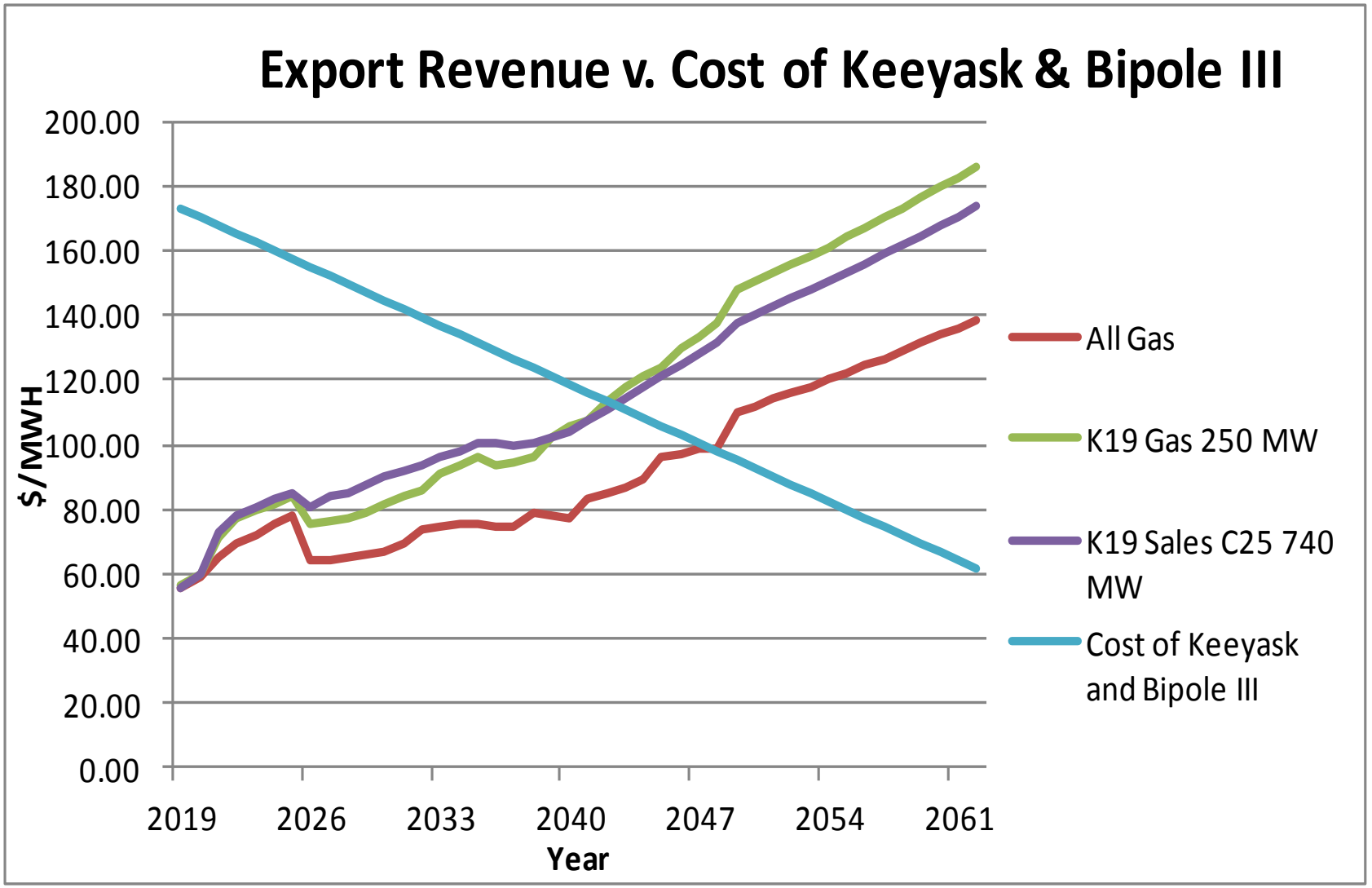
- Favorable economics of hydro erode as capital costs increase, as has been demonstrated in the updated work of MH. The initial $1.696 Billion advantage enjoyed by the Preferred Development Plan (PDP) over the All-Gas Plan diminished to $374 million as a result of an $800 million increase in estimates of capital costs associated with Keeyask and Conawapa and the removal of the WPS investment decision (See MH Exhibit 95 at slide 123).
- With the addition of DSM at level 2, the PDP's NPV advantage over the All Gas Plan falls to only $45 million (MH Exh. 95 at slide 130).

Hydro's Levelized Cost Comparison Obscures Impact of Upfront Cost of Hydro Plans

- MH reports a 67-year life-cycle levelized cost of 6-7¢/kWh for Keeyask and Conawapa. See Chapter 7 Table 7.3 and LCA/MH I-308. These costs do not include the sunk costs of Keeyask and Conawapa up through June 2014.
- These numbers are far different from those found in BO 5/12 at 54, which showed starting (non-levelized) costs of 9-10¢/kWh for Keeyask and Conawapa before MH made its new cost estimates known in this proceeding.
- Neither of these starting cost estimates includes approximately 3¢/kWh cost of Bipole III (per BO 5/12 at 54).

Adding Bipole III Costs to Hydro Plans Drives Up Their Costs

- The 10¢/kWh cost of power from Keeyask and Conawapa (from BO 5/12) is forecast to be above the overall weighted average forecast price of exports for many years into the future (See Slide 13).
- When fully loaded, the cost of Bipole III is estimated to add 3¢/kWh to the cost of power delivered (BO 5/12).
- When the cost of Bipole III is added to the cost of Keeyask alone, the deficit is even larger because the incremental costs of the 2000 MW of Bipole III must be recovered on the incremental energy produced from only 630 MW of Keeyask output.
- This drives the incremental cost of Keeyask to about 17.3¢/kWh before potential cost escalations are considered.


Export Revenue v. Cost of Keeyask & Bipole III
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
$/MWH
2019
2026
2033
2040
2047
2054
2061
Year
All Gas
K19 Gas 250 MW
K19 Sales C25 740 MW
Cost of Keeyask and Bipole III

PUB Board Order States:

"To the extent MH's real costs with respect to these projects are not recovered from export customers, it will fall to Manitobans to bear financial responsibility through reduced annual net income of MH (and reduced overall retained earnings) and increased electricity rates for Manitobans." BO 5/12 at 63.

Sunk Costs Disadvantage Non-Hydro Alternatives

By adopting the analytical approach for the NFAT that Bipole III is a sunk cost, Manitoba Hydro has biased its analysis in favor of the PDP. Under the PDP, Bipole III will be built first (for commercial service by 2017/2018 to accept the output of Keeyask in 2019 and of Conawapa in 2026.

Bipole III's Sunk Costs

The $3.3 billion cost of Bipole III exceeds the incremental benefits which the PDP is said to produce under many scenarios as compared to the benefits of the "All Gas Plan." Accordingly, adding the $3.3 billion cost of Bipole III to the NPV of the PDP and to the other hydro plans, while removing it from non-hydro plans, would make a vast difference in the probability analysis.

The next slide shows MH's Quilt Table for Several Plans with Updated Capital Costs from MH Exhibit 95 at 125.

Probabilistic Analysis Updated Capital Costs – Keeyask and Conawapa

Probabilistic Analysis Updated Capital Costs – Keeyask and Conawapa

Development Plan			1	2	4	8	5	14
			All Gas	K22/Gas	K19/Gas24 /250MW	CCGT/C26	K19/Gas25 /750MW	K19/C25 /750MW
							WPS Sale & Investment	
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV Dollars					
Low	Low	H	-1062	-1401	-851	-1501	-516	-1583
		Ref	-68	16	646	106	906	632
		L	734	1205	1898	1449	2086	2539
	Ref	H	-463	-1751	-1512	-2398	-1331	-3755
		Ref	208	-677	-334	-1085	-172	-1827
		L	750	232	658	15	795	-167
	High	H	-88	-1782	-1761	-2625	-1675	-4640
		Ref	416	-891	-748	-1480	-651	-2876
		L	823	-133	110	-519	205	-1356
Ref	Low	H	-2033	-120	543	325	236	2111
		Ref	-1039	1296	2040	1932	1658	4326
		L	-237	2486	3292	3275	2837	6233
	Ref	H	-671	-585	-260	-910	-492	-1130
		Ref	0	489	917	403	667	798
		L	542	1397	1910	1503	1634	2458
	High	H	17	-716	-620	-1343	-837	-2562
		Ref	520	175	393	-198	187	-798
		L	927	933	1251	762	1043	722
High	Low	H	-3454	892	1647	2005	645	5631
		Ref	-2460	2309	3143	3612	2066	7846
		L	-1658	3498	4396	4955	3246	9752
	Ref	H	-1158	402	797	469	112	1340
		Ref	-487	1476	1974	1782	1271	3268
		L	55	2364	2967	2882	2238	4928
	High	H	-82	210	368	-156	-186	-627
		Ref	422	1101	1381	989	837	1137
		L	828	1859	2239	1949	1694	2657

Process for Approval on Capital Projects Has Prejudiced the Result

- It is apparent that the process by which MH obtains approval for moving forward on capital projects warrants examination with a view to being reformed.
- Although the PUB has regulatory authority over the rates that MH imposes on ratepayers, it does not appear to have authority to approve or disapprove of MH's capital spending – unless requested by the Government (Minister of Energy) to review – and feels constrained to act within any Terms of Reference.
- BO 5/12 at 68: "While this Board's jurisdiction does not extend to the approval of MH's capital expenditures, this Board does have jurisdiction over the approval of MH's rates in which MH seeks to recover the financing, operating and amortization expenses directly attributable to MH's capital expenditures"
- BO 5/12 at 200: "PUB's role as regulator of MH is to make sure rates are justified, and that MH is not seeking increased rates for recovery of losses for mistakes, errors and inefficiencies. MH must ensure efficiencies are maximized, and that it exercises a discipline of maintaining lowest costs."

Process for Approval on Capital Projects Has Prejudiced the Result

- In this case, substantial amounts have been spent by MH prior to the Government asking for this NFAT.
- Although the PUB could deny rate increases to cover these costs, such an action would undermine indicators of financial health.
- New evidence provided in this proceeding appears to demonstrate that much less costly scenarios are possible, but may be coming to light too late to help the ratepayers.
- The remedy is to subject all major capital expenditures to NFAT review before substantial sunk costs are incurred.

LCA's Plan 17 Looks Promising

Plan 17, the LCA No New Generation scenario is a new scenario developed in the reports and testimony of La Capra. Because of Plan 17's low cost, low risk and substantial economic benefits, La Capra makes a strong case for refining this option into a full-fledged plan or an early stage of a long-term plan in order to reduce risk and cost. LaCapra recognizes that Plan 17 is not a fully fleshed out plan, but asserts that its benefits are so significant that its elements warrant serious consideration by the PUB. Transcript at 6071-78.

The LCA No New Generation Scenario Involves:

- DSM at levels 1.5 times the DSM assumed in MH's studies
- Substitution of natural gas heating for electric heating
- Development of a new 750 MW interconnection in 2029/30 with the US that increases import and export capacity.
- Reliance on relaxed import limitations (20% rather than 10% of domestic load plus export obligations) in lieu of developing generation within Manitoba, and
- Continuation of existing diversity exchange agreements with the United States.

Including Sunk Costs, Plan 17 Appears Advantageous

- Plan 17 demonstrates favorable economics despite being burdened by $4.3 billion in sunk costs that Manitoba Hydro incurred in connection with development of new hydro and transmission features that add little or nothing to Plan 17's value.
  - Sunk costs of $1.0 billion are associated with preserving the option to build Keeyask and/or Conawapa.
  - An additional sunk cost of $3.3 billion is associated with Bipole III.

Transmission Planning Standards

- According to Manitoba Hydro, the existing transmission system is vulnerable to a common mode failure such as catastrophic outages of either or both of Bipoles I and II for a period of months or years.
- An extreme event, such as a catastrophic failure of both Bipoles I and II would involve the simultaneous outage of all four single poles of Bipoles I and II (called an N-4 event); utilities must evaluate such scenarios for risks and consequences but need not mitigate them.
- Loss of a single pole of a Bipole is considered an N-1 event which has a less-than-1% probability of occurring (i.e., less than 1×10^{-2}). See the response to CAC/MH II-013b.
- Although industry reliability criteria require that Manitoba Hydro continue to serve all firm load obligations after the occurrence of any single contingency (an N-1 event), those criteria do not require that it continue serving all firm load after an N-2 event, let alone, after an N-4 event.

MH Reliability Standards Have Changed

- In justifying Bipole III for reliability reasons, Manitoba Hydro adopted a deterministic standard requiring that it be able to meet its peak demand after a loss of both Bipoles I and II for a period of months or years.
- The deterministic reliability standard used to justify Bipole III may not have been carried over in developing plans for comparison in the NFAT.
- That deterministic standard could be met either (1) by strengthening interconnections to the United States or (2) by adding Bipole III.
- Manitoba Hydro chose the more expensive option, adding Bipole III.

Planned Hydro Generation Additions Diminish Claimed Reliability Benefit of Bipole III

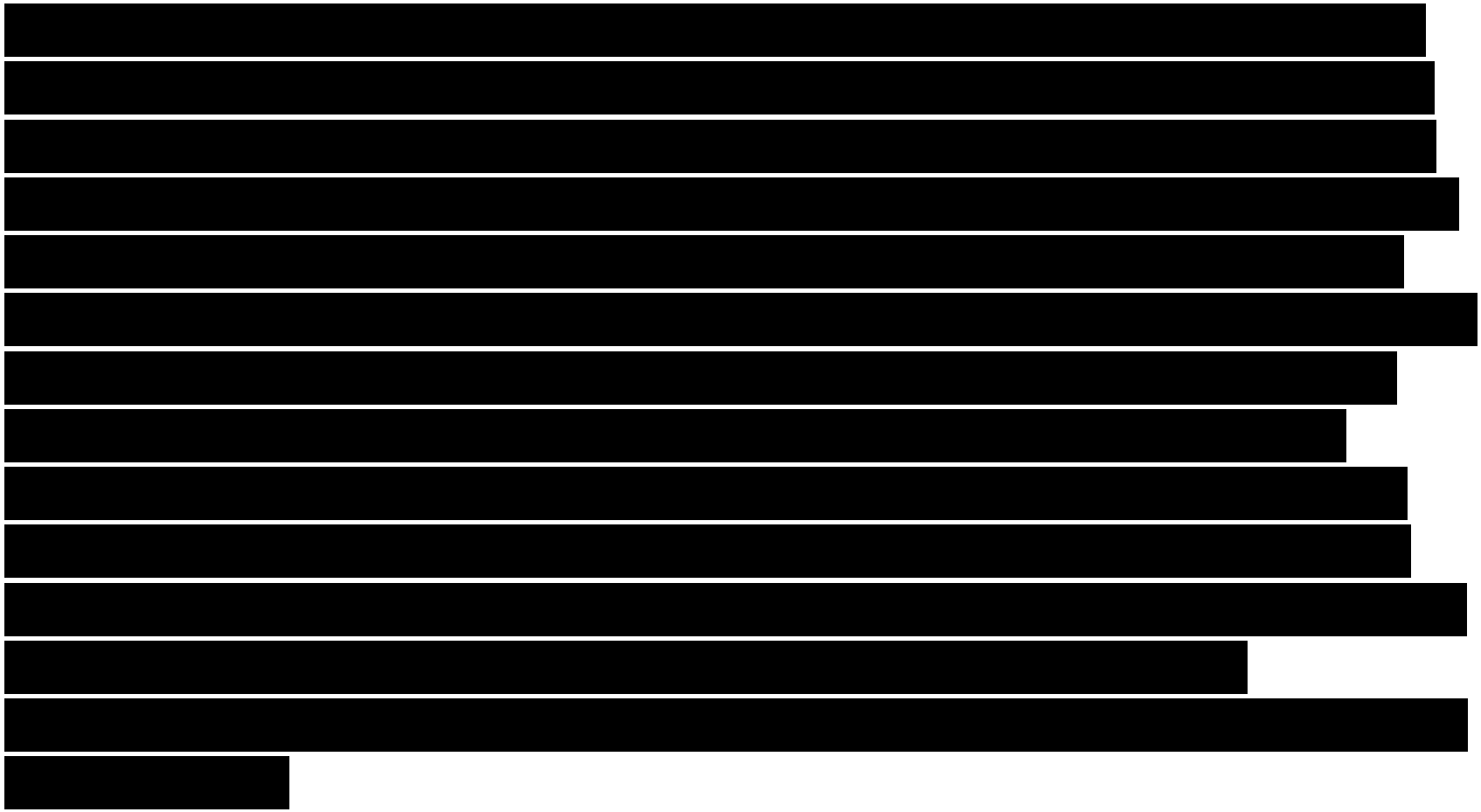
- The 2000 MW spare transmission capacity initially created by adding Bipole III will drop when Keeyask is added and virtually disappear once Conawapa is added.
- Under the PDP, Manitoba Hydro plans to upgrade its ability to import capacity from the USA to replace the diminishing spare transmission capacity in Bipole III.
- [redacted]

Too Many Eggs in One Basket

- Each of the hydro plans causes greater concentrations of the Province's hydro resources along the lower Nelson River, even higher than the present high (70%) concentration.

- MH's failure to evaluate these impacts seems to be an oversight in that the same type of catastrophic events that could take out Bipoles I & II could also take out Bipole III as well, trapping immense portions of Manitoba Hydro's resources without an outlet and cutting off revenues from export sales for extended periods of time. Without sufficient import capacity from the United States, Manitoba could be plunged into darkness under that scenario.

—LCA No New Generation Plan Supports Additional Interconnection



LCA's Plan 17 Promotes Exports and Imports

Addition of another 500 kV US interconnection alone without additional hydro capacity will increase Manitoba Hydro's exports as well as its ability to import power, according to LCA's analysis.

LCA's No New Generation Plan Annual Resource Generation Mix

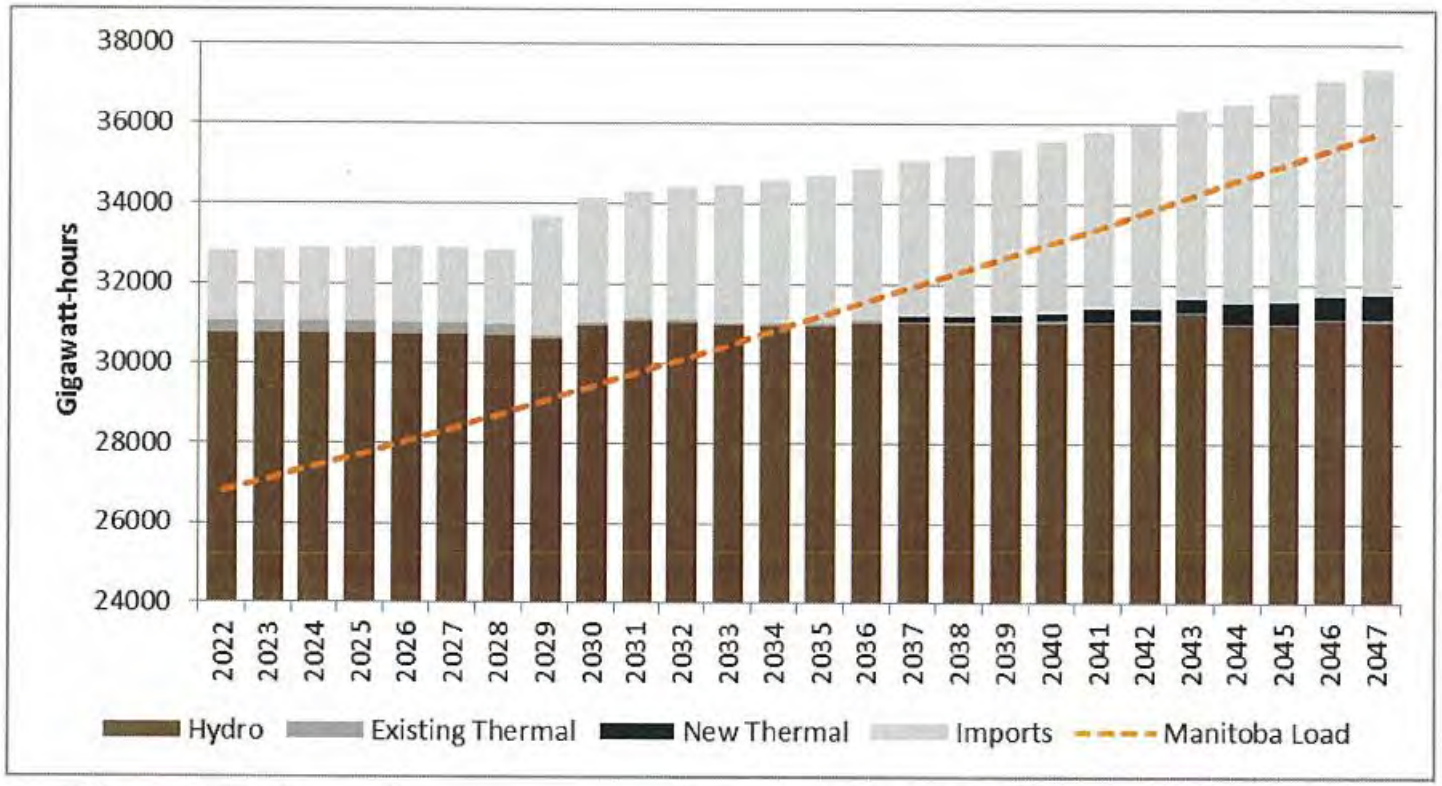


Figure 3-26: Annual resource generation mix in LCA No New Generation Plan

LCA's No New Generation Plan Annual Resource Generation Mix

- This figure indicates that adding a 750 MW line between MH and MISO along with MH's purchasing firm power from generators in the U.S. (but not constructing additional generation in Manitoba) would enable MH to export substantially more power in the annual amounts shown above the dotted line. See the sentence at bottom of first paragraph: "There is also an increase in exports, which is the difference between the load line and the top of the resource mix bar."
- The final paragraph on the page states in part: "More [transmission] import capacity could allow higher imports in off-peak periods allowing exports of hydro during peak price periods. The value of these exports and of the additional capacity in this scenario is likely to be significant, but at this point is unknown, as that analysis has not been conducted by MH."
- This indicates that much of the increase in exportable energy in Plan 17 is the result of energy imported in off-peak hours and stored as elevated water in Manitoba reservoirs until needed as a source of firm capacity and energy for on-peak exports.

MH Objects to LCA's "Import" Line

MH contends that Minnesota regulators would not approve a new transmission line designed for exports to Manitoba and, further, that there is insufficient firm generating capacity in MISO that could be imported cost-effectively by Manitoba. (See MH Rebuttal of Mr. Eric Swanson of Winthrop & Weinstine, P.A.).

I disagree because:

I Disagree Because:

- MISO, PJM and SPP are summer peaking regions that should have substantial surplus capacity and energy available in the winter when Manitoba experiences its peak demand.
- Entities owning generation in the U.S. would have an incentive to increase their sales of firm and non-firm power during the off-peak winter season and engage in diversity exchanges.
- Transmission providers are required to provide transmission service under OATTs at cost-based rates and to build needed upgrades.

I Disagree Because:

- FERC has established incentives to build and own transmission facilities that make such activities quite lucrative.
- FERC Order No. 1000 requires transmission projects for "public purposes" such as renewable energy be considered in developing transmission plans.
- Minnesota utilities have petitioned the Minnesota PUB to consider a competing alternative to the Great Northern Transmission Project. See Megawatt Daily for April 17, 2014.
- Firm power sold during an off-peak season commands only about half the demand charge associated with on-peak firm power during on-peak seasons.

If Plan 17 Had Been Evaluated Earlier:

- [redacted]
- If Bipole III did not already exist, its cost would have had to be added to the cost of any plan for developing Keeyask and Conawapa.
- [redacted]

Response to MH Rebuttal

- The MH Rebuttal to WRA addresses the reliability justification for Bipole III as described in MH/MMF/WRA-004a and b.
- MH proceeded with development of Bipole III to address the risk of an extended loss of both Bipoles I and II, an event expected to occur no more than 1 day in 17 years, a 1-day-in-17-year event. We accepted the proposition that the spare transmission capacity created by Bipole III without Keeyask and Conawapa would lessen risks and costs associated with loss of both Bipoles I and II, [redacted] We also questioned how Bipole III could fulfill its role as backup to Bipoles I and II once it is loaded with Keeyask and Conawapa power. We favored an additional tie line to the US.

Response to MH Rebuttal, cont.

- MH recognized that an additional link to the U.S. was a valid alternative to Bipole III, but, in analyzing alternatives to Bipole III, MH created a different and deterministic reliability standard for judging the adequacy of that alternative in providing reliability. That alternative involved a new 1500 MW AC U.S. interconnection which MH insisted must be backed up with 1500 MW of new gas generation. The additional cost of the new generation made an additional link to the US more expensive than Bipole III (without new generation), and that alternative was rejected.
- At page 5 of its new rebuttal, MH states that the alternative to Bipole III considered in the CEC proceeding was a new US interconnection that MH characterizes as a hypothetical "import only" transmission scenario. I am unfamiliar with the notion of an interconnection that would function as an "import only" line. Any new US transmission tie to the US would be no different in this respect from the proposed 750 MW tie to Minnesota and could be expected to provide opportunities for both imports and increased exports. This was supported by LaCapra's presentation on its No New Generation Plan.

Response to MH Rebuttal, cont.

- MH further insisted that it added on the cost of 1500 MW of new gas turbines because an "import only" line must be connected to some form of firm generating capacity. We believe that a new tie to the US would NOT need to be backed up by additional firm gas generation, especially generation needed only once in every 17 years. MH could rely upon its contingency reserves while it shops for longer-term supplies during an extended outage of both Bipoles I & II.
- MH's CEC analysis showed that it would need backup for loss of both Bipoles I & II primarily during the winter peak. With a new tie to the US, MH could expect to call upon winter surpluses of generating capacity in the primarily summer-peaking systems in the US and obtain that power at relatively low cost.

Response to MH Rebuttal, cont.

- MH seems to agree at page 6:2-6 of its latest rebuttal testimony. In speaking of its new US tie, MH states:

  > The proposed transmission line will have the added benefit of providing firm import transmission to Manitoba. As a result, Manitoba Hydro will be able to gain access to surplus energy from the MISO market at essentially no incremental capital or operating costs. There will only be variable costs associated with the cost of energy needed to supply Manitoba load in the times of unexpected outage.

- Moreover, by insisting that a new US tie be accompanied by an additional 1500 MW of gas generation, MH creates an apples-to-oranges comparison because all that Bipole III provides (if Keeyask and Conawapa are not built) is an alternative path for MH to reach its existing Northern Hydro. It does not create an additional 1500 MW of generation. Under MH's logic, Bipole III should also be backed up by 1500 MW of generation. In reality, a 1500 MW tie to the US has access to an array of generation sources while Bipole III can access only existing Northern generation.

Response to MH Rebuttal, cont.

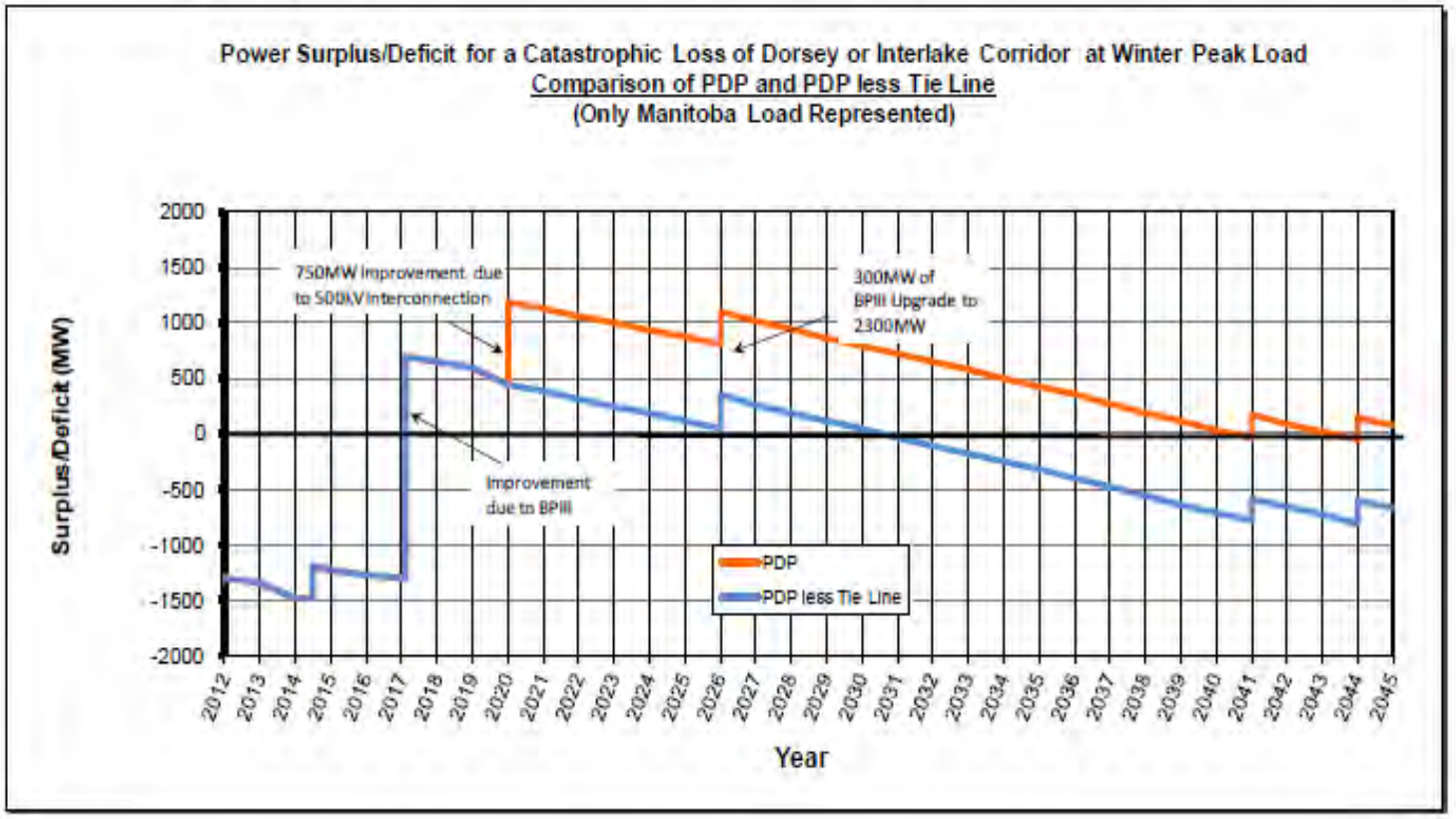
- At pages 1-3, MH challenges our position that it has implemented a less restrictive standard than it did in the CEC proceeding. MH seems to have missed my point because its rebuttal focuses on the adequacy of spare transmission capacity and not upon the adequacy of imported generating capacity to meet the strict new deterministic standard it espoused before the CEC. My calculations indicate that, with Bipole III, MH has not arranged for sufficient firm imports to meet the strict standard it set out in the CEC for covering a loss of both Bipoles I & II.
- The PUB should care about this sequence of events because MH created a stiff reliability standard to support the need for Bipole III and then seemed to back away from it in the NFAT. That stiffer standard occasioned little or no mention until MH filed its most recent rebuttal. As a consequence, Bipole III has been treated as a sunk cost in the NFAT and then repurposed. The result is a distorted economic analysis of alternatives in the NFAT. Moreover, by backing away from the CEC standard in the NFAT proceeding, MH has reduced the needed amount of firm purchases but has not updated the evaluation of a US tie on that same basis.

Response to MH Rebuttal, cont.

- In the NFAT, the hydro-based plans call for filling the spare capacity of Bipole III with the output of Keeyask and/or Conawapa. This would diminish the ability of Bipole III to provide spare capacity to cover the loss of both Bipoles I & II. In those hydro-based plans, MH would rely upon a new tie to the US to replenish the spare Bipole III capacity with capacity on a new US Tie. Thus, MH is planning to obtain backup from the US to replenish the diminishing ability of Bipole III to cover the loss of both Bipoles I & II. One wonders why it did not build a new lower-cost interconnection to the US in the first place [redacted]

MH Rebuttal Figure 1 at 4:

FIGURE 1: POWER SURPLUS/DEFICIT FOLLOWING LOSS OF BP I/II AT WINTER PEAK.



What Does This Show?

- This chart shows that an interconnection to the U.S. provides reliability benefits that are like those provided by Bipole III.

- The amount provided by the 750 MW 500 kV MMTP could have been increased, and built to a higher level [redacted]

MH Rebuttal–TPL–002 Note b

- At 6–7 of its new rebuttal, MH claims that footnote b of NERC Standard TPL–002 allows it to drop firm exports after an N–1 contingency. However, footnote b addresses an exception to the general rule of TPL–002 that Firm Transfers cannot be curtailed for single contingency (N–1) events. Instead, MH employs a number of special protection systems (SPS) to deal with its unique transmission system that cannot meet usual operating reliability levels.
- Note b states "Planned or controlled interruption of electric supply to radial customers or some local Network customers, connected to or supplied by the Faulted element or by the affected area, may occur in certain areas without impacting the overall reliability of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted Firm (non–recallable reserved) electric power transfers."

MH Rebuttal–TPL–002 Note b

- MH's SPS, in dropping firm transfers to the US goes well beyond the "radial customers or some local network customers" requirement. The US is not simply a remote load served by a radial transmission line and it is not "local network" on the MH system. Note b is applicable to minor firm load interruptions that are costly to avoid.
- Note b does not preclude the normal practice of system adjustments to prepare for the next contingency. Such adjustments can include dropping firm customers or reducing firm transfer in a controlled manner. However, automatically dropping firm customers or transfers with an SPS does not qualify as an adjustment.

In Conclusion

Manitoba Hydro's Preferred Development Plan has not been supported by Manitoba Hydro's NFAT submission and, if approved and built, will impose unnecessary and excessive risks on ratepayers. Manitoba Hydro's pursuit of DSM, imported power (supported by enhanced import capacity on its interconnections with the United States) and future gas generation would be far lower in cost in the years through 2031, and lower in risk, than would pursuit of its PDP. The PDP would exacerbate the concentration of its generating resources along the Nelson River hundreds of kilometers north of its Manitoba Winnipeg load center and put more eggs in that basket.

Tab 99

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MANITOBA PUBLIC UTILITIES BOARD

Re: MANITOBA HYDRO
NEEDS FOR AND ALTERNATIVES TO
REVIEW OF MANITOBA HYDRO'S
PREFERRED DEVELOPMENT PLAN

Regis Gosselin - Chairperson
Marilyn Kapitany - Board Member
Larry Soldier - Board Member
Richard Bel - Board Member
Hugh Grant - Board Member

HELD AT:

Public Utilities Board
400, 330 Portage Avenue
Winnipeg, Manitoba
May 13, 2014
Pages 10534 to 10759

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MMF-31	PowerPoint presentation	10543
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MH-199	GAC Pre-asks of Manitoba Hydro	10664
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MH-154 REVISED	Response to Undertaking 74	10758
MH-201	Response to Undertaking 142	10758

LIST OF UNDERTAKINGS

NO.	DESCRIPTION	PAGE NO.
147	Whitfield Russell Associates to provide a copy of the April 17, 2014, article from Megawatt Daily	10723
148	Whitfield Russell Associates to determine whether or not there is information available that would explain the third bullet on slide 41 where Minnesota utilities have petitioned the Minnesota PUB to consider a competing alternative and, in looking to see what that information is, whether there is any indication as to whether a financial contribution from Manitoba Hydro would be part of that	10731
149	Whitfield Russell Associates to advise whether or not NERC has provided an opinion on whether the SPS qualifies under Footnote B	10746

--- Upon commencing at 9:04 a.m.

THE CHAIRPERSON: Good morning. I believe that everybody's in position to commence today's proceedings. Now, before we start, I'll turn the microphone over to Mr. Peters, please.

MR. BOB PETERS: Thank you. Good morning, Mr. Chairman, panel members, ladies and gentlemen. On March the 3rd, 2014, many of us had today circled on our calendars. And I want Ms. Saunders and Mr. Marques to think it was because of them, but today is also the last scheduled day of evidence before the panel, if I need to remind anybody. But on this day we're pleased to have the Manitoba Metis Federation's witnesses from Whitfield Russell Associates. And I'll leave that My Friend, Mr. Marques and Ms. Saunders, to introduce in a few minutes.

But before they do, there's a couple of matters of housekeeping that I would like to attend to. Yesterday, the Clean Environment Commission's -- that's the Manitoba Clean Environment Commission's report on Keeyask was made as an exhibit, number PUB-69. And the parties should also be aware that on April the 23rd, after the Easter weekend, the federal Canadian Environmental Assessment Agency also released its

comprehensive study report on Keeyask. And that document is essentially the federal -- the federal counterpart to the CEC report on Keeyask.

So anticipating that the parties will want to make reference to that document in their submissions, I propose that we have that document filed on the record, as well. And it could be made PUB Exhibit 7-0, 70, if the -- if the secretary concurs.

MR. KURT SIMONSEN: I concur. Thank you.

--- EXHIBIT NO. PUB-70: Canadian Environmental Assessment Agency's comprehensive study report on Keeyask

MR. BOB PETERS: And there's one (1) other matter of business. And I'll perhaps look to My Friend opposite, Ms. Ramage. We received by email a few days ago the rebuttal evidence -- written rebuttal evidence from Manitoba Hydro in respect of Whitfield Russell Associates's evidence. And that should be marked as an exhibit. And subject to concurrence, it could be marked as Exhibit 85-2 because 85-1 -- I'm sorry, it's -- I'll suggest it be marked as Exhibit 85-

1.

MR. KURT SIMONSEN: Sure.

--- EXHIBIT NO. MH-85-1: Evidence of Whitfield Russell Associates

MR. BOB PETERS: And that'll just be a reminder to parties that Exhibit MH-85 was the rebuttal evidence filed by Manitoba Hydro earlier.

So with those matters, Mr. Chairman, I'm not aware of any other matters. I would suggest that it could be turned over to Ms. Saunders and Mr. Marques to introduce their witnesses, and we can proceed. Thank you.

THE CHAIRPERSON: Thank you, Mr. Peters.

Mr. Marques, Ms. Saunders, good morning.

MR. TONY MARQUES: Oh, I'm sorry. I'm not used to having to turn on a microphone. Good morning. Yes, we would like to proceed this morning. We have a PowerPoint presentation which has been given to the secretary. We made copies available to the parties. I believe that will be Exhibit 31.

MR. KURT SIMONSEN: That's correct, MMF-31.

--- EXHIBIT NO. MMF-31: PowerPoint presentation

MR. TONY MARQUES: Thank you. And we've already taken care of the Hydro rebuttal.

MOTION:

MS. PATTI RAMAGE: Mr. Chairman, I'm -- I'm dealing in unchartered waters at this point, so you're -- I'm going to beg your indulgence. In my time at the Board, I've -- I've never -- I have never done this before or made a motion with respect to a party's PowerPoint presentation.

And I'm not sure, and I look to Mr. Peters for -- to tell me where this comes in. Manitoba Hydro has concerns with this presentation. We're of the view that sections of it are in breach of the Board's Order 22/'14 and are dealing directly with the Bipole III issue.

And at some point in the proceeding, and I'm not sure whether it occurs at this point when the exhibit is filed, whether it occurs after the qualifications of the witness, or -- or where is the best point, we would like to speak to those portions which we believe should be struck, consistent with the Board's Order in 22'/14, to ensure consistency with

that direction of the Board.

THE CHAIRPERSON: Thank you, Ms. Ramage.

Mr. Peters, can you provide me with some guidance here?

MR. BOB PETERS: I will attempt to assist, Mr. Chairman. Just by way of background, the terms of reference from the provincial government to this Board indicated that there were certain matters that were not in scope. One (1) of those matters that was not in scope was the Bipole III project, as it was -- as it was called in the terms of reference.

Now, that in itself doesn't suggest that Bipole III hasn't been the subject of some discussion at the hearing. But, in short, the decision on whether or not Bipole III proceeds is not a matter that is within the jurisdiction of this Board.

That decision is made elsewhere. So to that extent, I think the -- the panel issued an order, as Ms. Ramage identified, as Order 20/'14 (sic). And since then, I believe MMF has been responsive and have, for lack of a better word, revised -- I won't say redacted, in the sense that there's any CSI, but they have deleted aspects from their testimony. And that's found as MMF Exhibit 14.

The suggestion that the PowerPoint that was circulated impinges on that order, I guess, is a -- a matter that Ms. Ramage will have to bring to the attention of the Board and then to hear from counsel for MMF as to whether any of those pages should be deleted or removed.

We can proceed on the record, or we can proceed by taking a short recess and seeing if Ms. Ramage and Ms. Saunders and Mr. Marques can -- can review those aspects to come to some understanding.

MS. PATTI RAMAGE: And, Mr. Chair, if I could jump in and just apologize to Mr. Peters. I was able to speak to Ms. Saunders, but because we got this late last night, we've been reviewing it upstairs, and I didn't get an opportunity to alert Mr. Peters to that.

So I congratulate him on his excellent recollection of the record, except for it was Order 22/'14, not 20.

THE CHAIRPERSON: My sense, Mr. Peters and Ms. Ramage, probably -- I would prefer if there was an attempt made to see if we can seek common ground before we consider the evidence presented. So I -- I think we should stand down and see if there's some way in which we can arrive at a consensus, how to address

the issues that are of -- of concern to Manitoba Hydro. And -- and then we're prepared to come back in. And -- and, you know, if -- if we can't arrive at a consensus, we'll make a ruling and proceed from there.

MR. BOB PETERS: Thank you. Perhaps I'll meet with Ms. Ramage and counsel in the Board's library and we'll just have quick run through this order and -- or the PowerPoints and see the concerns of Manitoba Hydro and if they can be addressed.

THE CHAIRPERSON: Thank you.

MR. BOB PETERS: Thank you.

--- Upon recessing at 9:11 a.m.

--- Upon resuming at 10:02 a.m.

THE CHAIRPERSON: I believe that we're ready to resume the proceedings. Mr. Peters, please.

MR. BOB PETERS: Thank you, Mr. Chairman. And thank the panel for the opportunity to caucus with Manitoba Hydro and the MMF parties. And as a result of caucusing, there was discussion in respect of the slide deck that Whitfield Russell Associates wants to present today.

And there were ten (10) or twelve (12) slides on which there were concerns that were raised.

The concerns were -- were focussed, and I believe the parties will want to bring those to the attention to the Board for a Board ruling on it. And that being the case, I would suggest that Ms. Ramage could come forward with the slides and the portions of the slides that Manitoba Hydro finds in violation of Board Order 22/'14 and then allow MMF the opportunity to respond to those concerns.

THE CHAIRPERSON: Thank you, Mr. Peters. Ms. Ramage, please.

SUBMISSIONS BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: Okay. Thank you. And with the Board's indulgence, I may have Ms. Moroz or Mr. Bedford jump in at some points. I am not the transmission legal expert that Ms. Moroz is, nor was I at the CEC hearing for the Bipole III, which Mr. Bedford was. So -- so I will do my best based on my reading of this in the last twelve (12) hours or so.

I should probably begin, before walking through, just go back to the -- the two (2) points in Order 22/'14, or two (2) statements in it that I used as my guide when I walked through these. And -- and just to put those on the record, the Board, at page 9 of Order 22/'14, said:

"The Board is not in a position to reach a determination as to which plan should or should not include Bipole III -- include the Bipole III project without delving into an analysis of the needs for Bipole III on a plan-specific basis."

It goes on in that page to say:

"The Board accordingly accepts that those portions of the WRA report that deal with the need, alternatives, or delay potential of Bipole III are outside the scope of the NFAT. The Board further accepts that it would be unfair to allow one (1) Intervenor to adduce evidence on such issues without other parties having an opportunity to the same and will order such portions to be struck from the record."

And those are the two (2) guiding principles that I went through -- or I -- I used when going through the slide deck. And so if we turn on the slide deck to page 33, and if we look at the last bullet on page 33, we see the bullet that says:

"LCA's No New Generation Plan has little or no need for Bipole III, making all sunk costs wasteful."

Manitoba Hydro's view is that it is appropriate to talk about sunk costs. It is appropriate to talk about a plan -- any plan assuming Bipole III, because it's a given in all plans. But the need for Bipole III is -- is not before this panel, and evidence to that effect is not appropriate today. So that's page 33.

The next is at page 35. And -- and the statement here is -- this discusses, by strengthening interconnections to the US -- United States before building Bipole III, what Manitoba Hydro can do. It goes on to say:

"Without distorting the analytical process of the NFAT or taking on the risks and costs associated with building Bipole III."

So it's clearly directed at whether Bipole III is in or out, the -- the words 'without distorting'. Anyways, and then later on that it says:

"Moreover, by strengthening int -- interconnections to the United States before building Bipole III, the PUB

would restore logic to the process."

And again, the shovel's in the ground for Bipole III. The terms of reference ind -- indicate Bipole III is not part of this proceeding. And this panel has specifically said it's not looking at the delay potential of Bipole III.

Page 42. We're looking really at the second bullet. And, for example, in that bullet, the -- the witness says -- it's about the fifth line from the bottom. Just want -- seeing where the sentence begins. But I'll begin by way of a question, whether Bipole III was the most cost-effective way to address the risk. Right there we see that's a -- that's questionable.

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: That's 43.

MS. PATTI RAMAGE: I'm sorry. I skipped a page, 42 is -- is dealing with -- that overhead is aimed at justifying, or deferring Bipole III. The -- in the first bullet it talks about a proposal, whether it would have enabled Manitoba Hydro to cancel Bipole III. You'll see that is the second-last line in that bullet. And again, the last bullet

on that page, for example, says:

"This situation raises the question of how many dollars could be saved by deferring or delaying the project."

And again, now over to 43, and I just went through that, it -- it has the -- the purpose of it is to question how Bipole III could fulfill its role as backups to Bipole I and II. And I'm trying to go through these fairly quickly.

Page 44, the first bullet, and it talks about the additional cost of new generation being more expensive than Bipole III without new generation.

Page 45 is -- it's both bullets on page 45 again deal with justifying Bipole III and the timing of Bipole III. And just for the Board, it's -- we're now going through 45, 46, 47, and 48.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Wojczynski is reminding me on 46 we could leave the first bullet in.

47, the intent appears to be, again, to justify Bipole III:

"My calculations indicate with Bipole III, Manitoba Hydro had not arranged

for sufficient firm imports to meet the strict standard it set out in the CEC for covering the loss of Bipoles I and II."

And these come from the inference that Bipole III is not needed.

Page 48, we look at the bottom of that page:

"One wonders why it did not build a new lower-cost interconnection to the US in the first place instead of building the more expensive and risky Bipole III."

Clearly, the intent of this slide is to question Bipole III.

And finally, at page 50, the second bullet. And there we have -- if you look at the last two (2) lines, it -- well:

"The amount provided by the 750 megawatt 500 kV Manitoba-Minnesota transmission project could have been increased and built to a higher level instead of or prior to the proposed installation of Bipole III."

And it's putting into issue the timing

and justification of Bipole III, which Manitoba Hydro is of the view is not the purpose of this hearing. And I certainly didn't come prepared with witnesses, or otherwise, to address the timing of Bipole III. And quite frankly, I'm at a bit of a disadvantage other than having My two (2) Friends on either side of me who can tell me what happened at other hearings. But that isn't what our evidence was intended to address.

And before turning over the mic to Ms. Saunders to address this, there is the question of our rebuttal evidence. And -- and just in terms of context, that rebuttal evidence was intended to address one (1) point and one (1) point only, and that was an assertion that the reliability standard used by Manitoba Hydro had changed since the Bipole III hearing to this hearing, and that we were using a different reliability criteria than in that previous hearing.

And if you look at that rebuttal evidence, that was the intent, what it was intended to address. If that evidence of -- of the MMF stands, we think that's appropriate. If the MMF wishes to withdraw that assertion that reliability criteria has changed, we -- we can resolve this by withdrawing that evidence.

But we think that was fair -- we -- we

can discuss reliability, and so Manitoba Hydro thought it important to bring to the Board's attention that that criteria has not changed. The MMF will differ on that point. And we can have that debate. But the debate doesn't allow us to extend to then discuss whether Bipole III should or should not be built.

So I think maybe Ms. Saunders can now walk through each of those points.

THE CHAIRPERSON: Thank you, Ms. Ramage.

Mr. Marques, please?

MR. TONY MARQUES: Thank you.

THE CHAIRPERSON: I'm sorry.

SUBMISSIONS BY MR. TONY MARQUES:

MR. TONY MARQUES: Thank you, Mr. Chairman. Like Ms. Ramage, I'm at a bit of a disadvantage. And the Board would know this. I have not been here prior to yesterday, so I don't have some of the background. With your indulgence, Ms. Saunders will step in. And perhaps -- usually it's the other complaint -- and perhaps if the Board feels necessary, any subjects from Mr. Russell or Ms. Looker.

But I -- I just wanted to put the whole thing into context first. What -- what Manitoba Hydro

is now asking you to do is to go through the PowerPoint presentation without hearing any context and, on a piecemeal basis, to take out certain portions of it. And their justification for doing that is they say that it's beyond the jurisdiction of this -- of this Board to make a determination as to the need for Bipole III.

We agree with that. You don't have the jurisdiction to come out with a finding that Bipole III is not needed. And we will not be arguing that at the end of the day. However, in the presentation and this part of the narrative that Mr. Russell hopefully will be able to -- to present, it's very difficult to separate individual items from the big picture.

And sometimes it is of assistance to imagine a scenario, or even a hypothetical scenario, that this does or does include Bipole III. That's for the purposes of analysis, because the -- at the -- at the end of the day, the Board's going to have to compare a number of different scenarios. And -- and what role Bipole III plays in them, I guess, will be for the Board to determine, whether it's a reliability role or whether it's a role of actually delivering power that doesn't really deal with the reliability issue.

All that aside, it's -- it's

acknowledged that Bipole III, and in terms of the need for Bipole III, that issue's been determined. We're not to look at it. There is a distinction, in -- in our submission, between us asking the Board to make an order that it can't make and talking about something to put it into proper context. And I think what Hydro's suggesting, in my submission, is that we can't even talk about it.

And in my submission, we should be able to talk about it to the extent that it's relevant to put everything into context. There's not a great harm at this point. The -- the slides have already been produced and -- and photocopied. There's not a great harm at this point in allowing Mr. Russell to go through his presentation and allowing Hydro to cross-examine on that presentation as much as it wishes and we have time for, in terms of any errors that -- that are contained in that presentation, and -- and allowing Hydro at the end of the day to say, The Board should disregard slides 33 and the second line in 44 and 45 and all of those other things because they're not relevant.

But to ask you to predetermine that now without the context of his testimony, I would submit, is probably not the best course to pursue because you

may find that, in fact, it is necessary to explain the narrative. And you may find that having him spend a few extra moments at this stage of the proceedings is really not that injurious to the role that you have to fulfill, which is to consider all of the facts.

That's my general submission. Ms. Saunders, I think, has some specific comments to make, as well. But my general submission is that we have to keep the big picture in mind.

SUBMISSIONS BY MS. JESSICA SAUNDERS:

MS. JESSICA SAUNDERS: I would thank you for hearing our comments at this late hour. And I know it -- it perhaps wasn't ideal. I think that my preference would have been to have received rebuttal evidence, because most of our substantive arguments in our report were available very soon after Order 22 and a Schedule A attached to that order that the Board did fill out.

And the subject of our further application to review and vary on Order 35 dealt with removing offending portions at that time such that the substantive arguments were available to Manitoba Hydro to make submissions on any point after Order 22.

So I think what we -- what we would have

done -- and I think I've enjoyed the PUB's process of allowing us to consider the points, the terms of reference, what we're hearing, what we discuss in these hearings to consider them thoughtfully and come back with a submission. I've utilized your rules, your applications to review and vary to do that

And my preference would have been, of course, to have received the rebuttal evidence and consider it and come back with a submission that perhaps would have thought more about those aspects of the report that we would have suggest be returned back to the -- to the record based on the rebuttal evidence.

We're faced with having the rebuttal evidence as of Thursday, and -- and for circumstances I explained in -- in an email to counsel for the PUB, I didn't get it until Friday. We were advised that appropriate protocol would be to address the new matters brought up in rebuttal evidence in slides in our presentation.

And so today we have some of those. And I can only, as you went through those slides, add to Mr. Marques's comments that what we did do is consider those matters that I did point out in the submission to review and vary Order 22. That would be Order 35, the submission that resulted in Order 35. We highlighted

that from Order 22 the general risk of reliance on the HVDC corridor, the sunk cost issues as Manitoba Hydro has recognized, as well as general issues of reliability were within scope.

And so what we did do was we received the rebuttal. We considered it in the time that we had, and we considered the fact that we were able to speak to those matters in our PowerPoint presentation. And we've done so on the understanding that in considering the reliability standards and -- and the -- the various other in scope matters some context would be required.

And now I do know that we go an added step of providing some conclusions on those contexts, but I leave that to your consideration in light of what Mr. Marques has said today here. And I thank you for considering this at this late hour, and I do believe that it's just a matter of process.

I would have liked to have dealt with it, I think, much earlier than -- than this morning. But unfortunately, having received it on the -- the 9th of May, this was the position that I think we were put in. So my apologies that this has happened, but I thank you for allowing us to deliberate this morning.

THE CHAIRPERSON: Thank you for that.

And now, Ms. Ramage, please.

REPLY BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: Yes, if I could comment on a -- a few of the comments being made by the MMF. I think we have agreement with everyone in the room that the Board was not given jurisdiction over this matter. And when a panel is not given jurisdiction, it doesn't hear evidence on the matter. It -- it's not a question of we get -- we listen to evidence and you can come to this panel and talk about whatever you like, be it Manit -- Bipole III, be it MPI rates.

Because the Board has a general topic, rates, we don't get to come to hearings and just talk about to the Board what we'd like to. We have a -- a scoping document, and we comply with the scoping document. I don't accept, quite frankly, that it's difficult to accept -- to separate individual items. This is the only -- only Intervenor who has raised Bipole III issues in this hearing.

All Intervenors were able to accept it, and it was quite easy to accept because Bipole III is consistently dealt with across every single plan. There is no need to take it out of any plan because it

-- it's been treated the same. It's a given. The shovels are in the ground. We're not talking about what happens when -- if it was delayed, deferred, it didn't occur, it was done differently. That was dealt with in a different process, and the MMF participated in that process.

I'm advised by Mr. Bedford in that process, they considered different alternatives. That's not something I can speak to and it's not something Manitoba Hydro has the appropriate people here to speak to, nor should they. It's not something that the Board has been prepared for in this hearing. It's not something we've been dealing with up till now. It's not something the other Intervenors have been dealing with up till now.

And to, on the very last day of this hearing, to come up with this type of evidence after the Board has already issued an order on this topic, -- and the Board was very clear in its order. And it asked that -- it -- it directed that this evidence be struck. And as I said earlier, it -- it's -- the evidence that was struck was those that -- which deals with the need, alternatives, or delay potential of Bipole III, the Board couldn't have been clearer.

And to suggest now that it's -- it's

difficult to -- to deal with this without Bipole III is, quite frankly, preposterous. You -- it's what we've been dealing with for the last how many ever months. No one has raised this until the last day of this hearing. To suggest that the Board needs to understand what role Bipole III plays, it's -- it plays the same role in every single plan. And -- and that's what the terms of reference have directed us to do, and -- and that's what we have done up till this date.

Mr. Marques talked about cross-examining. I can tell you, I can't cross-examine on Bipole III. It's not something I can -- came prepared to do. It's -- it's -- we didn't prepare for this issue. And we certainly didn't prepare after the Board's order directing that it would not be part of this hearing.

In terms of comments regarding the late date of the rebuttal, I would simply remind parties in the room of the timing of this. The WRA evidence, I believe, was filed originally February 18th -- no, February 12th. Manitoba Hydro responded with a motion on February 18th. The Board issued its order on March 4th.

In the Board's order, the Board invited MMF to refile its evidence. MMF filed that -- refiled

that evidence on April 29th. Manitoba Hydro did not know what was coming back, so Manitoba Hydro was not going to file rebuttal evidence on materials that it did not know what was going to be in them.

We've had plenty of different evidence introduced throughout this process, and the Board has generously advised parties that they can -- they -- they were invited to refile on that evidence. So certainly, Manitoba Hydro wasn't going to file rebuttal to something that hadn't been filed yet.

So I'd ask the Board to remember that that came in on April 29th. It's not new. It was raised in -- in the panels -- or it was -- it -- it was their evidence that we're dealing with now. They were -- it was struck. And now, in the materials we've put -- seen put back in what was taken out -- out of that struck evidence.

And I think it -- it's imperative that the Board deal with that right away, because if parties are allowed to come to hearings and ignore Board orders as to what's in scope and suggest that they can talk about whatever they like when they're here, regardless of a scoping order and regardless of the terms of reference, I think our processes will fall apart completely.

THE CHAIRPERSON: Thank you, Ms. Ramage.

MR. TONY MARQUES: Mr. Chair, I'm sorry, just one (1) --

THE CHAIRPERSON: Mr. Marques...?

MR. TONY MARQUES: -- minor issue that I think needs clarification. At the beginning, Ms. Ramage stated that the rebuttal was directly solely at the IR, an issue which was actually completed and -- and filed on the 28th of February. So I don't see how the redaction in the report or any other of those issues have anything to do with the late hour of Manitoba Hydro's rebuttal.

It was strictly based on a report of February -- or an IR of February 28th.

MS. PATTI RAMAGE: And if we want to talk about the rebuttal, the rebuttal only addresses the issue of criteria. It doesn't address the addit -- the issue of Bipole III. I -- I can advise the Board, we were very careful and it was the question I asked as it was being produced. We do not want to invite Bipole III into this, and we were very careful to word that rebuttal so it addresses the criteria and that there had been no change in the criteria. We did not address Bipole III in the criteria. We didn't invite this to

come back in.

Having said that, as we have suggested as a resolution, if these matters are withdrawn and that IR that has been allowed -- that is remaining is withdrawn, we have no issue with withdrawing the rebuttal also.

THE CHAIRPERSON: Mr. Marques, anything else?

MR. TONY MARQUES: I'm not sure what else to say. I think that even the rebuttal itself -- and I'm not certain to what extent the Board has had an opportunity to review it. I can tell you that the MMF does not agree with Ms. Ramage's statement that it's addressed to -- or confined to the issue of reliability.

Our position is that it's -- that -- that it's a bigger issue than that that's raised in the rebuttal. We'd like Mr. Russell to be able to explain that further. And as I say, at the end of the day, I think we're spending more time talking about it than just hearing it and excluding whatever's not relevant. But we don't accept that we can't -- that we can somehow artificially create a barrier where as soon at the words 'Bipole III' come up we can't talk about it.

THE CHAIRPERSON: Thank you. With that

we'll step down. We are going to caucus and be back as soon as we have a decision, which we will render to the parties as quickly as possible. Thank you.

--- Upon recessing at 10:28 a.m.
--- Upon resuming at 11:27 a.m.

THE CHAIRPERSON: I believe that we're ready to resume the proceedings. So, Mr. Peters, please.

MR. BOB PETERS: Yes, thank you, Mr. Chairman. In terms of proceeding at this time, I know we've perhaps taken time that we thought we might be in other evidence. But if the panel has finished their deliberations, perhaps the panel could indicate how it wants Whitfield Russell to proceed at this point, in terms of the slide deck.

BOARD RULING:

THE CHAIRPERSON: Now, the panel has -- has met to consider the motion made by Manitoba Hydro to delete certain portions of the slide deck prepared by Whitfield Russell and Associates. Dr. Grant recused himself from the deliberations on this matter.

In addressing this matter, the Board

relied on its decision set out in Orders 22/'14 and Orders 35/'14. I want to -- I want to read certain portions of those orders into the record.

(BRIEF PAUSE)

THE CHAIRPERSON: In respect of Order 22/'14, on page 8 of that order, the following paragraph is set out:

> "The extended scope of the Board's inquiry into the Preferred Development Plan is therefore set out and constrained by the NFAT terms of reference, which state that the Bipole III transmission line and converter station project are not in the scope of the NFAT. The Board interprets this carve out to mean that it is not the Board's mandate to inquire into the need for the Bipole III project, nor into the alternatives to the Bipole III project."

Now, from page 9, the following paragraph is set out:

"The Board accordingly accepts that those portions of the Whitfield Russell and Associates report that deal with the need, alternatives, or delay potential of Bipole III outside the scope of the NFAT. The Board further accepts that it would be unfair to allow one (1) Intervenor to adduce evidence on such issues without other parties having an opportunity to do the same."

Now, having considered those -- those orders, the Board has made the following determinations. And what we have done is we have edited the slide deck that was submitted by Whitfield Russell -- Whitfield Russell and Associates.

So starting on page 33, the Board has decided that the last bullet of that slide should be deleted.

Now turning to slide 35, the Board has determined that all the text on that slide should be removed with the exception of the title.

Moving to slide 42. The Board has determined that the first and third bullet of that slide should be removed.

Moving to slide 43. Starting with the second sentence of the second bullet, the sentence starts:

> "We accepted the proposition that the spare transmission capacity created by Bipole III without Keeyask and Conawapa would lessen risks and cost associated with loss of both Bipoles I and II."

The balance of that sentence is deleted.

Moving to slide 44. All of the text from that slide will remain in the record.

Moving now to slide 45. All of that text should remain on the record.

Slide 46. All of the slide should remain on the record.

47. All of the text should remain on the record.

Slide 48. In that case, the words at the end of the sentence, the last sentence of that slide:

> "One wonders why it did not build a new lower-cost interconnection to US in the first place."

So the rest of that is deleted.

And finally, turning to page -- to slide 50, rather. The -- turning now to the second bullet, the text should read as follows:

> "The amount provided by the 750 megawatt/500 kV MMTP could have been increased and built to a higher level."

The rest of that sentence is deleted.

With that, I think that is the -- completes my portion, Mr. Peters.

MR. BOB PETERS: Thank you. We might want to give MMF just a few minutes to wrap their head around all of that. And I believe they now have black and white paper copies.

I should suggest, Mr. Chairman, that in light of the ruling of the Board, that MMF -- what had been marked as Exhibit 31 would now be removed and we would provide a new exhibit number for the -- the new slide deck that the Board has -- has approved.

And I'll leave it to Mr. Secretary to provide us with the appropriate exhibit number.

MR. KURT SIMONSEN: We could call it 31 revised or give it a whole new number.

MR. BOB PETERS: I'd be okay with 35 revi -- 31 revised, unless there's any comments from --

MR. KURT SIMONSEN: Ms. Saunders, are you okay, 31 revised? Thank you.

--- EXHIBIT NO. MMF-31: Revised PowerPoint presentation

MR. BOB PETERS: And my last point, Mr. Chairman, is that the electronic version of this is available to Mr. Russell and Ms. Looker. I believe it's available so that when they go through their presentation, they can control the screen, although I'm -- I'm not sure if -- if they presently have the electronic version of it at this point in time.

MR. KURT SIMONSEN: I don't believe they have it yet. If we're going to have the presentation, we'd probably have to operate the system, if that's acceptable. You'll just have to indicate the next slide, please. Thank you.

THE CHAIRPERSON: So -- thank you, Mr. Peters.

So with that, Mr. Marques, please.

MR. TONY MARQUES: Thank you. In view of the fact that a number of the changes made are later on in the presentation, I propose that we commence. Certainly we have some work to do before we get into

the actual material. And I'm ready to go in the best interests of time if -- if you are, Mr. Chairman. Thank you. Perhaps we should have Mr. Russell sworn. We've already taken care of the exhibits.

MMF PANEL 2 - ECONOMICS:

WHITFIELD RUSSELL, Sworn (Qual.)

QUALIFICATION OF WITNESS:

MR. TONY MARQUES: Mr. Russell, you have been called as an expert witness on behalf of the Manitoba Metis Federation?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And you had produced a report which is filed with this Board as Exhibit 14?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And is that your report?

MR. WHITFIELD RUSSELL: It is.

MR. TONY MARQUES: You had received certain IRs and answered certain IRs and submitted certain IRs?

MR. WHITFIELD RUSSELL: I did.

MR. TONY MARQUES: And were those prepared for -- or prepared by you or at your

direction?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: All right. And all of the -- and you have prepared a PowerPoint, what's left of the PowerPoint this morning.

Was that prepared mostly at your direction?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: Yes. And all of the material that I have referred to, did you have anyone assisting you in the preparation of that?

MR. WHITFIELD RUSSELL: I did. I had Mrs. Looker, who is to my right. And then we had two (2) subcontractors, Mr. Thomas Besich and Mr. Harrison Clark.

MR. TONY MARQUES: All right. And I understand that Mr. Besich's CV is filed as Exhibit 16 before the Board, and that Mr. Clark's CV is filed as Exhibit 17. And Ms. Looker's CV, which we'll get to in a minute, is filed as Exhibit 18.

In the preparation of the material that you -- that we have referred to, first of all, with respect to your involvement, were you using your best professional experience and expertise?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And can you just briefly tell the Board what the involvement of the others was, in terms of the final product?

MR. WHITFIELD RUSSELL: Well, I and others, mostly Mrs. Looker, we drafted sections of the report. Then I would rewrite and react to comments on the drafts. I would initially draft parts myself. As comments came in, I took some and I rejected some, and that was the final report.

MR. TONY MARQUES: All right. And specifically referring now to Ms. Looker, she is seated beside you.

And I understand that you would like her to be able to assist you in your testimony?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And I understand that the assistance would be in the nature of clarification and finding material for you, and perhaps enhancing your evidence in some cases, depending on the circumstances?

MR. WHITFIELD RUSSELL: Indeed, yes.

MR. TONY MARQUES: And we will talk to her in a minute, but from your knowledge, what are her professional qualifications?

MR. WHITFIELD RUSSELL: She has a -- an

undergraduate degree from Hope College. She has a graduate degree in business administration from George Washington University. She became known to us when she worked for the American Public Power Association in Washington, DC, and began working with us, I think, in the late 1980s or early 1990 -- late 1980s. There was one (1) sabbatical for children and -- and other reasons, and she has returned and worked with us for many years.

MR. TONY MARQUES: And in a general way, can you tell the Board what her contribution to the report would have been?

MR. WHITFIELD RUSSELL: Well, she knows a great deal about our business. And so she administers -- when I have multiple cases going on, she -- she moves along the cases for me, does much of the substantive work, and kind of cracks the whip on me.

MR. TONY MARQUES: All right. Very well. And I'd like to talk about your qualifications for a moment. As I said, we have Exhibit 15 filed, which is your CV. And I don't propose to go through it in any great detail, but I did want to highlight some -- some points.

And I understand that you're an electrical engineer?

MR. WHITFIELD RUSSELL: I am.

MR. TONY MARQUES: Just tell us where you obtained your credentials.

MR. WHITFIELD RUSSELL: The University of Maine as a bachelor degree, and then a master's in electrical engineering from the University of Maryland.

MR. TONY MARQUES: What year did you obtain your master's?

MR. WHITFIELD RUSSELL: 1971.

MR. TONY MARQUES: Now, I don't quite understand why, but you also decided that you wanted to be a lawyer.

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And you have a juris doctor?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: Just tell us what the background is.

MR. WHITFIELD RUSSELL: Well, I went to night school at the Georgetown University Law Centre and graduated with that degree in 1976. And I was admitted to the bar in the District of Columbia and Virginia.

MR. TONY MARQUES: And I understand from our personal discussions that you don't actually

practice law except by giving free advice to your friends.

MR. WHITFIELD RUSSELL: That's right.

MR. TONY MARQUES: All right.

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: Just in terms of your professional involvement, I understand that sometime in 1969 you started as an associate engineer with the System Planning Division of the Potomac Electric Power Company?

MR. WHITFIELD RUSSELL: Yes. That's the utility for Washington, DC, and Maryland suburbs.

MR. TONY MARQUES: And just briefly explain what -- what your involvement was.

MR. WHITFIELD RUSSELL: It was transmission planning, generation planning. A good deal of our work was as part of the then-called PGM interconnection, which is a power pool of, I think, thirteen (13) companies organized into six (6) holding companies. And it is really the classic beginning of what is now the PJM ISO, which spreads as far west as Chicago and incorporates parts of Virginia and -- and other states.

MR. TONY MARQUES: Okay. And for people who don't -- like me who don't know what the PJM

--

MR. WHITFIELD RUSSELL: 'PJM' stands for Pennsylvania-New Jersey-Maryland. And the -- those classic PJM companies were -- resided there --

MR. TONY MARQUES: All right.

MR. WHITFIELD RUSSELL: -- served.

MR. TONY MARQUES: And from -- for a couple of years, you were with -- you were with the Federal Power Commission?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And then you moved on to chief engineer for Securities and Exchange, administering the Public Utility Holding Company Act?

MR. WHITFIELD RUSSELL: Yes. The -- the SEC has jurisdiction over about 20 percent -- at that time, about 20 percent of the electric industry. And that was with respect to mergers, acquisitions, and other matters under the 1935 Act, the Public Utility Holding Company Act.

MR. TONY MARQUES: All right. And I understand that you started your company, Whitfield and Associates, in 1976?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: So about thirty-eight (38) years ago.

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And what have you been doing for the last thirty-eight (38) years?

MR. WHITFIELD RUSSELL: Mostly our client base initially was public power companies and their dealings with investor-owned utilities. In 1978, the Public Utility Regulatory Policies Act was passed, and co-generation became a matter of great concern. And I worked for a number of large co-generators and small entities as well with -- who obtained rights under that statute.

And over the years, I've worked both against and for investor-owned utilities, publicly owned utilities, First Nations in -- in about forty (40) states in -- with respect to rate cases, contract disputes, arbitrations, and so forth.

MR. TONY MARQUES: Have you ever testified in proceedings similar to this?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And can you tell us generally approximately how many times you have?

MR. WHITFIELD RUSSELL: I've been accepted as witness somewhere between a hundred and fifty (150) and two hundred (200) times, an expert witness on these matters.

MR. TONY MARQUES: Expert in what?

MR. WHITFIELD RUSSELL: Bulk power planning, bulk power supply contracts, transmission access, and so forth.

MR. TONY MARQUES: In your CV, you indicate that you're -- that you have experience in electric utility system planning, transmission and generation, rate making, and bulk power contracts.

MR. WHITFIELD RUSSELL: I do, yes.

MR. TONY MARQUES: And is that a fair -- well, you prepared it, but is -- is that a fair summary of your area of expertise?

MR. WHITFIELD RUSSELL: It is.

MR. TONY MARQUES: Now, you said that you've been qualified as an expert witness in approximately twenty-seven (27) states?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And I understand that you've also been qualified as an expert witness in Canada in some provinces?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: I'm not going to -- I -- I see that in your CV there are a hundred and eighty-two (182) entries for matters in which you have testified or provided evidence. And I'd just like --

I'm not going to go through it any great detail, but just highlight a couple of the more notable ones.

I guess I should start with your involvement in Manitoba in 1990. Can you --

MR. WHITFIELD RUSSELL: Yes. That was the --

MR. TONY MARQUES: -- outline that for the Board, please?

MR. WHITFIELD RUSSELL: Yes. That involved the proposed sale of the output of Conawapa to the Ontario Hydro at the time. And I was retained by the Board to offer my comments on that and related matters.

MR. TONY MARQUES: Okay. I see that you have provided evidence in Alberta?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And what was the nature of that?

MR. WHITFIELD RUSSELL: I think the dis -- the -- the matter was the definition and pricing of ancillary services under their recently restructured market.

MR. TONY MARQUES: And you provided evidence in Ontario?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: And what was the nature of that?

MR. WHITFIELD RUSSELL: That related to the Sagkeeng Ojibwe First Nations. And a large 500 kV line was being planned to pass through their lands and -- for purposes of -- of transmitting the output of large additions of wind generation and the Bruce Nuclear Plant.

MR. TONY MARQUES: All right. And in the cases that I've just asked you about, were you giving the type of testimony that you have described that's within your area of expertise?

MR. WHITFIELD RUSSELL: I was.

MR. TONY MARQUES: I see that, from looking at your CV, that you have substantial involvement with the Wisconsin utility companies?

MR. WHITFIELD RUSSELL: Yes.

MR. TONY MARQUES: Just, again, very generally, can you tell us what that is?

MR. WHITFIELD RUSSELL: Yes, for a number of years I worked for the Wisconsin Public Power Inc., which is WPPI. It's a consortium of about thirty (30) publicly owned, municipally owned systems and in their dealings with investor-owned utilities, such as Wisconsin Public Service and Wisconsin Electric Power

Company, and so forth. And on other occasions -- this was with regard to rate dispute, transmission access, and so forth.

In other occasions they were a part of a coalition to promote and develop transmission lines, such as the Arrowhead Line, which terminates near where the Great Northern Minnesota line will -- will terminate, near Blackberry.

MR. TONY MARQUES: All right. And would you lastly describe for the Board what you consider to be your level of expertise or knowledge with respect to NERC, FERC, and MISO, in terms of their --

MR. WHITFIELD RUSSELL: That has frequently -- the reliability standards applicable to transmission and generation have frequently been a subject of my testimony over the years. And I should say that Mr. Harrison Clark was one (1) of the original -- after the 1965 blackouts in New York, when NERC was formed, he was -- had a very early role in helping draft the initial reliability standards of NERC.

MR. TONY MARQUES: And Mr. Clark being one (1) of your co-workers?

MR. WHITFIELD RUSSELL: One (1) of our sub -- subcontractors, yes.

MR. TONY MARQUES: Mr. Chairman, I'm going to be asking that Mr. Russell be accepted as an expert in electric utility system planning, both transmission and generation, rate making, and bulk power contracts, recognizing that that is a pretty substantial area. But -- and I don't know if any of the other parties have any questions for him, but that's what we're looking for.

And then I propose after we deal with Mr. Russell to then briefly ask Ms. Looker a few questions, just so that we can put her in context, in terms of anything she might contribute.

THE CHAIRPERSON: Mr. Marques, I've got electricity, utility planning and generation, transmission, rate making. And what was the other one?

MR. TONY MARQUES: Oh, and bulk power contracts.

THE CHAIRPERSON: Bulk power contracts. Okay.

MR. TONY MARQUES: Okay.

(BRIEF PAUSE)

THE CHAIRPERSON: I'll call on Ms. Menzies, please.

MS. MEGHAN MENZIES: Thank you, and good morning. CAC (Manitoba) has no objections to these qualifications as set out.

THE CHAIRPERSON: Thank you. Mr. Gange, please?

MR. WILLIAM GANGE: GAC is prepared to accept the witness as well.

THE CHAIRPERSON: Thank you, Mr. Gange.

Me. Monnin, s'il vous plait.

MR. CHRISTIAN MONNIN: Merci, M. President. The IECs have no objections.

THE CHAIRPERSON: Merci, Me. Monnin.

Ms. Ramage...?

MS. PATTI RAMAGE: Manitoba Hydro has no questions.

THE CHAIRPERSON: Thank you for that, Ms. Ramage.

Mr. Peters...?

MR. BOB PETERS: No questions. Thank you.

THE CHAIRPERSON: Thank you. I -- I -- looking at the clock. I think what we're -- what I propose to do is that we -- we work for about a half an hour and then break a half hour for lunch and then resume the proceedings. Because of the delays we've --

we've encountered today, I'd like to proceed as quickly as possible, because we are time constrained at the panel level beyond six o'clock, I believe. So I really would like to get it done today if possible. Otherwise, we -- we'll have to look at alternatives.

MR. TONY MARQUES: Very well. And perhaps I -- I can save some time by saying that I've already indicated what our intentions are with respect to Ms. Looker's involvement. I will ask Mr. Russell if Ms. Looker contributes any information that is not in accordance with your expertise, will you undertake to advise the panel?

MR. WHITFIELD RUSSELL: I will, yes.

MR. TONY MARQUES: And perhaps we can do it that way. Her CV speaks for itself, and we'll get moving right along. Very well.

MR. KURT SIMONSEN: Mr. Marques, is Ms. Looker to be sworn in?

MR. TONY MARQUES: Yes, I think that would be a good idea. Thank you.

GENEVA LOOKER, Sworn

THE CHAIRPERSON: Now, I want to make sure that we understand. Ms. Looker, you're going to

be serving as a fact witness in this case, right, and -- but the expert is Mr. Russell?

MR. TONY MARQUES: Yes. There are obviously certain business aspects to the presentation which I think will be quite clear. But clearly what we're here for is the technical aspect of the presentation, and the expert is Mr. Russell.

THE CHAIRPERSON: Okay. I just want to make sure that the Intervenors and Manitoba Hydro is prepared to accept what's being proposed here.

MS. PATTI RAMAGE: No, Manitoba Hydro has no objection.

THE CHAIRPERSON: No concerns from the Intervenors? Looking around the room, there doesn't appear to be any concern. So what I neglected to say is the panel's prepared to accept Mr. Russell as an expert witness for the areas outlined by Mr. Marques. And we're also prepared to accept Ms. Looker as a fact witness in support of Mr. Rusfield -- Mr. Russell's testimony. Okay, with that?

MR. TONY MARQUES: Thank you very much, Mr. Chairman.

THE CHAIRPERSON: Thank you.

MR. TONY MARQUES: And with your permission, we will get right into the presentation.

EXAMINATION-IN-CHIEF BY MR. TONY MARQUES:

MR. TONY MARQUES: So, Mr. Russell, I ask you to start your presentation based on the revised PowerPoint that was prepared.

MR. WHITFIELD RUSSELL: Thank you. May we go to slide 2, please. We're going to focus on a quick summary here of what my presentation focusses on, is the lack of transparent data available to us, largely because we were unable to see CSI materials.

The study period underlying the NFAT is too long; seventy-eight (78) years. The export revenue forecasts have been unavailable, and the -- the detail underlying the NFAT. But we resorted to second-best information and did the best we could to put together a substantive presentation for your -- for your use.

Export revenue forecasts are unavailable, and they indicate a lot of risk. Exports will not recover the full costs of Keewa -- Keeyask and Conawapa. Hydro's analysis and conduct indicates a very strong predisposition to develop hydro. That -- I'm going to discuss Bipole III's 3 billion -- $3.3 billion cost, which is deemed sunk and is ignored, frankly, as a neutral factor in the economic comparisons analysis. Other sunk costs with respect to Keeyask and Conawapa are similarly omitted and

prejudice the analysis. And the seventy-eight (78) year study favours hydro.

Next to the last is reliability analysis that Hydro relied on to expand the HVD sys -- HVDC system. I'm going to contrast that with what has changed since then.

And finally, an additional transmission line to the US, I believe along the lines outlined by La Capra, will lower costs and risks and improve reliability for Manitoba.

Slide 3, please. Much of the data that we tried to obtain and would rely on in the absence of our CSI barrier was on financial and economic risks of the PDP, but it's been restricted. And many questions that were asked by the IECs were of interest to us -- the responses, that is -- and similar to those that we would have asked. And many of the answers came back as follows, quote:

> "This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro."

Close quote. That left us in a situation where we had to rely upon the findings and

analysis of the IECs. And when we tried to do so, much of what we were interested in was redacted. So we have sort of an indication in many instances of the precision, but in other cases we weren't able to get the full benefit of their analysis.

Next slide please. The terms of reference lack Bipole III review. We -- we regard this as a very significant matter. The Bipole III high-voltage DC transmission line and converter station is not covered by the NFAT. This portion of the terms of reference caused the parties to treat future investments as sunk costs, even though much of it has not yet been made; that is, the investment. And some of that investment may be avoidable. This element of the terms of reference, I believe, distorted the analyses to favour hydro-centric alternatives.

Next slide please. Number 5. We addressed the seventy-eight (78) year study period as too long. I think, from my review of the transcript, you've probably heard quite a bit of comment on that. Let me just quickly pass through the things that struck us.

It's no -- it's longer -- the seventy-eight (78) year period is longer than typical, even for Manitoba Hydro, which uses a twenty (20) year

projection for its financial forecast and a thirty-five (35) year period for its Power Resources Plan.

Second, the use of the seventy-eight (78) year period favours the hydro-centric plans that have been proposed. They have near zero energy costs, but they add generating capacity in very large blocks that cost a great deal, require export sales until their capacity and energy is recaptured for use by Manitoba Hydro. And even after it has been recaptured, export sales are a -- remain a large factor in their power supply economics. They take a long time to build and are projected to generate savings only after much of their initial cost has been depreciated.

Third, the seventy-eight (78) year study periods makes the plans susceptible to very difficult to predict -- slide 6, sorry -- to predict structural changes such as those that could alter relative costs of assets and lower domestic demands, and also changes in export prices.

Fourth, the seventy-eight (78) year study period kind of masks the need for near-term rate increases to support the hydro projects before they begin to generate savings.

And one (1) -- one (1) final thing is over a seventy-eight (78) year period, we can expect to

see changes in laws and changes in judicial findings which will affect how revenues and costs are treated. We've been through that in New York State, where our clients have had an interest in the Niagra project, a -- a 2,000 megawatt project -- hydro project. It was built in the late 1950s. It was a very low cost. Its costs have crept up over the years.

In -- when the New York ISO was restructured and formed, the ancillary services from that project became very valuable, so much so that it represented a substantial portion of the revenues obtained from the project. Because of our series of decisions and administra -- administered by the New York Power Authority, our clients were denied the revenue credits associated with that, and those revenue credits were instead diverted to the state treasury.

Now, those kinds of things can happen. So even though we're looking at something that looks like a benefit to the ratepayer, had this project been analyzed from the ratepayer benefit in New York beginning in 1950, looking forward seventy-eight (78) years, I'm sure no one would have admi -- envisioned that it -- throwing off substantial revenues which would have cut its costs would have -- would have redounded to the benefit of the state and not to the

customers intended to receive that power. So our clients are paying more than they otherwise would.

Slide 7 please.

THE CHAIRPERSON: Could we go back to slide 6, please? I -- and I -- I'm a bit surprised by the initial statement on bullet 4, "Masks the need for near-term rate increases," because we know that the Preferred Development Plan encompasses 3.95 percent rate increases for a generation, basically, per year.

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: So I'm -- I'm trying to put that -- this initial statement in the context of what is before us as a panel.

MR. WHITFIELD RUSSELL: I'm just saying that as compared to the outlays of cash and the large risks that are being undertaken with respect to Keeyask and Conawapa in their early years, that they really represent and -- and affect rates over the long term, which may not be seen immediately because we're ramping up slowly. If we took those costs into account currently, with construction work in progress, as is often the case in other jurisdictions, then we'd see the full impact as we go along of those large outlays for capital.

But because we borrow and we capitalize

interest and we put those things in service later, at the same time they start throwing off export revenue, you kind of mask the impact in the early years of what you're undertaking.

Slide 8. Oh, I'm sorry. Slide 7. Now, the net benefits claim for plans involving Keeyask and Conawapa are highly dependent upon the magnitude of the export revenues. That's not news to any of you. Publicly available data on the historical magnitude of these exports and the average price per kilowatt hour sold revealed a disturbing trend of considerable volatility and decline in export prices since 2006 and '07.

Slide 8, please. And we see these declines here in -- as you go down the chart. The firm power price peaked out around fifty-nine dollars ($59) in 2005/2006, had a resurgence in 2009/2010, and then, as the great recession took its toll, these prices plummeted. And that's on the firm part, which you would expect to be able to maintain its value over time.

I noticed that there was a decline in the gigawatt hours sold. But just looking at this from the outside, it didn't offer all the protection that one would have expected associated with firm -- firm

sale, dependable sales.

On the opportunity sales, of course, there was a real plummet. These prices peaked around sixty-nine dollars ($69) in 2003 and '04. And for the last period we have data reported by Manitoba Hydro, in 2012 and '13, it was down to twenty-three sixty-two (23.62), twenty-three dollars and sixty-two cents ($23.62) a megawatt hour. That's -- that's quite a -- quite a hit.

In my business -- and -- and I have some utilities like Manitoba Hydro as clients, the Navajos in the Northeast portion Arizona, and they spill their -- their reserve -- you call it a reserve; we call it a reservation -- spills over into New Mexico. They have their own utility. It's sparsely developed, but they're a -- they're a winter-peaking entity in the middle and adjacent surrounded by summer-peaking entities. They have a very different need profile from all of their neighbours, and as a result they benefit from seasonal diversity.

And so -- but when someone like that goes into the marketplace, and we do on behalf of the NTUA, they're careful to watch the price at which market power is available as compared to what they would sell -- or -- or pay if they develop projects on

the -- on the reservation. And so that's a -- that's a major thing.

So when I see these kinds of declines in prices, it's kind of a red warning light. It's a -- it's a buy signal. This is -- this is a strong sign to anybody who's developing power that, If I sell, I'm not going. And -- and if I depend on sales of my surpluses, I'm looking in -- into a diminishing market. And secondly, there's a real opportunity out there perhaps to develop long-term purchases and -- at those low prices. Sellers will be desperate when these -- when these conditions develop.

Now, I ask you just to keep in mind this final price, the average price for 2012/'13 for the weighted average blend of the opportunity sales and the dependable sales. Note that it's thirty-four point five-seven dollars ($34.57), the actuals for 2012/'13.

Slide 9, please. There is a risk associated with the export revenue forecast. And the overall forecast of weighted average export prices of Manitoba Hydro has dropped in each successive forecast since 2009, often by large percentages and amounts.

Slide 10, please. What we have here is a tabulation of successive forecasts of off-system sales revenues. And I want to draw your attention to a

few things. First, the -- the first at the top is IFF09, the -- the distinction between the integrated financial forecast for '09 and -- and 2010. And then it goes down, has four (4) more, with the final being a comparison of the IFF12 to the NFAT prices.

And I want to recall that we had a actual price of 2012/'13 of thirty-four point five-seven (34.57). But compare that to what the actual price for '09 was forecasted back in '09 for that same time period. So they were forecasting sixty-six point nine dollars ($66.9) and fifty-eight point seven (58.7), and the actuals came in at thirty-four point five-seven (34.57).

Now, everybody's had the same problem. I'm not saying that anybody's done a bad forecast or -- or anything of the sort. But what I'm saying is that the trend here was clear at this period. And the trend was we had declining prices historically and -- and an expectation of declining prices going forward as we made each successive forecast.

Let me ask you to look at one (1) other comparison on -- this is what, nine (9)? Okay. Two (2) other numbers to look at on -- on slide 10. Look at the column 2009/2020, and look at the top as of 2009. It was forecast in 2010. It was forecast that

the price would be a hundred and eight dollars ($108). It's ten point eight (10.8) cents.

It's -- the latest forecast in the NFAT was fifty-nine point two (59.2). And notice that the sixty-six point five (66.5) and fifty-nine point two (59.2) also are roughly where the forecast was in the IFF09 for 2012/2013. We've just seen a tremendous plunge, not only in market prices, but in expectations. Again, to me, this is -- this is a signal to buy power, not to be entering the marketplace dependent upon very large sales.

Slide 11, please. Manitoba Hydro's selection of the Preferred Development Plan seems to reflect its predisposition to build high-cost resources largely for export in the initial period of the life of the resources. And that, in -- in the face of these prior data, makes -- raises a question in my mind.

Second, the market for firm exported power is primarily determined by the marginal costs of alternative thermal resources which presently tend to have capital costs much lower than those of hydro. And I've put there the nominal prices for simple-cycle gas turbines and -- and combined cycle. And they're far below the nine thousand dollars ($9,000) a kW.

Now, there's another thing about a

market for -- for firm power if you're going into a market as a winter-peaking entity into summer-peaking supply base. The marginal cost will not be dictating the price I pay. The marginal cost in the summer will deta -- will dictate the price that I sell.

But when I go into the market as a winter-peaking entity in a -- in a region dominated by summer-peaking entities, there's lots of surplus capacity in those off-peak periods, and the price of it is far below the marginal cost. Frankly, sellers are anxious to sell at a period when there is no real demand locally for their power. And so I add that as a reinforcement of this buy signal. Manitoba Hydro is uniquely situated to make firm purchases during its winter peak season, owing to its geographic location.

Slide 12, please. I get into a discussion of how export revenues will not fully recover costs of hydro. And I -- I do this not based upon detailed access to the CSI information, because I -- I didn't have that. So we went again to the best available information that we could find. And -- and, frankly, the Board's opinions, particularly one (1) in January of 2012, was a very useful indicator of expectations of costs of hydro projects, and also indications of what had transpired with respect to

those costs versus the costs -- the prices of power that could be expected in the export market.

Now, the -- there is a substantial gap between the initial high -- the -- the high initial in-service annual revenue requirement to recover the cost of power for Wuskwatim, Keeyask, and Conawapa, which was then specified by the Board. And -- and I mean no offence by referring to the Board order as 'BO'. And if you'll excuse me, that's unfortunate.

But they -- the costs that they were projecting and -- and seeing for -- the completed cost of power from a completed Wuskwatim, Keeyask, and Conawapa were then a hundred dollars a megawatt hour and up. And so there's a substantial gap between that and the much lower prices at which Manitoba Hydro can expect to sell its firm and surplus power at that time in export markets. And they were looking at unit sale prices of now more than six (6) or seven dollars ($7) -- sixty (60) to seventy dollars ($70) per megawatt hour on average for firm sales and oppity -- opportunity sales combined.

And those are the kinds of prices that I was addressing in those two (2) tabulations. It's a blend of opportunity and firm prices.

DR. HUGH GRANT: Can I ask for

clarification, what -- what you mean by 'initial in-service annual' --

MR. WHITFIELD RUSSELL: Well --

DR. HUGH GRANT: -- revenue 'requirement'?

MR. WHITFIELD RUSSELL: Yes, sir, Mr. -- Mr. Grant. We all know when you have a -- a large capital investment, be it a thermal plant or -- or a transmission line, or a -- or a hydro plant, that we're going to have a life-cycle cost expectation that's relatively well below the cost of that resource when it first enters service.

When you've got the full capital investment and the initial cost at the in-service date, you're going to have a much higher than average, or a live -- levelized, price that you're going to need. And for something that lasts sixty-seven (67) years, that high initial price will last a long time, because you're only taking a little bite of depreciation each year.

So your fixed charges for financing, added to the depreciation costs, added to insurance, and all of the other costs associated with a fixed asset are going to be at their highest at the beginning of that project. So that's -- that's what I'm

comparing here, is the high initial in-service revenue requirement for these projects is -- is pretty stiff. And it will do down over time, make it more attractive for export sales. But in the meantime, the -- the retail ratepayer of Manitoba is -- is seeing the full cost, the front-end cost. And the -- over time, they'll get the benefit of that declining cost of power on the fixed charges; but for the time being they won't, initially.

Slide number 13. Here we've plotted the prices that are projected for average dollars per megawatt revenue on total export sales to the US. And these are taken from the materials prepared by Manitoba Hydro in the NFAT Appendix 11.3. And it's for the three (3) -- three (3) cases indicate: the All Gas, which is in light blue; the K19/Gas/250 case, which is the red; and the K19/C25/750 scenario.

And what you'll see here is that these prices remain below ten dollars ($10) a megawatt hour until about 1038 (sic). So going back to your Board order --

MS. GENEVA LOOKER: 2038.

MR. WHITFIELD RUSSELL: 2038, pardon me. So going back to your Board Order of 2012, they're forecasting a price at the front end when you put a

Keeyask and Conawapa, the plant alone is going to cost around ten (10) cents a kilowatt hour and we're looking at these forecasts of prices blended from and opportunity sales of well below -- sometimes well below a hundred dollars a megawatt hour looking forward in time. And in fact, on this chart it shows until 2038.

Slide 14, please. Just to comment on the impact of prices and the study length. Manitoba Hydro has incentive to maximize the firm exports and lock in pricing for those firm exports. They command a higher price. But it's constrained by the buyer resistance that I described before and the cost of alternatives to those potential buyers.

So you've heard this many times, as costs escalate on the projects that you're adding in Manitoba Hydro and during this long construction period, the opportunity for costs to increase is of course enhanced vis-a-vis the three (3) year building period for, say, a simple-cycle or a -- or a combined-cycle gas.

So as the costs escalate and the forecast evi -- for -- for export prices fall or remain low, the point in time at which the export revenue can recover the increased costs is pushed farther and farther into the future. And I think this is what's

going on, and it may have some bearing on the -- the incentive to lengthen the study period associated with these projects.

Slide 15 please. Keeyask and Conawapa are depreciated over their sixty-seven (67) year lives, and their costs will fall, will decline to a level that's projected to fall below the price of exports. But that crossover is not expected to occur for a long time. And in the meantime, losses will accumulate before eventually being reduced.

In comparison to the All Gas benchmark case, we fee -- we see a very similar trend in La Capra's analysis, showing negative cumulative NPVs for the first thirty (30) years for Plans 4, 5, and 6. Now, 4 is the K19/Gas24/250. Based on the transcript, I can't believe I have to make reference, but I'll do it out of caution. You -- you've been told this many times. Case 5 is K19/Gas25 with 750 megawatts and the PUB service arrangement with both its investment and its sale. And finally, Case 6 is K19 -- Keeyask19/Gas31 and 750 megawatt interconnection.

So this is just a copy of the chart from LCA slide 24 -- slide 16, pardon me. And the -- you see that with the Preferred Development Plan, there's a very large dip in the cumulative NPV; and it doesn't

recover until something like 2054, as I recall. And this -- this is showing you that you have very large accumulations of negative net present value as the -- vis-a-vis gas in these early years. And it -- and it recovers over time to become the best case.

I'm not holding myself as an expert on the nuances of these La Capra calculations. But to me, they were a vivid demonstration of the kind of risks you take on with some of these Hydro plans.

And this -- this is a calculation of cumulative NPVs over time. It's consistent with my concern about the long time period over which it'll take to get export revenues that become compensatory with respect to the cost of the project being sold.

Slide 17. There was a concern expressed by the Board in its 2012 order about Manitoba Hydro's failure to incorporate up-to-date cost estimates in its analyses and negotiation of export contracts. And the recent increases in the capital costs of Keeyask and Conawapa would exacerbate the squeeze. And they were apparently not known at the time Manitoba Hydro negotiated term sheets and export contracts.

Slide 18. There's an erosion of benefits as the impacts the plan choice. So the favourable economics of Hydro erode as their capital

costs increase. And we've seen a demonstration of that in this proceeding. The initial $1.7 billion advantage enjoyed by the Preferred Development Plan over the All Gas Plan diminished to 374 million as a result of an $800 million increase in estimates of capital costs associated with Keeyask and Conawapa and the removal of the Wisconsin Public Service investment decision. And you can see that on Manitoba Hydro Exhibit 95 at slide 123.

And then with the addition of DSM at Level 2, the Preferred Development Plan advantage over the All Gas Plan falls to only 45 million. And again, that's at slide 130 of the Manitoba Hydro Exhibit 95.

Slide 19. Hydro's levelized cost comparison obscures the impact of the upfront costs of its hydro plants. Manitoba Hydro reports a sixty-seven (67) year life cycle levelized cost of six (6) to seven (7) cents. And this is in Chapter 7 of the NFAT, Table 7.3. And it's also supported by the LCA/MH I-308 response.

These costs do not include the sunk costs of Keeyask and Conawapa up through June 2014. These numbers are far different from those found in the Board order discussion in -- back in 2012, which showed starting non-levelized costs in -- or -- or -- and

rates of nine (9) to ten (10) cents for Keeyask and Conawapa. And this was before Manitoba Hydro made its new cost estimates known in this proceeding.

Neither of these cost estimates include about three (3) cents per kilowatt hour, which the Board was using as the cost of a fully loaded -- that is, fully utilized -- Bipole III. And that's discussed at the Board order Nove -- in January of 2012 at page 55.

Slide 20, please. Adding the Bipole II cost to hydro -- to their hydro plans drives up the costs of those plants. A ten (10) cent cost of power from Keeyask and Conawapa, which I'm using for this illustration and from the -- from the Board order, is forecast to be above the overall weighted average forecast price of exports for many years, as I showed on my slide 13.

When fully loaded, the cost of Bipole III, as I noted, was about -- was then estimated to be about three (3) cents a kilowatt hour. But when the cost of Bipole III is added to the cost of Keeyask alone, the deficit is even larger, because the incremental costs of a 2,000 megawatt Bipole must be spread across the incremental energy produced from only a 630 megawatt project.

And when you make that calculation based upon these illustrative data, it drives the incremental cost to about seventeen point three (17.3) cents per kilowatt hour. And that's before additional cost allocations are considered in both Keeyask, Conawapa, and potential for cost overruns on Bipole III.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: Okay, slide 21. What we've done here on slide 21 is we've taken that combined cost of a hundred and seventy-three point two (173.2) for Keeyask and Bipole III and we've plotted it on those forecast embedded prices projected for the same time period. And what you see is a very drastic chart indicating non-recovery of the costs of Keeyask and Conawapa for these many years, out until the mid-two -- 2040 -- 2040s.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: Slide 22. This is not news to the Board, but I'll just -- I found this statement in the January 2012 Board order to be significant.

"To the extent that Manitoba Hydro's real costs with respect to these projects are not recovered from export customers, it will fall to Manitobans to bear financial responsibility through reduced annual net income of Manitoba Hydro and reduced overall retained earnings and increased electricity rates for Manitobans."

Slide 23, please. Sunk costs are a disadvantage to the hydro -- alternatives to the hydro.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: By adopting the analytical framework for the NFAT that Bipole III is a sunk cost, Manitoba Hydro has biassed its analysis in favour of the Preferred Development Plan and other hydro resources that would make use of it.

Under the Preferred Development Plan, Bipole II will be built first for commercial service in 2017 to 2018 to accept the output of Keeyask in 2019 and Conawapa in 2026. And again, if Conawapa is not built, Keeyask is going to have to bear, on an

incremental cost basis, the full share of those Bipole III costs.

What I've shown here is that -- slide 25 -- slide 24... Slide 24, pardon me. The $3.3 billion cost of Bipole III exceeds the incremental benefits which the PDP is said to produce under many scenarios, as compared to the benefits of the All Gas Plan. Accordingly, adding the $3.3 billion cost of Bipole III to the NPV of the PDP and to other hydro plans while removing it from non-hydro plans would make a vast difference in the probability analysis.

And the next slide, slide 25, shows the Manitoba Hydro quilt for several plans with updated capital costs from Manitoba Hydro Exhibit 95 at slide 125. And as you scan this matrix, you will see that subtracting the $3.3 billion cost throws many of the favourable results into negative territory and, of course, reduces some of those, which are even bigger.

Slide 26. Process for approval on capital projects is prejudice the result in favour of the hydro alternatives. And we're in slide -- yes. So it's apparent that the process by which Manitoba Hydro obtains approval from moving forward on capital projects warrants examination, although the Public Utilities Board has regulatory authority over the rates

that Manitoba Hydro imposes on ratepayers, it doesn't not appear to have authority to approve or disapprove of its capital spending unless requested to take a look at it by the Minister of Energy. That's my understanding. I haven't done all of the legal research, but that's my understanding of the conundrum that is facing the Board.

And the Board noted in January 2012 that while its jurisdiction does not extend to the approval of the capital expenditures, the Board does have jurisdiction over the approval of Manitoba Hydro's rates in which Manitoba Hydro seeks to recover the financing, operating, amortization, and expenses directly attributable to Manitoba Hydro's capital expenditures.

Most significantly is that at page 200, they -- the Board noted that its role as a regulator is to make sure the rates are justified and that Manitoba Hydro is not seeking increased rates for recovery of losses from mistakes, errors, and inefficiencies. It must ensure inefficiency -- efficiencies are maximized and that it exercises the discipline of maintaining lowest cost.

Slide 27, please. In this case, substantial amounts have been spent by Manitoba Hydro

prior to the government asking for this NFAT. And although the Board could arguably deny cost increases to cover any mistakes, errors, or inefficiencies found in those -- those actions, that such an action by the Board would undermine the financial indicators of financial health. And I think that sort of summarizes the conundrum in which the Board finds itself.

Now, the new evidence produced in this proceeding appears to demonstrate that much less costly scenarios are possible. But because of the sunk costs, these -- these sorts of lower-cost scenarios may be coming to light -- too late to help the ratepayers.

So the only -- given what I understand to be the structure of the regulatory market here, the only real remedy that's available is to subject all major capital expenditures to an NFAT review before the sunk costs become too substantial, before this type of NFAT.

Slide 28. La Capra's Plan 17 looked very --

THE CHAIRPERSON: Excuse me, Mr. Russell, I -- I think it's probably an appropriate time for us to take a rece -- to recess, because it's about 12:30. So I suggest that we break now and we have lunch and then resume the proceedings at one o'clock.

We're about halfway through your presentation, so I think it's an appropriate time to -- to make the break.

So we'll see each other again at one o'clock. Thank you.

--- Upon recessing at 12:29 p.m.

--- Upon resuming at 1:07 p.m.

THE CHAIRPERSON: Good afternoon. I believe that we're in a position to recommence the proceedings. So I would, I guess, turn the microphone over to Mr. Russell, please.

MR. WHITFIELD RUSSELL: Thank you.

THE CHAIRPERSON: I believe -- I believe we're at slide 28.

MR. WHITFIELD RUSSELL: Thank you, sir.

LCA's Plan 17 looks promising. Plan 17 was the No New Generation scenario, and I think it came as a surprise to La Capra themselves. Because of its low cost, low risk, and substantial economic benefits, I think that makes a strong case for refining this option into a full-fledged plan or an early stage of a long-term plan in order to reduce the risk and cost of going forward.

Now, La Capra recognizes that Plan 17 is

not a fully fleshed-out plan but asserts that its benefits are so significant that its elements warrant serious consideration. And a few -- a few paraphrases from the transcript, 6,076. I think it was Mr. Athas or Athas, I'm not -- said, "Boy, that did a nice job on economics." But his colleague said:

> "However, it's not -- it's not that we're done, go do this plan."

And then he said:

> "I would recommend it only to the extent that it raises issues that seem to have promised improved economics."

And then, in a dialogue with Mr. Bel at 5,727, he -- 5,730:

> "It allows us to use existing hydro more efficiently, imports on the nights and weekends, and give us more degrees of freedom."

It -- it was a surprising case to me too, because it was accompanied by a relaxation of the 10 percent limit on imports that had been a mainstay of the Manitoba Hydro planning criteria.

Slide 29. The LCA No New Generation scenario involves DSM at levels one point five (1.5)

times the DSM assumed in Manitoba Hydro's initial studies, the substitution of natural gas heating for electric heating, development of a new 750 megawatt interconnection to enter service in '29/'30 with the US, increases both import and export capacity.

And the reason for that is the same reason that the colloquy with Mr. Bel pointed out, that this is kind of a -- Hydro has kind of an alchemy that you can bring power in during off-peak periods, store it, and send it back out as firm power at a higher price. And this increases exports.

It relies on the relaxed import limitations of 20 percent instead of 10 percent of domestic load plus export obligations. And it called for a continuation of existing diversity exchange agreements.

Slide 30, please. Including sunk costs, the Plan 17 appears advantageous -- advantageous. It demonstrates favourable economics, despite being burdened by 4.3 billion in sunk costs that Hydro incurred in connection with developing new hydro and transmission features that add little or nothing to Plan 17's value.

Slide 31. Switching gears now, we're going to move over to reliability. According to

Manitoba Hydro, the existing transmission system is vulnerable to a common mode failure, such as a catastrophic outage of either or both Bipoles I and II for a period of months and years. It would be an extreme event, and the regul -- the reliability standards of NERC. It's catastrophic failure of both Bipoles I and II would involve a simultaneous outage of all four (4) single Bipoles, which is called an N-4 event, all four (4) single poles of Bipoles I and II.

Utilities must evaluate such scenarios for risks and consequences, but they don't need to mitigate them. The loss of a single pole of a Bipole is considered an N-1 event, which has a less than 1 percent probability of occurring. And you can see the response of CAC/MH II-013b.

Although the industry reliability criteria require that Manitoba Hydro continue to serve all firm load obligations after the occurrence of any single contingency, which is called an N-1 event, those criteria do not require that it continue serving all the firm load after an N-2 event, let alone after an N-4 event. Nonetheless, it is on the basis of an N-4 event and fear of an extended outage that caused Bipole III to be built before Keystone and Conawapa.

Slide 32. Manitoba Hydro reliability

standards seem to have changed. In justifying Bipole III for reliability reasons, Manitoba Hydro adopted a deterministic standard requiring that it be able to meet its peak demand after loss of both Bipoles I and II for a period of months or years.

The deterministic reliability standard used to justify Bipole III may not have been carried over in developing plans for comparison in the NFAT. That deterministic standard could be met either by strengthening the interconnections to the US or by adding Bipole III. For that purpose, Hydro chose the more expensive option: adding Bipole III.

Slide 33. And I am recalling that the third bullet has been redacted. The planned hydro generation additions diminished the claimed reliability benefits of Bipole III. Bipole III was initially justified because it would enable power to be delivered through the parallel path of Bipole III during the outage of Bipoles I and II. So out of the northern hydro that was available, 2,000 megawatts could continue to be developed -- delivered if Bipoles I and II were forced out.

The 2,000 megawatt spare transmission capacity initially created by adding Bipole III would drop, however, when Keeyask is added and will virtually

disappear once Conawapa is added. And under the Preferred Development Plan, Manitoba Hydro plans to upgrade its ability to import capacity from the USA to replace the diminishing spare transmission capacity in Bipole III.

What this is telling us is that Bipole III, as a reliability -- in its reliability function, is totally fungible with an upgrade of its import capacity for Manitoba Hydro. You could solve the problem either way.

Slide 34. Each of the Hydro plans causes greater concentrations of the province's hydro resources along the Lower Nelson River, and it's even higher than the present 70 percent concentration. And Manitoba Hydro failed to -- failure to evaluate these impacts seems to be an oversight in that the same type of catastrophic events that could take out Bipoles I and II could also take out Bipole III as well, trapping immense portions of Manitoba Hydro's resources without an outlet for potentially extended periods of time, cutting off remendues from -- revenues from export sales as well. Without sufficient import capacity from the United States, Manitoba could be plunged into darkness under that scenario.

In the recently filed Manitoba Hydro

rebuttal they -- they qualified, and we didn't dispute, that this would reduce the probability of such events over what they are now with just Bipoles I and II. That is, Bipoles -- Bipole III wouldn't, in its unloaded providing spare capacity, improve reliability. And they -- they -- we don't disagree that it would lower risk. But there -- and -- and they calculated something like one (1) in thirty-one hundred (3,100) years after Bipole III from -- from environmental events such -- earthquakes and so forth, winds, tornadoes, and so forth.

But I did note in reading the PES report -- and it was kind of difficult because we had to patch our way around the redactions, substantial redactions. But it did appear from the PES, Power Engineering, report that they raised the risks inherent in Bipole's III addition that were unrelated to weather events and discussed possibilities of certain outages of all three (3) Bipoles.

I don't know where that stands in the record. I do know it was raised as an issue. I think in the rebuttal Manitoba Hydro discussed the need for more detailed modelling of Bipole III, to get a grip on it. But putting three (3) Bipoles are not just susceptible to environmental events. They're also

susceptible to systemic failures simply because of the additional complexity of adding it to the very, very complex control scheme which governs the use of the HVDC system after outages of any of the poles or after outages of the major 500 kV interconnection to the United States. And I just want to highlight that that's not -- the environmental factors are not the only thing which would -- could potentially precipitate a loss of all three (3) Bipoles.

Slide 35 was deleted in its entirety.

Could we go to 36? LCA's Plan 17 promotes both exports and imports. It's been characterized in some of the documents as import-only line, but it's -- it's really not. In addition to the addition -- simply stated, addition of another 500 kV US interconnection without additional hydro capacity will increase Manitoba Hydro's exports as well as increase its ability to import power. And that's according to the -- the LCA analysis itself. And this is important because Plan 17, again, is not an import-only case.

Slide 37. This, what I found, is a very interesting chart from LCA's discussion of the No New Generation Plan. And what -- what you see in this chart is the existing hydro and existing thermal -- new

thermal, you see being added there off to the years on the far right side -- and imports. And what you see is that when the new line under the LCA No New Generation case is added in 2029, you see a bump up in exports.

And it's -- it's associated and really correlated with increments of imports. And it's this special alchemy that hydro projects with storage have. They can shut them down, accumulate water in the reservoirs behind the dam, and buy imported power to serve the Manitoba load. That extra power-producing capability accumulated during the off-peak hours, during the purchase period, is then available in the same amounts, later hours, when prices are higher. And that's what is apparently demonstrated by the analysis that LCA received from Manitoba Hydro and of its No New Generation case.

Slide 38. And I wanted to focus on this because below the figure in the La Capra report that I just discussed on slide 37, the figure indicates that adding the 750 megawatt line, along with purchasing firm power, but not constructing additional generation would enable Hydro to export substantially more power in the annual amounts shown above the dotted line.

Now, this additional import capabilities associated with that line, if that line were greater,

one would expect the import capability to be commensurately greater, increasing the benefit of this storage and return function that the hydro system can perform.

Moreover, there's no reason to expect that building that import line, that -- that line for increasing imports, at an earlier point in time wouldn't produce the same benefits. So we have those benefits starting earlier and, with an upgraded line above 750, maybe increased benefits starting earlier.

The final -- the bot -- the sentence at the bottom of the first paragraph is -- after the diagram in the La Capra report is:

> "There is also an increase in exports, which is the difference between the load line and the top of the resource bar mix (sic)."

And the final paragraph on the page states:

> "More input capacity..."

That is, transmission import capacity:

> "...could allow higher imports in off-peak periods, allowing exports of hydro during peak price periods. The value of these exports and of the

additional capacity in this scenario is not like -- is likely to be significant but at this point is unknown, as that analysis has not been conducted."

This indicates that much of the increase in exportable energy in Plan 17 is a result of energy imported in off-peak hours, stored as elevated water, until needed as a source of firm capacity and energy for on-peak exports.

Slide 39. Manitho -- Manitoba Hydro objects to LCA's import line; that -- that's the characterization that Hydro has given that proposal. We contend that the Minnesota regulators would not approve a new transmission line designed for exports to Manitoba and, further, that there is insufficient firm generating capacity in MISO that could be imported cost effectively by Manitoba. And this -- these points are made generally in the rebuttal testimony of Mr. Eric Swanson of Winthrop & Weinstine, P.A.

I disagree with this for a number of reasons. Slide 40. As we discussed earlier, MISO, PJM, and SPP -- that's the Southwest Power Pole, which is the large regional ISO south of MISO -- there are summer-peaking regions that should have substantial

surplus capacity and energy available in the winter when Manitoba Hydro experiences its peak demand.

The entities owning generation in the US would have an incentive to increase their sales of firm and non-firm power during the off-peak winter period, and also to engage in diversity exchanges with Manitoba Hydro.

The transmission providers in those regions are required by FERC policies and rules to provide transmission service under their open-access transmission tariffs at cost-based rates. And they're required to build needed upgrades when requested to do so by a -- a transmission request and if the requesting entity is willing to pay for the studies and pay for the upgrades.

I further disagree -- slide 41. FERC has established incentives -- because FERC has established incentives to build and own transmission facilities that make such activities quite lucrative for the utilities in the United States. And one need only look at how much Manitoba Hydro will pay Minnesota Power for the Great North -- the Great Northern Minnesota line, as in -- indicated in Mr. Jacobson's slide 88. There's four hundred and ninety-nine dollars ($499) to $567 million in ongoing O&M expenses that

Manitoba Hydro is expected to pay to Minn. Power.

Now, much of it -- to -- to compensate Minnesota Power for this ownership and -- of 60 -- the 66 percent of the line above the 49 percent that Manitoba Hydro will own. Those -- those -- when you set rates for transmission in the United States and you have an equity return for a large part of it, FERC has been very permissive in allowing entities to claim very high equity components of their capital structure. Those equity components get very favourable treatment on rates of return.

In addition, the utilities get to collect taxes in what we call a normalized tax, normalization, which in effect allows them to collect a lot of taxes in the early years of a project that they don't have to pay; it's paid back in later years. And oftentimes, FERC will allow capital structure reflecting more equity than the owner of the line actually invests.

So here you've got a case of collecting income taxes you don't pay on equity you didn't invest and the associated returns. FERC has made the construction and ownership of transmission facilities, that's the bottom line, very, very attractive. And we're seeing one (1) -- some evidence of that in -- in

the case -- in the exhibits of Mr. Jacobs.

FERC Order 1,000 requires transmission products -- projects for public purposes, such as renewable energy, to be considered in developing transmission plans; while Hydro's ability to store off-peak wind is a great enhancement to the ability of wind machines to get demand charges and firm up their ability. So if you're going to be proposing projects to move wind power to Manitoba, those would arguably fall within the public purposes defined in Order Number 1,000.

Next, Minnesota Utilities had petitioned the Minnesota Public Utilities Board -- Minnesota Public Utilities Board to consider a competing alternative to the Great Northern Transmission Project. In other words, this is another manifestation of how lucrative and attractive it is to build transmission in the US. You've got some Western Minnesota entities are filing a competing application to the -- to the Great Northern Transmission Project. And that's discussion in a Megawatt Daily article on April 17th of this year.

Next, firm power sold during an off-peak season tends to command only about half the demand charge associated with on-firm peak power. So when you're going -- that's another illustration of -- of

when you're going, as a winter entity, to a summer peaking region to buy power, it's off-peak power, it's not -- the pricing is not governed by marginal cost of new capacity, there's plenty of surplus capacity in the off-peak period, and those demand charges tend to be lower than what you would see if you wanted round-the-year, seasonal peak, summer power.

Slide 43. Forty-two (42) is deleted, as I recall. Oh, I'm sorry. There is one (1) bullet. If Plan 17 had been evaluated earlier, and if Bipole III did not already exist, its cost would have to be added to the cost of any plan for developing Keeyask and Conawapa.

That's at the heart of my criticism of the NFAT analysis of economic plans, is that if -- if these sunk costs associated with Bipole III did not already exist, when you came to evaluate Keeyask and Conawapa, you'd have to add those costs into it. And that would make it certainly less attractive when you carried out these economic studies going far into the future.

Forty-three (43). Now I'm beginning my response to the Manitoba Hydro rebuttal. The Hydro rebuttal to us addresses the reliability justifications for Bipole III as described in the response MH/MMF/WRA-

004a and 'b'.

Hydro proceeded with development of Bipole III to address the risk of an extended outage -- extended loss of both Bipoles I and II in an event expected to occur no more than one (1) day in seventeen (17) years. It's a one (1) day in seventeen (17) event, we'd say. Except to the proposition on our part that the spare transmission capacity created by Bipole III without Keeyask or Conawapa would lessen the risk and the costs associated with loss of both Bipoles I and III.

I'm going to skip over the redaction here.

We also questioned how Bipole III could fulfil its role as a backup to Bipoles I and II once it is loaded with Keeyask and Conawapa power. And for that reason, we had favoured an additional tieline to the US.

Slide 44, please. Hydro recognized that an additional link to the US was a valid alternative to Bipole III; didn't dispute the concept. But in analyzing the alternatives to Bipole III for purposes of reliability after loss of Bipoles I and II, they created a different and deterministic reliability standard for judging the adequacy of that alternative.

And by 'deterministic', I mean it's like the N-1 criteria. It's not probabilistic; it's deterministic. And it doesn't matter if you have a piece of switch gear which is 2 feet long. If it's subject to an N-1 outage that will affect the system, we look at it. If it's a 100-mile-long line, it's still subject to an N-1 criterion as -- as would align just 4 or 5 feet long.

These -- this -- this is what we mean by a deterministic criteria. it's not probabilistic; it's black and white. If you meet it, you keep all loads in service after an N-1, that's what we mean by 'deterministic'.

So they invented a new one (1) -- well, I shouldn't say, "invented." They applied a new deterministic reliability standing -- standard in judging the adequacy of the alternative to Bipole III for reliability when you went and built enhanced interconnection to the United States.

The alternative involved a 1,500 megawatt AC line. Now, the Bipole III would have provided 2,000 megawatts of backup so they could continue bringing hydro from the North in the amount of two thousand (2,000) in the event they lost Bipoles I and II. The alternative being investigated and

rejected would have called for a 1,500 megawatt import line, 500 megawatts of additional gas in Manitoba; but it also insisted upon the 1,500 megawatt line being backed up by an additional 1,500 megawatts of gas turbine capacity.

The additional cost of this new generation made the alternative of a new interconnection across the border more expensive than Bipole III without new generation, which involved no new generation. And that alternative of a new interconnection was rejected.

Now, at page 5 of its new rebuttal, Manitoba Hydro states that the alternative to Bipole III considered in the CEC proceeding was a new US interconnection that they characterized as an import-only transmission scenario. I am unfamiliar with the notion of an interconnection that would function as a import-only line.

Any new US transmission line tying Manitoba to the US would be no different in this respect from the proposed 750 megawatt tie that Manitoba Hydro itself is planning and could be expected to provide opportunities for both imports and exports. Indeed, this was supported by La Capra's presentation on the No New Generation Plan.

Slide 45. Manitoba Hydro further insisted that it added on the cost of 1,500 megawatts of new gas turbines because an import-only line must be connected to some form of firm generating capacity. We believe that a new tie to the US would not need to be backed up by additional firm gas generation, especially generation that would be needed only once in seventeen (17) years.

Manitoba Hydro could rely upon its contingency reserves while it shops for longer-term supplies for a week, a month, or port -- or longer periods, to back -- during an extended outage to provide backup during Bipoles I and II. This is indeed what happens in the US historically with large delays or long delays of large nuclear plans. It also happened after the loss of Three Mile Island I and II.

It's -- people don't plan and build extra capacity to back up their systems for these out-of-the-ordinary, extreme losses. What they do is they rely upon the installed reserves of the interconnected system as a whole. And, sure, they have to go into the market in a disadvantageous position. They have to pay more power -- pay more for the power they buy.

But the fact of the matter is having interconnections -- and this is one (1) of the major

advantages of interconnections -- is that you can rely upon your neighbours. There's a long history in the industry of doing so. And indeed, in the NFAT, I quote in my report portions where Manitoba Hydro cites just this kind of opportunity as being available from enhanced interconnections.

Manitoba Hydro's CEC analysis show that it would need backup for loss of both Bipoles I and II primarily during the winter peak. With a new tie to the US, Manitoba Hydro could expect to call upon winter surpluses of generating capacity in the primarily summer-peaking system in the US, and obtain that power at a relatively low cost vis-a-vis peak price power in the US.

Manitoba Hydro seems to agree with me on this. At page 6, lines 2 to 6 of its latest rebuttal testimony, in speaking of its new US tie, they sta -- they stated, quote:

> "The proposed transmission line will have the added benefit of providing firm import transmission capacity to Manitoba. As a result, Manitoba Hydro will be able to gain access to surplus energy from the MISO market at essentially no incremental capital

or operating costs. There will only be variable costs associated with the cost of energy needed to supply Manitoba in times of unexpected outage."

Close quote. Moreover, by insisting that a new -- new US tie would have to be accompanied by an additional 1,500 megawatts of gas generation, they create an apples-to-orange comparison. In other words, because all Bipole III provides, if Keeyask and Conawapa are not built, is an alternative path for Hydro to reach its existing northern hydro. It doesn't create an additional 2,000 megawatts of generating capacity for the system.

So to insist that a new tie to the US go out and -- and bear the burden of those additional megawatts of firm generating capacity is -- is an apples-to-orange comparison. That, in reality, the 1,500 megawatt tie to the US has access to an array of generation sources as compared to Bipole III, which could only access existing Northern generation.

47. At pages 1 to 3 of the rebuttal, Hydro challenges our position that it has implemented a less-restrictive standard than it did in the CEC proceeding. Hydro seems to have missed my point. Its

rebuttal focusses on the adequacy of the spare transmission capacity and not upon adherence to its -- its insistence that imported generating capacity meet the strict new deterministic standard and be firm and backed up.

My calculations indicate that with Bipole III in the NFAT case, Manitoba Hydro has not arranged for sufficient imports to meet the strict standard it set out in the CEC for covering a loss of both Bipoles I and II. Let me clarify what I'm driving at here.

In putting Bipole III, it provides a spare path for the existing hydro. Once you add Keeyask, that's cut -- that spare capacity is cut by six thirty (630). Once you add Conawapa, the spare capacity for the outage of Bipoles I and II is gone. They then, under their Preferred Plan, enhanced transmission import capacity from the United States, the very concept they rejected in the CEC proceeding.

And so what I'm saying is, as opposed to the CEC proceeding, where they -- Hydro insisted all the capacity be firm, to meet firm loads without Bipoles I and II, in the Preferred Development Plan they fall short. They're importing less firm capacity than they insisted was the standard in the CEC.

The second bullet. I think the Board should care about the sequence of -- of events because Hydro created a stiff reliability standard to support the need for Bipole III and then seemed to back away from it in the -- in the NFAT. The stiffer standard occasioned little or no mention until Hydro filed its most recent rebuttal.

As a consequence, Bipole III has been treated as a sunk cost. And then, in the NFAT -- then in the NFAT, and then has been repurposed. In other words, it served as a spare for Bipoles I and II. And then when you load it up with capacity, we need some other spare. And that would be the inter -- interconnection -- the new interconnection capacity to the United States.

The second bullet. Moreover, by backing away from the CEC standard in the NFAT proceeding, they reduced the needed amount of firm purchases but has not updated its evaluation of a US tie on that same basis.

Slide 48. And I understand the last clause of this has been redacted, so I'll just read to that point. In the NFAT, the hydro-based plans call fulfilling the spare capacity of Bipole III with the output of Keeyask and Conawapa. This would diminish the ability of Bipole III to provide spare capacity for

both Bipoles I and II.

In those hydro-based plans, Hydro would rely upon a new tie to replenish the spare Bipole III capacity with capacity on their new US tie. Thus, Hydro is planning to provide backup from the US to replenish the diminishing ability of Bipole III to cover the loss of both Bipoles I and II. One wonders why it did not build a new lower-cost interconnection to the US in the first place.

And this next chart is from Hydro's rebuttal at Figure 1. And what it shows you is -- the blue line is showing the amount of surplus ability to meet firm load created dur -- during an outage of Bipoles I and II, created by Bipole III. And you'll see there in 2019 it -- 2017, the deficit in their ability to do so today is reduced from about twelve fifty (1250) and -- and becomes a -- a surplus of around seven hundred (700) to seven-fifty (750).

Then as you see, that line tails off to the right as Keeyask and Conawapa and load growth kick in. You'll see that the second US tie kicks in. What this shows us is that capacity on the interconnection, from the US, and reliability provided by Bipole III are fungible. They're one (1) and the same.

The chart shows, slide 50, that the US

provides -- the US tie provides reliability of benefits that are like those provided by Bipole III.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: The amount provided by the 750 megawatt 500 kV Manitoba-Minnesota Transmission Project and the tie within Minnesota itself could have been increased and could be built to a higher megawatt level.

Slide 51. At page 6 to 7 of its new rebuttal, Hydro claims that Footnote B to NERC standard TPL002 allows it to drop firm exports after an N-1 contingency. And I'm shifting gears here. We're talking about another disagreement we had with Hydro over the reliability criteria.

However, Footnote B addresses an exception to the general rule. The general rule is if you have an N-1 contingency, firm transfers cannot be curtailed for those kind of events. Instead, Hydro employs a number of special protection schemes to deal with its unique transmission system that cannot meet the usual operating reliability levels. So they can't meet the N-1 standard and keep a firm export to the US going if they lose the major tie. That violates the

general rule. They look for solace and comfort in Footnote B. I don't think it's there.

Note B says:

> "Planned or controlled interruption of electric supply to radial customers and some local network customers connected to or supplied by the faulted element, or by the area, may occur in certain areas without impacting the overall reliability of the interconnected system. To prepare for the next contingency, system adjustments are permitted including curtailments of power contracted firm, non-recallable reserved electric power transfers."

Now, that's two (2) sentences. The first sentence if the -- is the original and primary reason for Footnote B. What they're talking about is we always analyze the system. Every N-1 contingency that's possible in a transmission system is analyzed to see its consequences.

So if you've got a large load served from a line as a tap, and that line sof -- suffers an -- an N-1 outage, the protection equipment takes the

line out. And as a consequence of that, what was otherwise a firm load is dropped during an N-1 condition. Now, if it's very expensive to build duplicate transmission to that load, and it's not a major consequence for purposes of operations, Footnote B was drafted and originally intended for that situation.

Now, the Footnote B goes on to permit curtailments with -- through system adjustments of firm exports if necessary to protect the system from further risk. System adjustment is a different category of event -- or reaction than what Hydro uses in response to its loss of the main tie to the US.

When Hydro loses it 500 kV tie to the US all the exports on that line are cur -- are -- are intercepted and stopped by what we call a special protection system. Without human intervention, that outage is sensed, and an equivalent signal -- let's say the 1,732 megawatts, which is the rated capability of the existing 500 kV tie.

If you lose the 1,732 megawatt export on that line, a signal is sent to the Northern Hydro, and that amount is shut down very quickly so that we don't have excessive amounts of power pouring into southern Man -- Manitoba where there's no place to use it. That

would just drive up the frequency in Manitoba and add to the potential for instability across its ties with the United States.

So this special protection scheme without human intervention is different from what is commonly called a system adjustment. A system adjustment means we have the N-1 event, the line has -- the transaction still keeps going. And oftentimes, we have a twenty (20) or thirty (30) or half-hour rating on the line, and the transaction can keep going for a while. But under the rules, we're supposed to bring the rating and power flow on the line back within rated capabilities within certain time periods.

That's what this system adjustment is all about. You go out and find somebody on the far side of the export to bring up its generation while you back down generation on the near side, on the exporting system. That's what's talked about. The SPS, with its -- without human intervention, this is not a system adjustment as I understand the term.

Slide 52. Manitoba Hydro's special protection system, in dropping firm transfers to the US, goes well beyond the radial customers of some local network permitted in Footnote B. The US is not simply a remote load served by a radial transmission line, and

it is not a local network on the Manitoba Hydro system.

Note B is applicable to minor firm load interruptions that would otherwise be costly to avoid. Note B does not preclude the normal practice of system adjustments to prepare for the next contingency. And it can include dropping firm customers or reducing firm transfer in a controlled manner. However, automatically dropping firm customers or transferred -- transfers with an SPS would not qualify as doing so in a controlled manner.

In conclusion, Hydro's Preferred Development Plan has not been supported by the NFAT submission, and if approved and built will impose unnecessary and excessive risks on ratepayers.

The pursuit of DSM, imported power supported by enhanced import capacity on its system in connections and future gas generation would -- would be far lower in cost in the years through 2031, and lower in risks than would be pursuit of the Preferred Development -- Preferred Development Plan.

The Preferred Development Plan would exacerbate the concentration of its generating resources along the Nelson River hundreds of kilometres north of its Manitoba Winnipeg load centre, and would put more eggs in that basket.

And that concludes my presentation.

(BRIEF PAUSE)

MR. RICHARD BEL: Could you go over that last bit about the SRS event?

MR. WHITFIELD RUSSELL: The SPS --

MR. RICHARD BEL: So what is the argument between you and Hydro?

MR. WHITFIELD RUSSELL: Well, they're -- what they're saying is -- and -- and don't get me wrong. I'm -- I'm not -- I'm not suggesting we abandon it. I think a little bit of history is worthwhile and -- but -- but in essence, what they do is this.

When they lose the major tie to the US, oh, and they lose one (1) of the poles on the HVDC, the SPS system backs down generation and curtails exports to the US, okay? And it does it without human intervention, under the control of protected systems. It does it quickly, and it provides a -- a protection to the system.

However, on its face, it violates the N-1 standard that you've got to keep your firm exports going after the N-1 event. It's always been that way. US understands it. The -- the -- it's what makes the

exports of low-cost power, hydro power, available.

I'm not suggesting we get rid of it. I'm suggesting that maybe the -- MISO is -- is reluctant to allow any more SPS, and they will allow -- they seem to have grandfathered this one (1). And -- but they don't allow any increase in the amount of run back on the hydro systems, the northern hydro, or a run back on the DC Bipoles whenever Hydro expands.

So that kind of constrains a little bit the planning that could go on. For example, the 1,732 megawatt line -- rated line going to the US. It is capable of being uprated by about -- from 2,000 amps up to 2,500 amps, about a 25 percent increase in delivery -- in transfer capability. But it cannot be done that way. And it could be done by increasing the rating of what they call a Roseau series capacitors, but it can't be done because MISO has a firm policy against allowing an increase in the amount of run back that's required and dropping of exports as -- as a result of this SPS.

So the situation is we don't want to get rid of this. It's been there a long time. The buyers are aware of it. But there is resistance, on the part of MISO in its -- in its role as enforcing reliability, to expanding it. And they're also firmly -- strictly limiting any further or future SPS. But the SPS is --

it's -- it's an automatic protective system for Manitoba which kicks in without human intervention and violates the general rule that you can't cut a firm export after an N-1 event.

MR. RICHARD BEL: Okay. Good. Second question. You're recommending that the 750 transmission line be uprated for --

MR. WHITFIELD RUSSELL: Yes, yes.

MR. RICHARD BEL: -- and that would enhance exports and imports?

MR. WHITFIELD RUSSELL: Possibly. But I was more focussed on the import. Now, what happ -- what -- you'll notice that there's a -- quite a large discrepancy between the transfer capacity for exports and the transfer capacities for imports, both on the existing line and with the enhancement of the new 500 kV line.

It's not that it's limited by the capability of the conductors. The conductors themselves are probably worth about 3,000 megawatts on each circuit. The existing circuit, because of reactive resistance and the characteristics of the system, is operating at 1,732 megawatt rating.

When you add that second line, the import capacity does not go up commensurately to 1,732

megawatts. What I understand is the problem, and I think we have a data response to that effect, the limit on import capability -- enhancing import capability to Manitoba is the result of a concern with voltage collapse down around Minneapolis and points north on the 500 kV line.

Voltage collapse means that you've got a lack of reactive support, which can be fixed without adding new poles and wires, but by adding reactive support and devices which ena -- enable the system to avoid voltage collapse during the precipitating event. Those kinds of things can be added and upgrade the capacity to near its ampacity rating of the conductors.

MR. RICHARD BEL: Thank you.

THE CHAIRPERSON: Now, some of the statements you made address the transmission capacity that would be available on Bipole III in a context where Keeyask and Conawapa were built.

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: Now, say we take Conawapa out of the picture.

MR. WHITFIELD RUSSELL: Okay.

THE CHAIRPERSON: Then it would leave up transmission capacity -- there would be some free transmission capacity on Bipole III.

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: Does that change any of your conclusions?

MR. WHITFIELD RUSSELL: I think -- no, I think the amount of firm imports shown in the Preferred Development Plan are still less than would have been required under the deterministic criteria set forth at the CEC. So in degree, yes. But in -- in consequence, no.

In other words, if you cancel Conawapa, there would still be 2,000 megawatts less the six-thirty (630) would still be available for spare. So you would reduce the spare capacity available from Bipole III if you did not -- by adding Keeyask, but you wouldn't wipe it out. And -- and that's your question, I take it.

THE CHAIRPERSON: Yes. But that kind of obviates the need for an intertie then for -- from the standpoint of needing US imports for reliability purposes?

MR. WHITFIELD RUSSELL: Yes, it argues in support of that, yes. It indicates.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: Oh, I -- I miss -- I misunderstood your question. Negates the need for an import capacity increase for reliability?

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: May -- may I have you re-ask the question, please?

THE CHAIRPERSON: Well, you know, I think it would be best if we went back to the slide that indicates that -- I'm trying to find it. But it indicates that, you know, if -- once Conawapa is built, then the available transmission capacity on the Bipole III is used up --

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: -- the shortage. In fact, there's a shortage.

MR. WHITFIELD RUSSELL: That's correct. Correct.

THE CHAIRPERSON: Right. And so -- and that kid supports the thesis that an intertie would be the approach that should be used to address that shortage?

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: Okay. Now, if you

take Conawapa out of the picture, what does that -- does that change your recommendation?

MR. WHITFIELD RUSSELL: It'll distinguish --

THE CHAIRPERSON: So Conawapa's out of the picture. You have excess transmission capacity out of Bipole III. You don't -- you don't need to rely on US exports in that scenario. I mean, adding an intertie would certainly increase the reliability?

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: But you don't need it. I mean, you don't need it because you have plenty of export -- you have plenty of capacity on that Bipole III transmission line?

MR. WHITFIELD RUSSELL: Well, the Bipole III transmission line would read its -- its function as a backup would be reduced by 630 megawatts, okay.

So if there were insufficient transmission import capacity in that situation you -- you would need more -- another line, yes. But that -- your -- your question is related to transmission capacity. And my -- my testimony was about the amount of firm capacity backing up any kind of interconnection.

And what I'm saying is that the insistence that the increased 1,500 megawatts of transfer capacity in the alternative to Bipole III as a reliability premise -- at the CEC they said you had to go out and buy 1,500 megawatts of firm capacity in the US to put on that line, and I disagree.

So I took and I went to the pre -- the -- the load capacity tabulations for the Preferred Development Plan and I said, Well, did they impose the same standard on themselves when they expanded the system under the Preferred Development Plan. And what I found was that under the Preferred Development Plan, use of the CEC proceeding would dictate -- a CEC standard would dictate something like 748 megawatts of firm purchases, but they only had six hundred (600) and -- six hundred and five (605) planned.

So that -- that's my point. My point is that it -- it -- that insistence of megawatt-for-megawatt backup on the interconnection to the US was not carried forward in the NFAT, and it helped the economics of the NFAT to depart from that prior -- from that prior insistence.

So -- but -- but to go to your transmission question, I'll -- I just have to do some calculations and -- and answer you. I -- I don't have

it at my fingertips.

THE CHAIRPERSON: Now, I guess the -- one (1) of the suggestions that was made by La Capra is to consider removing a 10 percent cap on imports?

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: Now, there are strategic considerations involved here, aren't there, in a sense that, you know, if Manitoba was to remove that 10 percent cap, it then becomes increasingly reliant on US sources of energy to supply its needs?

MR. WHITFIELD RUSSELL: Yes, but there seems to be plenty of it. And because they can store so much energy in the hydro system, I don't think that that poses an -- an immense risk.

THE CHAIRPERSON: But don't -- let's not forget here, we're talking about resource planning. And you're planning ten (10) years ahead of time. And you're saying in lieu building a dam or building a gas plant, we're going to increase imports from the US up to 20 percent, allow us to import power from the US?

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: That's assuming that power's available in the US for us to import, isn't it?

MR. WHITFIELD RUSSELL: Yes, and for the reasons that I stated, I think a winter-peaking

system shopping for power from a summer-peaking system, there should be plenty in the off -- off-peak season in the -- in the US.

THE CHAIRPERSON: But to the extent that you're going to rely on US power, you're going to have to firm it up. You're going to have to -- to sign a contract to get that power in place so you -- you know -- you -- it's available when you need it?

MR. WHITFIELD RUSSELL: Yes, but a -- a reservation -- as I said, a reservation for -- let -- let me just say it this way. When you look at rate schedules for industrial power, when you look at rate schedules for contracts for purchase power -- that is, one (1) wholesale buyer buys from another -- the price of capacity, firm capacity, in the off-peak season -- you take a summer-peaking system in the US. It's being asked to provide firm power in the off-peak period.

Those demand charges associated with that power are well below the marginal cost of capacity. They are delighted to have an additional sale during their off-peak season, because they've got extra capacity and it's -- it's like incremental revenue without much in the way of incremental cost.

So, yes, you would increase -- you would -- you would need some more power, but it tends to be

much cheaper than the marginal cost of adding capacity in -- in Manitoba itself. So the -- the question is: Is it going to be deliverable on a reliable basis? And there's no reason to believe that reliance for 20 percent of your energy, much of which could be brought in during the off-peak hours, even during the winter peak, would -- would endanger the hydro system. I haven't seen calculations or -- or claims that that's the case.

THE CHAIRPERSON: But, you know, the -- the -- if -- if we were to go along with that idea though, we are -- would then become dependant on US supply in a context when we need it without having the knowledge that it's firmed up. Without --

MR. WHITFIELD RUSSELL: Oh --

THE CHAIRPERSON: -- without being sure that there's contract supply available that will be supplied if something goes wrong?

MR. WHITFIELD RUSSELL: I'm -- I'm not making myself clear, and -- and let me say it again. And maybe I should just devise a hypothetical. Let's say instead of looking at Keeyask, looking at firm power new gas generation in Manitoba, e decide to go to MISO or Southwest Power Pole, or maybe over to Chicago in the -- in the PJM area, their western extremity, and

line up a firm purchase, okay? And -- but I only want it for the peak months of the winter. And that -- that -- believe me, in the -- in a summer-peaking system there will be capacity available, and it will command a far lower price. Firm power during the off-peak in the US, will command a far lower price than it would for year-round or a peak period.

So it's there and it's available at a price below what you would pay to build something new in Manitoba to meet the winter peak in Manitoba. And now that -- that's my experience in -- in buying power and selling power.

THE CHAIRPERSON: Well, I -- I think that -- you know, where I'm disagreeing with you is that we're -- we're talking about supplanting firm, you know, generation capacity in Manitoba in favour of US generation capacity.

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: Now, we would be doing that at a time when -- you know, admittedly, we're arguing about when -- when Manitoba needs extra generation capacity, but admittedly, we'd -- we'd be contracting for firm power at some point in the future, relying on US sources to gen -- to provide the capacity for -- for Manitoba.

And we'd have to -- we'd have to sign contracts to ensure the power is there when we need it.

MR. WHITFIELD RUSSELL: If you want a firm power --

THE CHAIRPERSON: Now, we have some inkling of the kind of contracts that Manitoba Hydro has been able to sign in US for -- for selling firm power into the US. So we know what the prices are. They're -- they're good prices for firm dependable capacity. So flip that around now. Now, we're into the US, we're negotiating for firm power at a time when Manitoba needs it.

Do you -- do you really think that we'll get better prices than what Manitoba has -- you know, I -- do you think that we'd get modest prices for that firm dependable capacity?

MR. WHITFIELD RUSSELL: Yes, that's my experience. And -- and like I said, we worked for the Navajo Tribal Utilities in the Four (4) Corner area of the US, a very big bulk power marketing hub. And the demand charges that we're negotiating are literally 50 percent in the winter, because that's the -- that's the peak in the winter for the Navajos. The price they pay for their power during their peak in the winter is literally half the demand charge they incur for

purchases during the summer. They don't need much during the summer, and so it's -- it's very advantageous.

But, yes, and then if you look at the industrial rate schedules of, like, Pacificorp in the -- the Warren Buffett company in Utah and the surrounding states, those demand charges in the winter are -- are 50, 60 percent of what they are in the -- in the summer. And power in the wholesale market is sold on those kind of principles and on those kind of prices.

In the winter, when nobody is particularly demanding lots of extra capacity in a summer-peaking system, you -- you can negotiate much better deals. And the price at which they'll sell during their off-peak season is below the marginal cost you would incur to build something new in Manitoba.

THE CHAIRPERSON: Now, you know, I hear you on the winter capacity.

MR. WHITFIELD RUSSELL: Yeah.

THE CHAIRPERSON: We just finished a very cold winter. And I'm -- I'm reading the material that comes out of the MISO footprint indicating the strains that that cold winter has placed on the -- on that MISO system --

MR. WHITFIELD RUSSELL: Okay.

THE CHAIRPERSON: -- in the northern part.

MR. WHITFIELD RUSSELL: Yeah.

THE CHAIRPERSON: And so here we are, winter-peaking capacity, and relying on -- on the availability of US capacity in the wintertime, it seems to me that we're exposing ourself unduly to a potential shortfall of power at the very time when we need it.

MR. WHITFIELD RUSSELL: And -- and I just don't see that. If the transmission capacity is available, your import capacity is sufficient, the power can be delivered from the supplier to your Manitoba border, you can survive N-1 events, then it seems to me that that's not a great risk that's taken on.

I mean, I work for many invest -- some investor-owned utilities, and -- and a far greater number of publicly owned co-ops or municipals. They're entirely dependent upon another supplier. But because they're embedded within a large integrated network and they have strong interconnections to their suppliers, that's not viewed as a particular risk.

You -- you do the -- you do your reliability analysis on the deliverability of the firm

capacity. You check out the firmness of the capacity itself, how -- how much its backed up with, in the form of installed reserves and how it's operated in terms of operating reserves, and that's not an unusual or non-traditional risk. It's -- there's -- as I see it, there's nothing unique about Manitoba's situation which would make that an unwise strategy.

Now, one (1) more thing. The LCA Plan 17 scenario recommending reliance upon imports, they are very clear, and I want to endorse it. But it's not a standalone alternative. It has a lot of advantages in deferring the need for generation in Manitoba, and it may well be it's a stepping stone to a later installation of Keeyask and Conawapa.

So, you see, what -- what adoption of an import or -- or a no new gen case for a while, where you rely on imports, as a transition to a time period when your hydro capacity may be able to command better prices in the US, when the market picks up and stabilizes and gets better, that's what I see the value of that No New Generation case to be.

So you -- you take advantage of low costs that prevail for the -- for the foreseeable eight (8) or ten (10) years, let's say, and go and see what you can find in the way of purchases. See what kinds

of outlays you have to incur to import -- increase your import capacity to a point where you're safe with an N-1 or maybe an N-2 of types. And then go back to Keeyask and Conawapa, when the prospects for that look a lot better.

That, I think, is where the -- the LCA No New Generation case brings a lot of value to the table.

THE CHAIRPERSON: I think that's all the questions that the panel has for now, so I'll turn the microphone over to Ms. Menzies.

MS. MEGHAN MENZIES: Thank you. Thank you, and CAC (Manitoba) has no questions for this witness. Thank you.

THE CHAIRPERSON: Thank you, Ms. Menzies.

Mr. Gange, please?

MR. WILLIAM GANGE: Mr. Chair, I have no questions for the witness panel.

THE CHAIRPERSON: Thank you, Mr. Gange. And, Me. Monnin, s'il vous plait?

MR. CHRISTIAN MONNIN: Merci, M. President. We have no questions either.

THE CHAIRPERSON: So, Ms. Ramage, back to you.

CROSS-EXAMINATION BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: Hang on. Yes, I do have a few questions. Mr. Russell, you'd agree that the Board should be concerned with the financial impact of the Preferred Development Plan, that goes without saying, correct?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And the proper means of examining the financial impact of a -- of the Preferred Development Plan is a full scale financial analysis, correct?

MR. WHITFIELD RUSSELL: Presumably, yes.

MS. PATTI RAMAGE: And that would be revenue requirement impacts, and rate -- rate impacts?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And in terms of economic evaluation, this hearing has heard much about it being standard in practice in -- or it's standard and good economic evaluation practice to exclude sunk costs when deciding whether a project should proceed or not.

Do you -- do you disagree that this is standard practice based on sound economic theory?

MR. WHITFIELD RUSSELL: Can -- can I

have the premise for your question?

MS. PATTI RAMAGE: That --

MR. WHITFIELD RUSSELL: That -- you say the Board has already found that it's -- it's proper to ignore sunk costs?

MS. PATTI RAMAGE: No, no. I -- I said that the hearing has heard much evidence that it's standard and good economic evaluation practice to exclude sunk costs when deciding whether a project should proceed or not. And I'm wondering if you disagree that this is standard practice, or that it -- disagree that that's sound economic theory.

MR. WHITFIELD RUSSELL: Oh, no, I disagree. I mean, we -- we've been down this road in the United States many times with nuclear plant over -- cost overruns. And what the story goes oftentimes is this:

You get a cost overrun. They're challenged by the regulators. And they say, Oh, well, just ignore those sunk costs. Completing this nuclear plant is going to be cheaper than looking at all the other alternatives on the table. So they go ahead it again and there's further cost overruns. And again, the scenario repeats itself.

I think racking up large billions of

dollars of sunk costs is something that ought to be looked at and -- and develop a strategy for catching them early and seeing whether they can be avoided. And so I just don't think it's -- it's appropriate in any way to ignore sunk costs in a going-forward under all circumstances. We ought to -- we ought to be trying to avoid the costs of -- of large sunk costs that don't contribute to the overall lowest cost plan.

MS. PATTI RAMAGE: You said you don't think, but in -- in economic theory is it not standard practice to -- to ignore sunk cost?

MR. WHITFIELD RUSSELL: You mean -- you mean...

MS. PATTI RAMAGE: Yeah, when you're calculating an IRR or an NPV, you don't include the sunk costs, correct?

MR. WHITFIELD RUSSELL: Well, that -- that's what you've done here, but we're talking about a regulatory situation where we're concerned about excessive rates. The customer's going to pay for those sunk costs. If there's a way to avoid those sunk costs, yes, I think we should look at a methodology to lessen them and avoid them insofar as possible, so that we don't have a large amount of sunk costs for attributes of a plan which don't contribute to its --

to its cost effectiveness and efficiency.

MS. PATTI RAMAGE: But you acknowledge the money's already been spent and that it has to be paid somehow, correct?

MR. WHITFIELD RUSSELL: Oh, I'm not disputing the facts that the -- the money's been spent. The question is what could we have done to avoid it.

I think if you had the No New Generation case on the table at the time Bipole III was approved, and Bipole III was subjected to an NFAT, and -- and La Capra came in with a repo -- with a -- with a -- some version of Plan 17, I think we'd be in a very different world today.

MS. PATTI RAMAGE: Sir, do you have an example of a proceeding like this where sunk costs are ignored?

MR. WHITFIELD RUSSELL: I -- I don't, no. But I do know that sunk costs and cost overruns have been a subject of many disallowances by investor owned utilities that built excessively costly nuclear plants. So that's -- that's the concern we're trying to address.

MS. PATTI RAMAGE: So that disallowance though is in the rate-setting -- is in a rate-setting mode, not whether to move forward or not?

MR. WHITFIELD RUSSELL: Yes, but the regulatory authority typically had jurisdiction over the planning and irriga -- and the integrated resource plan which lead up to it being placed in rate-based -- or being requested for rate-based treatment.

So the -- the thing -- the thing which distinguishes matters here in Manitoba is that this Board has jurisdiction over rates, but it seems to me it doesn't have any cost-effective way to control the buildup of the sunk costs which go into those rates. And disallowing the inclusion of sunk costs in rates, you know, with -- with a province-owned utility system, I -- I just -- I think all that does is undermine the indicators of financial health.

So it's just a no win situation that I think the Board finds itself in.

MS. PATTI RAMAGE: Okay. Thank you. And it occurs to me, Mr. Chairman, I jumped in, I actually have some documents to distribute and a stick. So if I could just have a moment to pass those out?

THE CHAIRPERSON: Go ahead, please.

(BRIEF PAUSE)

MS. PATTI RAMAGE: And just a couple of

housekeeping matters as we go. I had also passed out the response to GAC's Pre-ask which we had identified as Manitoba Hydro Exhibit 199, and we should probably get that on the record so that we can call this short, little book of documents Manitoba Hydro exhibit 200.

--- EXHIBIT NO. MH-199: GAC Pre-asks of Manitoba Hydro

--- EXHIBIT NO. MH-200: Manitoba Hydro Book of Documents - MMF/WRA

CONTINUED BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: And I'm not going to the book of documents right away, but I was wondering if Diana could bring up page 11 of the WRA presentation this morning.

(BRIEF PAUSE)

MS. PATTI RAMAGE: And on page 11 of your presentation, in the second bullet, you refer to the market for firm exported -- exported power.

Do you see that?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And are you...

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: It's back on. I said, "yes."

MS. PATTI RAMAGE: When you refer to market are you referring to Manitoba Hydro's market in this bullet?

MR. WHITFIELD RUSSELL: I'm referring to the market for exported power in the US.

MS. PATTI RAMAGE: So the -- the market that Manitoba Hydro can export its power to?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: You're aware that Manitoba Hydro has signed contracts with Minnesota Power, WPS, and NSP?

MR. WHITFIELD RUSSELL: I understand they're contingent on completion of additional -- well, some of the contracts are not con -- conditional. Yes, they have signed contracts.

MS. PATTI RAMAGE: And these contracts are -- are for energy from new hydraulic generation?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And would you agree

then that these customers are not interested in power from Manitoba Hydro thermal resources? They've contracted for hydro generated power?

MR. WHITFIELD RUSSELL: I agree, they have, yes.

MS. PATTI RAMAGE: So on what basis would you conclude that the price Manitoba Hydro's customers are willing to pay -- pay for power is based on the cost of thermal resources?

MR. WHITFIELD RUSSELL: Oh, that would be their alternative if they didn't have access to Manitoba Hydro. Now, the -- let's -- let's just refine that a little bit. To the extent this satisfies a renewable portfolio standard requirement, and -- and -- then -- then I think what -- what you're comparing is a slightly different issue; that is, if Manitoba Hydro power in the hands of the purchaser qualifies it for satisfaction of its renewable portfolio standard. And if it would otherwise have to go to wind generation in combination with thermal resources, we wouldn't be -- we wouldn't be confined to this narrow set of alternatives that I've laid out in this -- in this bullet.

MS. PATTI RAMAGE: If we could turn to page 14 of the presentation now. On page 14 at the

third line of the -- on the third line there, you refer to customer resistance to buy power from Manitoba Hydro.

Do you see that? Or buyer resistance.

MR. WHITFIELD RUSSELL: Yes. If -- if the cost of the Manitoba Hydro is going to be higher than their alternative portfolio which would satisfy their needs, yes, there would be resistance.

MS. PATTI RAMAGE: Are you aware of Mr. Cormie's testimony in this hearing that Manitoba Hydro has effectively sold out all of the new hydraulic energy from Keeyask?

MR. WHITFIELD RUSSELL: I was not.

MS. PATTI RAMAGE: Okay. Are you aware of Mr. Cormie's testimony that Manitoba Hydro's 308-megawatt agreement with WPS represents roughly 30 percent of the output of Conawapa?

MR. WHITFIELD RUSSELL: I wouldn't dispute it, but I'm -- my -- my issue is at what price as compared to the cost.

MS. PATTI RAMAGE: And you haven't seen that price, correct?

MR. WHITFIELD RUSSELL: No. That's all CSI. I wasn't allowed to see the contract prices.

MS. PATTI RAMAGE: Right. You're aware

that Manitoba Hydro has signed MOUs with SaskPower and Great River Energy for a total --

MR. WHITFIELD RUSSELL: I was generally aware, yes.

MS. PATTI RAMAGE: And that's 1,100 megawatts of power from Conawapa?

MR. WHITFIELD RUSSELL: I -- I'll accept that.

MS. PATTI RAMAGE: Okay. Would you accept then that these agreements and MOUs add up to 1,408 megawatts of power which, when you add the 10 percent required to get that -- to move that power, is 1,550 megawatts, or greater than the capacity of Conawapa?

MR. WHITFIELD RUSSELL: I'm -- I'm not disputing that. The question is at what price? The incremental price versus the incremental cost. And I haven't seen that.

MS. PATTI RAMAGE: If we could turn to page 40 of the presentation.

Now, at page 40, you suggest that there are entities with surpluses willing to sell energy to Manitoba Hydro.

Do I have that correct?

MR. WHITFIELD RUSSELL: Yes. I would

expect so, yes.

MS. PATTI RAMAGE: And are any of these entities the ones that Manitoba Hydro already has sales agreements with?

MR. WHITFIELD RUSSELL: Not necessarily. In other words, further south where there's less exposure and more surpluses, the -- the -- I would expect there to be more firm surpluses in -- in the winter for -- for use by Manitoba Hydro. The question is whether you can transmit it, the upgrades can be justified, and -- and can be accomplished.

In other words, all the intervening parties with which you have bilateral arrangements have an obligation to transmit power to other buyers and sellers.

MS. PATTI RAMAGE: So when you're saying further south, can you identify any -- any party in particular that has this surplus power --

MR. WHITFIELD RUSSELL: No.

MS. PATTI RAMAGE: -- or are we just -- it all conjecture?

MR. WHITFIELD RUSSELL: I -- I don't -- it's not conjecture. I know such transactions are available, and in the ordinary course of my -- of my consulting business over the past thirty (30) some

years, that's -- that's been -- that's been the -- the way it's done. That's been the expectation, and it's been proven out in practice.

MS. PATTI RAMAGE: Now, I note in slide 40 you refer to PJM and SPP.

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: You're -- you're aware of course that there's no transmission path between PJM and SPP to -- to Manitoba Hydro?

MR. WHITFIELD RUSSELL: Of course there is.

MS. PATTI RAMAGE: There -- firm transmission?

MR. WHITFIELD RUSSELL: Well, yeah, from -- from Chicago it would be a backhaul, I would think. Sure, why not. The prevailing flow is from west to east during the summer peak. Why -- why wouldn't -- why wouldn't Commonwealth Edison in Chicago, or someone in eastern Wisconsin want to sell power to you in the winter?

MS. PATTI RAMAGE: The testimony that we've heard to date is that there is no firm transmission from further -- further east. So are you able to confirm -- confirm absolutely that that exists, or are you just guessing that that might be there?

MR. WHITFIELD RUSSELL: I'm -- I'm making a very different point. The absence of existing firm transmission capability should not be a constraint in a long-range arrangement. Each of those transmission owners between you and a potential supplier has an obligation under their Open Access Transmission capaci -- Tariffs to build transmission upgrades in first-come first-serve basis as requested.

If you identified a low cost supplier, which was able to sell you power at -- at a commensurately reasonable rate in the winter and there was some constraint between your potential supplier and the Manitoba border with the US, you can file a request under the OATT. In the case of MISO, MISO would administer the OATT. And they -- if you long -- as long as your supplier met the milestones and paid the fees for the studies, and they would get their firm transmission upgrades and be able to deliver.

Very often, however, the situation in -- in a -- the US is that if you're going to do a backhaul, say from Chicago, I expect the prevailing flow, in my experience working in -- in Wisconsin, the prevailing flow on the transmission systems is towards Chicago. If Chicago -- Commonwealth Edison in Chicago, or Exelon, wanted to generate and sell power for sale

in Manitoba, there would be a backhaul. They would be unloading facilities when they cranked up generation.

So I have two (2) expectations: 1) that a supplier from a backhaul would be feasible, and second, that if it's not, you can exercise -- your supplier can exercise his rights under the OATT. O-A-T-T.

MS. PATTI RAMAGE: Under the Open Access Transmission Tariff though, you'd be paying point-to-point rates through various trans -- jurisdictions, correct?

MR. WHITFIELD RUSSELL: It -- it depends. If you want to -- if you want to establish yourself as a network customer you could get network service.

MS. PATTI RAMAGE: Have you studied the costs of either network service or point-to-point to do that?

MR. WHITFIELD RUSSELL: I have not. That's the whole purpose of making a request under the OATT, so the -- the intervening utilities, or the transmission provider, is obligated to give you those prices on a -- on a first-come first-serve basis.

THE CHAIRPERSON: Mr. Russell, could you move you -- could you move your microphone this way

a little bit? Yeah, a little bit more.

MR. WHITFIELD RUSSELL: Yeah, I apologize.

THE CHAIRPERSON: I think just -- we're getting too much echo. Thank you.

MS. GENEVA LOOKER: I just wanted to add also that between PJM and MISO there is no double transmission charge, that they have removed the pancaked rates and you only pay one (1) transmission charge.

(BRIEF PAUSE)

CONTINUED BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: If we could turn to page 41 of the presentation. Here you're referring to FERC Order 1,000?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And it's intent to incent construction of new transmission in the US?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: Are you also aware of state legislation in Minnesota that provides incumbent utilities with the right of first refusal when transmission is built?

MR. WHITFIELD RUSSELL: I would be surprised if that would withstand challenge, but I don't deny that it exists. We have the national -- what is it, NIETC -- National Interest Electric Transmission Corridor bill, which is addressed to those very situations where you've had repeated instances in the United States where needed interstate transmission is -- is frustrated and stopped by a refusal of a state commission to approve facilities needed by an out-of-state buyer or seller.

And so this -- this federal legislation in the US was put in place to -- to resolve just that situation. I think -- I think it would be a problem in the short-term but not in the long haul.

MS. PATTI RAMAGE: Would you be suggesting to this panel that it's a good ideal to drop Manitoba Hydro in the middle of a state versus federal battle in the US?

MR. WHITFIELD RUSSELL: No. I'm saying that if the economics are sufficiently robust, your potential seller would be delighted to take on such -- such a trans -- such a challenge. But in the meantime, they have their rights under the OATT, So I'm not sure how the -- how the state of Minnesota could under the federal preemption principles that govern FERC's

jurisdiction over transmission.

I mean, FERC has exclusive jurisdiction over transmission. If -- if FERC, in administering or enforcing its OATTs of it's jurisdictional utilities, tells -- tells you that you are entitled to get transmission from a supplier, then the battle becomes between FERC and the state of Minnesota. I don't think that's going to withstand a challenge.

MS. PATTI RAMAGE: Page 41, we're still there. In the last bullet you suggest that Manitoba Hydro may be able to buy firm power on a seasonal basis.

Do I have that correct?

MR. WHITFIELD RUSSELL: During the off-peak season, yes.

MS. PATTI RAMAGE: Are you familiar with MISO resource -- the MISO Resource Adequacy Construct?

MR. WHITFIELD RUSSELL: Not -- I'm not -- I'm aware that such a thing exists. I'm -- I'm not familiar with the details.

MS. PATTI RAMAGE: Well, sir, would you accept, subject to check, that there exists a MISO requirement that capacity resources be available year - - year-round?

MR. WHITFIELD RUSSELL: For what purpose?

MS. PATTI RAMAGE: Well, MISO requires the capacity be available year-round. And -- and that being the case, how -- I'm asking how Manitoba Hydro could contract for seasonal capacity?

MR. WHITFIELD RUSSELL: I just can't answer until I see the -- the -- see what the policy is. It doesn't make sense to me.

You couldn't pull forced -- you couldn't pull a maintenance outage if that was the requirement. You had to be available year-round. I -- I'm not sure I understand your point.

MS. JESSICA SAUNDERS: Yes, Ms. Ramage, if I could just intervene here. Is there anything in your book of documents that you could refer Mr. Russell to?

MS. PATTI RAMAGE: Not -- no, it's not in the book of documents.

MS. JESSICA SAUNDERS: Okay.

MS. PATTI RAMAGE: But I'm asking Mr. Russell if he understands the MISO -- but we can back up a step.

Does he have knowledge of MISO's Resource Adequ -- Adequacy Construct when making these

recommendations? Is he confident that his recommendations meet with that construct?

MS. JESSICA SAUNDERS: And I just want to confirm that Mr. Russell has a full understanding based on what you've explained of the construct in order to respond.

MS. PATTI RAMAGE: I would suggest it should be his understanding, not mine; but if he -- if he's able to confirm that he understands that construct.

MR. WHITFIELD RUSSELL: As I said, I'm not familiar with the details of that, so I can't really help you there.

CONTINUED BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: This morning during -- or I guess more this afternoon during your testimony you were discussing the import-only line. And I'll say my understanding of import-only line was no new long-term firm contracts at the front-end to justify the line or -- or no counterparty purchasing firm power from Manitoba Hydro to justify that line.

Is that consistent with your understanding?

MR. WHITFIELD RUSSELL: May I have the

question again, please.

MS. PATTI RAMAGE: I'm asking: Is no new long-term firm contracts at the front-end of the import-only to justify the line? Is that what you understand import-only line to mean?

MR. WHITFIELD RUSSELL: I don't know what you mean by "import only line." Is that what you're saying? You want me to say --

MS. PATTI RAMAGE: I'm asking you -- my understanding of what import-only line is no new long-term firm contracts to justify the line. And is that consistent with yours, or do you -- your understanding, or do you apply a different meaning?

MR. WHITFIELD RUSSELL: I just -- I just don't have an understanding of what that term means. If that's what you mean by that term, that -- that's...

MS. PATTI RAMAGE: Well, in your evidence you -- you critiqued this -- the import-only line as being, as I recall, something where you didn't believe that a line would ever import only. Which I'm saying is not my understanding of what La Capra meant when it called it an import-only line. What they meant was -- my understanding was that they meant that there would be no contract.

MR. WHITFIELD RUSSELL: All right. Let me -- let me clarify. And I'm not -- I'm not trying to be argumentative here. This import-only term was invoked in your rebuttal testimony with respect to a new AC interconnection to the US in the CEC proceeding as an alternative to Bipole III. You invoked it. I didn't -- it didn't have any meaning to me in that context. And -- and that's what I was responding to in my testimony.

MS. PATTI RAMAGE: So you weren't responding to the La Capra import-only line --

MR. WHITFIELD RUSSELL: No, no.

MS. PATTI RAMAGE: -- in that scenario?

MR. WHITFIELD RUSSELL: I was responding to your rebuttal.

MS. PATTI RAMAGE: Okay. If I could, in the -- the book of documents that we've brought up -- on the first page of that book of documents. I wanted to explore with you the commentary regarding LCA's Plan 17.

And here you've said Plan 17 looks promising, correct?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And if we turn to page 7 --

MR. WHITFIELD RUSSELL: I didn't use those words specifically, but I think -- I think that's -- that's a fair characterization.

MS. PATTI RAMAGE: Oh, I think the heading actually says, "LCA's Plan 17 looks promising."

MR. WHITFIELD RUSSELL: Oh, yes. Okay. Yeah. Okay.

MS. PATTI RAMAGE: I tried not to read. I'm sorry, panel. I was trying not to read a quote, but see what happens when I try to paraphrase.

MR. WHITFIELD RUSSELL: Good catch. Thank you.

MS. PATTI RAMAGE: At page 17 --

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: -- and now I'm going to read -- the third bullet. And this is slide 33 from La Capra's presentation. And they said:

> "While a hypothetical plan, the results point to potential for added elements to other plans such as increased import capability and DSM."

Do I take it from your evidence that both you and La Capra agree Plan 17 is a hypothetical plan?

MR. WHITFIELD RUSSELL: Yes, they were

wary of recommending its implementation and adoption without sub -- substantial further study. They also, as I read their testimony, wanted to -- it to be considered in connection with other plans -- its elements in connection with other plans, especially for its cost effective attributes.

MS. PATTI RAMAGE: And you're aware that Manitoba Hydro has filed in its Exhibit 104 an analysis of additional levels of DSM?

Is that -- are -- were you aware of that analysis?

MR. WHITFIELD RUSSELL: I -- I had -- I had read that that was the case, the Levels 1, 2, and 3 DSM, yes.

MS. PATTI RAMAGE: And if we could go to page 4 in this -- I hate to call it a book of documents, this pamphlet of documents. This would Manitoba Hydro's Exhibit 171, and it presents the results of some of that analysis. And if we look at -- of Exhibit 171 and look at the Level 2 DSM which is the -- the large box in the middle of the page --

MR. WHITFIELD RUSSELL: I see it.

MS. PATTI RAMAGE: -- on the left-hand side.

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: We see that three (3) of the plans shown in that exhibit, Plans 5, 6, and 14 include the 750 megawatt interconnection.

Do you see that?

MR. WHITFIELD RUSSELL: I see 5, 6, and 14, yes.

MS. PATTI RAMAGE: Now, if I could have you turn to page 5 in the documents. Here we have tran -- a section of the transcript. And we have Mr. Peaco of La Capra responding to Board member Bel's question regarding the 750 megawatt interconnection and the thought of raising the import floor. And if I -- I could read for the record, Mr. Bel asks:

> "So it's -- we have the 750 megawatt interconnection, and we have a raise in the import floor. So we doubled the amount of the imports that are allowed?"

And Mr. Peaco answered, "Yes."

Do you see that?

MR. WHITFIELD RUSSELL: On page which --

MS. PATTI RAMAGE: Sorry, it's 5,727, the bottom left-hand corner --

MR. WHITFIELD RUSSELL: I was -- I was looking at the wrong place. I apologize. Excuse me.

MS. PATTI RAMAGE: Yeah, sorry. Beginning at lines 20 through 24. I'll give you a minute to read that.

MR. WHITFIELD RUSSELL: Thank you.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: I see it, yes.

MS. PATTI RAMAGE: Yeah. And I'm then going to have you turn the page to transcript page 5,732. And this is the continuation of that discussion. And here, I'll -- I'll read it into the record. And I'm looking at page 5,732, lines 5 through 15, which read -- Mr. Peaco says:

"There's -- there's a determination as it -- you know, how much -- how much are we going to rely on imports is really a policy determination, because there's -- there's a policy that Manitoba Hydro uses in its planning and it -- and it could be different. And we've talked about the issue separately in our reports. And -- and this -- this case was an -- an -- was an opportunity for us to

test, you know, does it make any difference if we relax that? And -- and so you see the combined effect of both those things in that effect -- or, sorry, in that case."

And when I'm reading that, would you agree that the combined effect that is being referred to is relaxing the import policy and the effect of the import line?

MR. WHITFIELD RUSSELL: I so took it, yes.

MS. PATTI RAMAGE: Okay. So if we could now turn to page 8 in this document, we're going to see -- we have here Manitoba Hydro Exhibit 104-14. And here, Manitoba Hydro has provided a comparison of La Capra's hypothetical Plan 17 to Plan 14.

Have you -- are you familiar with this exhibit?

MR. WHITFIELD RUSSELL: I -- I have seen this exhibit before, yes.

MS. PATTI RAMAGE: So you see the table on the left-hand side. There's a comparison of Plan 1, being the All Gas Plan, Plan 17, together with three (3) different variations of Plan 14.

Do you see that on the left?

MR. WHITFIELD RUSSELL: I do, yes.

MS. PATTI RAMAGE: Okay. Plan 17 is labelled 'LCA No New Generation' and is described as LCA load reduction 750 megawatt, relaxed import criteria, extended diversities.

Do you see that?

MR. WHITFIELD RUSSELL: I do.

MS. PATTI RAMAGE: And the associated incremental NPV for Plan 17 is $1,421 million.

Do you see that?

MR. WHITFIELD RUSSELL: I -- I thought it was 1 billion four (4), but --

MS. PATTI RAMAGE: Oh, 1.421 billion would be the other way to say that.

MR. WHITFIELD RUSSELL: I thought it was 1.4 -- 4 billion, yes.

MS. PATTI RAMAGE: Okay.

MR. WHITFIELD RUSSELL: Yeah.

MS. PATTI RAMAGE: Now, the first Plan 14, which is the Keeyask19/Conawapa25/750 --

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: -- you see that the incremental NPV for that 1.696 billion?

MR. WHITFIELD RUSSELL: I do.

MS. PATTI RAMAGE: Okay. Now, Plan 14

is then repeated and labelled as Keeyask19/Conawapa30/750 megawatts.

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And it's described as LCA load reduction, MP sale, WPS sale, and investment.

Do you see that?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And GRE diversity extension. I forgot to -- to -- that's also included in that plan, correct?

MR. WHITFIELD RUSSELL: I so took it.

MS. PATTI RAMAGE: And the associated incremental NPV is $2.607 billion for that plan, correct?

MR. WHITFIELD RUSSELL: I understand, yes.

MS. PATTI RAMAGE: So the comparison between the two (2) plans labelled as Plan 14 provides a direct comparison of the impact of the load reduction and the diversity extension between those two (2) plans, correct? That's the difference.

MR. WHITFIELD RUSSELL: I -- I note that the All Gas Plan it's being compared to is with no load reduction. Is that right?

MS. PATTI RAMAGE: That's correct.

MR. WHITFIELD RUSSELL: I'm -- I'm puzzled about the -- the meaning of this without also doing the load reduction on the no -- All Gas Plan. Is there some reason that wasn't done?

MS. PATTI RAMAGE: For our purposes, what we're doing is comparing the LCA No New Generation Plan to the Plan 14. So what we're trying to do here is -- is demonstrate the difference between the load reduction -- no load reduction and the load reduction.

MR. WHITFIELD RUSSELL: I understand that, but if we're comparing LCA with a load reduction, Plan 14 with a load reduction, why wouldn't we also do the All Gas load reduction? I -- I'm not sure.

MS. PATTI RAMAGE: Yeah, yeah. That -- that may be done in another analysis, but for the purposes of -- of this is to compare these -- the plan -- the 14 with no load and with load reduction. So if you could just follow me on that. You'd agree that the difference between the 2.6 billion and the one point six (1.6) is roughly $900 million.

Is that correct?

MR. WHITFIELD RUSSELL: I -- I agree, but I question the significance. Yes.

MS. PATTI RAMAGE: Well, would you

agree that the value of the load reduction, if we're talking to Plan 17, where it has LCA load reduction, that would also have the same LCA load reduction as the second Plan 14?

If we're talking LCA load reduction in that Plan 17 and the second Plan 14 also has LCA load reduction, that would be the same load reduction, correct?

MR. WHITFIELD RUSSELL: I think we'd want to see the All Gas case with load reduction to reach any significant conclusion here.

MS. PATTI RAMAGE: You'd agree, though, that Plan 17 load reduction -- with load reduction and Plan 14 with load reduction would be dir -- directly comparable?

MR. WHITFIELD RUSSELL: Yes, yes. But you must understand that my opinion is the NCA -- the LCA No New Generation case would not need Bipole III, but case 14 would. And if you took 5 -- 3.3 billion in avoided Bipole III costs and put them on top of case 17, it would be substantially higher than case 14 with load reduction.

MS. PATTI RAMAGE: But, sir, Bipole III is in every single one (1) of these. We reviewed that this morning.

MR. WHITFIELD RUSSELL: I know that. That's -- that's the point of my testimony. It shouldn't be.

MS. PATTI RAMAGE: But these numbers, it is.

MR. WHITFIELD RUSSELL: That's right.

MS. PATTI RAMAGE: That's right. And the difference between those two (2) numbers is 900 million, correct?

MR. WHITFIELD RUSSELL: Oh, yes. Yeah, I -- I -- yes, I don't dispute that. Well, six ninety-six (696), it's a little less. It's --

MS. PATTI RAMAGE: I think it's nine eleven (911) to be exact. And that --

MR. WHITFIELD RUSSELL: Six-nine-six (696), yes. Okay. Yeah.

MS. PATTI RAMAGE: And that same nine hundred and eleven (911) on account of load reduction that's in 14 would be the same nine hundred and eleven (911) that's on account of load reduction in Plan 17.

That -- nine hundred and eleven (911) would make up -- or of that fourteen (14) -- $1.421 billion, 911 million is on account of load reduction, correct?

MR. WHITFIELD RUSSELL: I see the

arithmetic. I don't see the significance of it without doing a load reduction on the All Gas case.

MS. PATTI RAMAGE: Sir, I'm -- I'm somewhat limited in terms of how I can help you, because this is LCA's calcula -- or this is -- they started this -- this plan. So I -- I have to deal with what I have here. And -- and I'm simply trying to confirm that of the $1.421 billion, $911 million of it is on account of a load reduction.

That's what this -- this exhibit tells us.

MR. WHITFIELD RUSSELL: May I have the question again? I didn't follow it.

MS. PATTI RAMAGE: I'm asking you whe - - to confirm that if -- if the load reduction is $911 million, as between -- when you compare a plan with the -- with no load reduction and a plan with load reduction, and that's the comparison of the two (2) Plan 14s, we -- we've confirmed that $911 million is on account of the load reduction, correct?

MR. WHITFIELD RUSSELL: Yes, but the significance of it without redoing the All Gas case with load reduction is lost on me, so.

MS. PATTI RAMAGE: It -- it's lost on me why the All Gas case is -- why you need that load

reduction, because we're determining that amount by comparing the two (2) 14s. We have a consistent figure in All Gas, and then we have the two (2) Plan 14s: one (1) with, one (1) without. And we -- we know that the difference is $911 million. I think we've agreed on that number.

And what I'm -- I'm trying to understand -- or trying to get you to is that same nine hundred and eleven (911), that's the amount of load reduction, that's the value of the load reduction portion of this NPV?

MS. GENEVA LOOKER: I would like to add that where we have a problem with this comparison that you're trying to make is that we believe that there should be a comparable run of case 17 with no load reduction. You're trying to make us compare these two (2) case 14s to a case 17 that doesn't have a comparable run.

We don't know what all of the elements are and how they combine together in case 17. And -- and this is why we are reluctant to agree with your question here.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Are you suggesting then that you've recommended this alternative without understanding the difference between these?

(BRIEF PAUSE)

MS. GENEVA LOOKER: No, as we've stated, we -- and I think everyone has felt that they were all amazed at the difference and the positive benefits that arose out of these elements. And it would have been nice to have been able to explore more and had more runs done with variations to them.

And the problem is here you're showing -- you're trying to make a comparison, and without more information we don't feel that we can agree with that comparison.

(BRIEF PAUSE)

MS. PATTI RAMAGE: You'd agree though that it certainly -- this suggests that a lot of the benefit is -- as between the -- a lot of the benefit of these plans is as a result of the load reduction?

MS. GENEVA LOOKER: Yes.

MS. PATTI RAMAGE: Okay. And do you

adopt that, Mr. --

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: -- Russell?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: Thank you.

MR. WHITFIELD RUSSELL: I -- I volunteered to jump in if I had to. I didn't have to.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Russell, you spoke about your clients who count on external suppliers to help them meet their peak load.

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: Do those customers experience long periods of minus 30 degrees or colder over those peak periods?

MR. WHITFIELD RUSSELL: It gets pretty cold around Messina, New York, yes.

MS. PATTI RAMAGE: As cold as Winnipeg?

MR. WHITFIELD RUSSELL: Not as cold as Winnipeg, but it gets pretty bitter, and in Maine too. I grow -- I grew up in Maine.

MS. PATTI RAMAGE: And do those customers count on electricity for heat?

MR. WHITFIELD RUSSELL: Less so in the non -- in the investor owned ones that rely on thermal fossil fuel, no. But there are some -- there are some communities served by the New York Power Authority, which is pretty much all hydro, and I think there's some substantial reliance on electric heat there, yes, because it's so cheap.

MS. PATTI RAMAGE: And if I could just have a moment.

(BRIEF PAUSE)

MS. PATTI RAMAGE: And with that, I think that concludes our questions, so I want to thank you both --

MR. WHITFIELD RUSSELL: Thank you.

MS. PATTI RAMAGE: -- for coming up and testifying. And if I could maybe turn over the mic to Mr. Peters, but I'm going to suggest we have a quick break, because I got rushed down here right after lunch.

THE CHAIRPERSON: That's a very good idea. So I think we'll take ten (10) minutes.

--- Upon recessing at 2:56 p.m.

--- Upon resuming at 3:15 p.m.

THE CHAIRPERSON: I believe that we can resume the proceedings. So, Mr. Peters, please.

CROSS-EXAMINATION BY MR. BOB PETERS:

MR. BOB PETERS: Thank you. Thank you, Mr. Chairman. Good afternoon, Ms. Looker, Mr. Russell.

MR. WHITFIELD RUSSELL: Good afternoon.

MR. BOB PETERS: I'll start my questions going through your slide presentation. Just for ease of following, if Diana can assist me on that. But we'll start off on your slide number 5, please. And that's slide 5 of MMF Exhibit 31 revised.

The general thrust, Mr. Russell and Ms. Looker, of -- of the -- this portion of your written pre-filed evidence also found in MMF Exhibit 14 is to the effect that from Whitfield Russell Associates's perspective, the seventy-eight (78) year study period is not the correct period of time in which to analyze Manitoba Hydro's needs.

Would that be correct?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And are you suggesting a shorter period of time, such as the twenty (20) year

that was used in the financial resources, or is it thirty-five (35) years as done in the Power Resource Plan?

What number does WRA suggest is more appropriate than the seventy-eight (78) years?

MR. WHITFIELD RUSSELL: Well, in -- in fairness, we're -- we're not used to dealing with hydro systems, so there is -- there is that unique thing. But we're -- we usually see twenty (20) to thirty (30) year horizons on planning studies.

MR. BOB PETERS: And are those -- are those -- sorry, I didn't mean to interrupt. Are those twenty (20) to thirty (30) year planning studies done primarily for thermal plants?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And does that twenty (20) to thirty (30) year life equate to the probable useful life of the -- of the --

MR. WHITFIELD RUSSELL: Well, it's the economic life. But -- but we've -- we've come across -- Bonneville has -- Bonneville Power Administration has 30,000 megawatts of hydro. I don't recall seeing any of their studies that went seventy-eight (78) years, so. But, of course, they haven't built a lot of new hydro.

You know, they -- but this just is so far out of the range we've every encountered. And it incorporates so much in -- in the way of speculation that it -- it kind of lends itself to -- it kind of lends itself to -- to getting the answer you want sometimes.

MR. BOB PETERS: Do you recall what study period was used in the previous Manitoba Hydro review of Conawapa back in 1990?

MR. WHITFIELD RUSSELL: I do not.

MR. BOB PETERS: One (1) of the other witnesses in this proceeding, I believe it was La Capra, had -- had used what they called cumulative present values, where they took snapshots along the path to seventy-eight (78) years.

You're familiar with that?

MR. WHITFIELD RUSSELL: Yes, we -- we incorporated that exhibit. If you will look at page -- slide 16.

MR. BOB PETERS: And that slide 16 was from the La Capra evidence, but it's not been updated to the most current evidence.

Would that be correct?

MR. WHITFIELD RUSSELL: That's how I took it, yes.

MS. GENEVA LOOKER: It -- this was corrected, but I'm not sure if it includes the updated capital cost information or anything like that.

MR. BOB PETERS: Well, Ms. Looker, if we look in the top right-hand corner on your slide 16, I see the number one billion, six hundred and ninety-six million dollars ($1,696,000,000)?

MS. GENEVA LOOKER: You're corre -- you're right. I believe they corrected it for the years. That's why they called it corrected. But you're right, it is -- it is using the old 2012 NFAT material.

MR. BOB PETERS: All right. Thank you. And -- but they also, in -- in taking their snapshots at different points in time along the cumulative present value, they may have gone twenty (20), thirty-five (35), fifty (50) years?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: Is there one (1) metric that is more valuable than any other metric in the measurements?

MR. WHITFIELD RUSSELL: Well, we -- we work mostly for people that buy and sell power, and so the revenue requirements are -- are of significance to us in our work, and it -- it's just what we're the most

familiar with.

MR. BOB PETERS: So if the revenue requirements are what -- what should drive, that speaks to perhaps the twenty (20) year financial forecast outlook that --

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: -- the utility generally uses?

MR. WHITFIELD RUSSELL: Correct.

DR. HUGH GRANT: It would be helpful to know what the discount rate is on this graph.

(BRIEF PAUSE)

MR. BOB PETERS: Board member Grant, the answer that you've heard is the understanding of the witnesses, which I'm not disagreeing with. But I also think this may be a matter that the panel has asked for La Capra to provide additional information, perhaps a revision. So that, I believe, is still to be filed.

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: If we turn to slide 8 as we work our way through, Mr. Russell, Ms. Looker,

the -- this document, I think, the panel has seen before.

But under the US dependable sales, did Whitfield Russell Associates recognize that the US dependable sales included diversity exchange sales at MISO market prices?

MR. WHITFIELD RUSSELL: I did not. That -- that would make a difference.

MR. BOB PETERS: Well, let's -- if -- if we assume that is the case, and if that's found to be the case, what would that -- what imp -- impact would that have on the -- the comments you've made relative to this -- this page?

MR. WHITFIELD RUSSELL: In other words, if you had a diversity transaction with firm power going out and firm power coming in and the dollars balanced out, I'm not -- I'm not sure how the megawatt hours and the dollars would be accounted for on a diversity transaction. But I -- I could see how that would scramble the results, yes.

MR. BOB PETERS: And are diversity transactions a common contractual arrangement in many of the jurisdictions you're familiar with?

MR. WHITFIELD RUSSELL: Yes, they are. We -- we see a lot of that, particularly in the Pacific

Northwest with California.

MR. BOB PETERS: And it's a swapping of capacity basically as between two (2) -- two (2) different entities?

MR. WHITFIELD RUSSELL: Yes. There's a variety of -- of formats. Some, it's you just exchange kilowatt hours at certain guaranteed capacity rates. Sometimes there's no guarantee on the capacity rate. Sometimes -- for a long time, Bonneville sold capacity for 2,500 kilowatts of energy every year. And so that was a way to get energy, but not get a capacity charge.

MR. BOB PETERS: And are you aware that Manitoba Hydro's diversity exchanges are done at market -- MISO market prices without -- without capacity charges?

MR. WHITFIELD RUSSELL: I -- I was not. We -- we didn't have access to unredacted contracts, so I didn't invest a lot of time in that. I -- I did not know that.

MR. BOB PETERS: All right. Speaking of contracts, on page 11 of your presentation, you talk about different contracts.

Have you -- have you reviewed in detail the -- the public versions of Manitoba Hydro's export contracts?

MR. WHITFIELD RUSSELL: I read through some of them and some of the term sheets. But without the prices and -- there was some extensive redacted sections in some of the contracts, so -- but, no. It's a very thick book of contracts, and I can't say that I invested a lot of time in it.

(BRIEF PAUSE)

MR. BOB PETERS: I wanted to make sure the panel understood, and I think you and the Chairman may have had some discussion about the second bullet on page 11.

And that had to do with the market for firm exported energy being determined by the marginal cost of the alternative source, correct?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And your suggestion here is that counterparties will pay a certain price for energy regardless of the marginal cost of its generation.

MR. WHITFIELD RUSSELL: Yes. There -- there -- a buyer's going to look at his alternatives. And -- and -- well, I did -- I had some questions from -- I think it was Hydro. If the alternative is

capacity and energy from hydro versus capacity and energy from a thermal plant, that's one (1) set of questions.

If the -- if the issue is buying enough renewable power in the US to meet a renewable portfolio standard, plus firming it up, firming up wind with thermal, that's a different calculation. I think hydro would look better in -- in that sort of a situation. Most -- as you know, most renewable resources other than geothermal, you really can't hold a flat schedule. It's intermittent power and to serve a customer around the year on a firm basis there's not much beyond hydro that provides renewable power that's schedulable and -- and can hold a schedule and be firm.

So this was just a shorthand for making a capacity comparison. I understand that the -- that the calculus engaged in by a US buyer subject to a renewable portfolio standard would -- would encompass a great deal more than what's seen here.

MR. BOB PETERS: When you and the Chairman had some discussion, Mr. Russell, about the purchase of -- Manitoba Hydro purchasing firm energy, you referenced that -- and it may have also been in discussion with Ms. Ramage, that you referenced that there could be a backhaul arrangement, if I understood

correctly.

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And where could power suppliers be located under a backhaul arrangement?

MR. WHITFIELD RUSSELL: Well, downstream as the flow goes. In the US the prevailing flow is from the west, midwest, toward the east coast. And it -- it almost never reverses except possibly during some cold strikes we've had which reversed some power flows.

So if the prevailing flow when you want your power is toward the -- toward the east, and the prevailing flow on the -- and -- and your buyer is located downstream, and if he wants to back schedule some power to Manitoba he's going to unload the transmission network between, say, Chicago and Manitoba when the prevailing flow is toward the east. So you really -- you can expect to have a lot more transmission available for a backhaul arrangement.

MR. BOB PETERS: Would these be firm bilateral arrangements?

MR. WHITFIELD RUSSELL: Sure. They could be. Yes. Or -- or you could have a network arrangement. In other words, if you bought network power you wouldn't have to tie it to a specific

resource. You could tie it to a group of network resources.

MR. BOB PETERS: And how does transmission congestion impact that arrangement?

MR. WHITFIELD RUSSELL: Well, on a backhaul you're much less susceptible to congestion. In fact, you're relieving congestion.

MR. BOB PETERS: On page 10, which I glanced over, it was a page with a lot of numbers on it, Mr. Russell and Ms. Looker. The purpose of your showing this information is -- is to look at the forecasting of Manitoba Hydro relative to certain years, correct?

MR. WHITFIELD RUSSELL: Yes. Yes. And -- and really it was -- it was to reinforce the point made on slide 8 with the historic sales. In other words, the historic sales were plummeting and at the same time the forecast of future sales was plummeting. So that -- that to me was a strong buy signal and certainly not an aggressive sell signal for someone developing a high cost -- capital cost hydro plant.

MR. BOB PETERS: Are you suggesting that the export prices have -- have now bottomed out, so to speak?

MR. WHITFIELD RUSSELL: I -- I was not

saying any such thing. I'm -- I'm -- I don't know how we can be certain of that until it happens.

MR. BOB PETERS: Only in the rearview mirror?

MR. WHITFIELD RUSSELL: Yes. I mean, you have to make a guess. And you do your modelling and you make your best guess, but with the US Congress in charge of carbon emissions we don't know when that's going to happen.

MR. BOB PETERS: On slide 12 you talked about the in-service costs, and you explained your understanding of that to -- to Dr. Grant. Did Whitfield Russell Associates actually calculate the initial in-service costs, that is the annual revenue requirements, for Wuskwatim or Keeyask or Conawapa?

MR. WHITFIELD RUSSELL: No, we -- we know that -- that a $6.3 billion Conawapa cost and a 9 percent levelized annual -- levelized fixed charge applied to a declining rate base. It would start up in the thirteen (13) cent range, I think on Keeyask, yes.

MR. BOB PETERS: The 6.3 million you referenced was for Keey --

MR. WHITFIELD RUSSELL: Six (6) point - - 6.3 billion --

MR. BOB PETERS: Sorry.

MR. WHITFIELD RUSSELL: -- the -- the new one.

MR. BOB PETERS: And that was referencing Keeyask?

MR. WHITFIELD RUSSELL: Yes. So we -- we were -- in other words, by using these ten (10) -- ten (10) cent numbers, the ten (10) hundred dollar per megawatt hour, we -- we were understating the potential impact.

MR. BOB PETERS: Did Whitfield Russell Associates analyze the unit sale prices of the combined-cycle gas turbine electricity going into the future?

MR. WHITFIELD RUSSELL: We've done that on many occasions in the past. We haven't done it recently for this case.

MR. BOB PETERS: What -- what has been the unit sale prices of CCGT?

MR. WHITFIELD RUSSELL: The general rule of thumb when we -- we checked this last fall and got -- got indications from a number of developers and it was around twelve (1,200) hundred a kilowatt completed, was the rule of thumb for combined-cycle gas with no coal generation. With no steam load, in other words.

So you got a -- like a seven thousand (7,000) heat -- or a sixty-three (63) hundred heat rate and twelve (1,200) hundred times whatever the -- the capital structure of the developer was. But it -- it all depends on -- on who the developer is and how his capital structure -- how his project financing is done, and so forth.

MR. BOB PETERS: On your slide 11 you were comparing then that -- that twelve (1,200) hundred dollar per kilowatt number to the nine thousand ($9,000) --

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: -- dollar per kilowatt for -- for the hydro capacity?

MR. WHITFIELD RUSSELL: Correct.

MR. BOB PETERS: And what does the CCGT price work out to in terms of an energy price per kilowatt hour?

MR. WHITFIELD RUSSELL: Well, it depends on the gas price. If you've got a seven thousand (7,000) heat rate on the combined cycle and four dollar ($4) gas, it's twenty-eight dollars ($28) a megawatt hour, and then you add three (3) or four (4) -- two (2) -- two (2) to four dollars ($4) for -- for O&M, so that's another -- that's in the thirty (30),

thirty-two (32) range, and then your fixed charges.

So I haven't -- I haven't done the arithmetic, but that's the general framework.

MR. BOB PETERS: And how much are the fixed charges?

MR. WHITFIELD RUSSELL: Like I say, it depends upon who's financing it and what format. If it's an investor owned utility financing it to put in rate base, you'd -- you'd run a calculation with his -- with his normalized taxes and his -- his capital structure, and you'd get a life cycle cost that way. If it was a project financing with a -- with a 20 percent equity and 80 percent debt, and you'd get a very different and lower cost per capita.

So I'm -- I'm not trying to evade your question. I'm saying it depends on who -- who's building it and for what purpose.

MR. BOB PETERS: Oh, I understand your point. On slide 13 you plotted, from Manitoba Hydro's Appendix 11.3, some average export revenue on -- on its exports to the United States?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: How does Whitfield Russell explain -- Whitfield Russell Associates explain the low value of exports in the All Gas Plan relative

to the -- to the other plans?

MR. WHITFIELD RUSSELL: I -- I don't know what the pattern of sale was. There's certainly going to be fewer sales with the All Gas Plan. So I -- I didn't delve into it, but I would expect that there's -- there's less for sale, and the All Gas Plan probably wouldn't have much in the way of firm sales.

So that would bring whatever they did sell down closer to an opty -- opportunity sale price. But, again, we didn't investigate the details of that modelling.

MR. BOB PETERS: You didn't determine whether or not there was firm export capability?

MR. WHITFIELD RUSSELL: On the gas?

MR. BOB PETERS: Yes, on the All Gas Plan.

MR. WHITFIELD RUSSELL: Correct.

MS. GENEVA LOOKER: The material came from Appendix 11.3. And I don't know whether it's broken down into dependable and opportunity sales. Maybe. I'm not sure.

MR. WHITFIELD RUSSELL: It's -- it wasn't, that I recall.

(BRIEF PAUSE)

MS. GENEVA LOOKER: It is -- it is not broken out. It's just total export sales to the USA.

MR. BOB PETERS: All right. Thank you for that.

(BRIEF PAUSE)

MR. BOB PETERS: On slide 20 -- slide 21, can you explain how the unit cost of Keeyask and Bipole III line was calculated?

MS. GENEVA LOOKER: This was meant to be a very simple analysis. So what we did was I took $6.2 billion for Keeyask, $3.3 billion for Bipole III, summed them up to 9.5 billion, then depreciated them over sixty-seven (67) years and used an 8 percent carrying charge to sort of look at what the revenue requirement would be over time, and then divided by the average megawatt hours output of Keeyask.

MR. BOB PETERS: So the decline in annual unit cost was because of the depreciation that you -- you employed over the --

MS. GENEVA LOOKER: Yes.

MR. BOB PETERS: -- sixty-seven (67) years?

(BRIEF PAUSE)

MR. BOB PETERS: One (1) of the subjects that you talked with, I think, both the panel, as well as Ms. Ramage about, was the -- what's been called the import line. And we could start, I guess, at your slide 39 in terms of a reference slide.

I want to explore and understand better: the suggestion from WRA is that an import line is possible?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: Can you give this panel any examples where an import line has been used?

MR. WHITFIELD RUSSELL: Sure. Southern California Edison is quite dependent upon imports from the desert southwest, which is this -- coal-fired plants to its east, and firm purchases from -- historically, firm purchases from the Pacific Northwest.

So they have a very extensive EHV network dependent upon the availability of those resources. And it's a combination of resources that they own in whole and part, and it's in the desert southwest and -- and sometimes firm purchases.

But these regions, like Southern

California, are -- are very much dependent upon firm imports.

MR. BOB PETERS: And are these transmission lines owned as a merchant line by an investor?

MR. WHITFIELD RUSSELL: Typically, no. It -- they can be now, but, no. Typically, historically, no. They were -- now they're managed and planned by the California ISO. Ownership is private for the most part, and management operation is by the ISO.

MR. BOB PETERS: And is the ownership by -- by an entity that is also the utility, or is it a standalone transmission company?

MR. WHITFIELD RUSSELL: It's -- it's some vertically integrated and some without generation.

MR. BOB PETERS: And is the decision to build or not build made by the investor or is it mandated by the ISO?

MR. WHITFIELD RUSSELL: The OATT administered by the California ISO is what determines, but it's under the general management of California ISO.

Now, there is a hierarchy. In other words, first and foremost, you got to meet the

reliability standards, and if nobody's offering to build a line for import, low cost imports or -- for economic reasons, it's got to be built to maintain reliability standards.

Then if, in addition, someone wants to build a line for economic purposes that's over and above what's required for reliability alone, that -- that's a different kind of calculus, and that also is permitted. And now with Order 1000, planning must been -- must be done to incorporate the need for public policy, satisfying public policy needs, such as renewable power.

So there's -- there's a hierarchy, but it tends to be under the auspices of the California ISO. In my dealing with them on behalf of wind generators, you make your filing with the California ISO and you negotiate with the local owner of the transmission for your needed upgrades.

So if I'm a wind generator in Palm Springs and I want to sell to a customer in the California -- Southern Cal. Edison area, I -- I got to California. The -- the ISO will send me to Southern California Edison for interconnection and transmission, the administration of my needed upgrades.

MR. BOB PETERS: So let's bring that a

little closer to home, or at least my home. And if Manitoba Hydro wanted to have a -- a line into the United States for its exports and also the ability to import, who would it approach? Does it approach the ISO, or does it go to an investor and see if it can strike a --

MR. WHITFIELD RUSSELL: Are we talking about an interconnection to MISO?

MR. BOB PETERS: Yes.

MR. WHITFIELD RUSSELL: All right. Yes, I think -- I think the dealings would be with MISO, but the studies might be conducted -- in the case of the studies we've looked at, the studies might be conducted by one (1) of the investor-owned utilities. We've seen one (1) by XL, and NSP. But this is usually a consortium of engineers from different participants in MISO, and they get together and conduct these studies.

In fact these kind of consortiums date back to my days with PEPCO in the '70s: Multi-company arrangements are -- or groups are assembled to do analysis of needed upgrades.

MR. BOB PETERS: Under the example, who would own the land -- the line -- the line into MISO?

MR. WHITFIELD RUSSELL: Typically in

the US, whoever's service territory it's in owns the line. That was one (1) of the major controversies surrounding Order 1000 because FERC was trying to push independent developers and give them an opportunity to compete for construction of transmission lines. And they finally reached a -- FERC sort of reached a -- a compromise arrangement in which anything built on the existing -- in a transmission owner's rights-of-way would be built by the existing owner; anything on a new right-of-way would be up for competition.

MR. BOB PETERS: So it would have to be the utility whose service territory is going to receive the line that would have to sponsor it through the US regulatory approvals?

MR. WHITFIELD RUSSELL: Not necessarily, no, no. But you'd have to deal with him for getting it done in that territory.

There -- there is a custom, I would say it's a default, that the local in -- investor owned utility owner would -- would build and -- and develop the line sometimes for -- for a joint ownership, and sometimes solely own it, and then render transmission service to the customer. I think you have a mix of both under the arrangements for the line to -- to Minnesota Power.

MS. GENEVA LOOKER: I would note, however, that there has been an increase in merchant -- I'm not sure they're merchant transmission lines, but they are transmission-only companies who have been coming in and proposing to build lines, especially in MISO, currently in order to access wind power and send it to the load centres. And some of those are -- are not the local transmission provider.

MR. WHITFIELD RUSSELL: That's true.

MS. GENEVA LOOKER: And so that is an opportunity -- there are opportunities now to work with some of these newer entities that are out there who are trying to profit from building transmission.

MR. BOB PETERS: Would Manitoba Hydro's, if it could build into the United States a transmission line, have to be coupled with renewable energy proposals to get approval?

MR. WHITFIELD RUSSELL: Not -- not necessarily, no. It would get -- the -- the transmission proponent would file his transmission service request and get in the queue. That's -- that's the typical way you proceed.

MR. BOB PETERS: In terms of Manitoba Hydro having the best access into the MISO market, how deep into the MISO market would it want to have its

transmission?

MR. WHITFIELD RUSSELL: Well --

MR. BOB PETERS: To maximize its return and its ability to sell?

MR. WHITFIELD RUSSELL: The -- it depends. It depends on how much displacement capability there is. And, of course, it depends upon whether you're looking for a backhaul. If -- if you were going east for a supplier, I think you'd benefit more from the -- from the backhaul -- benefits of the backhaul. If you were going to the west, I think there'd be -- some major reinforcements might be needed because you'd be asking for power to be sent in -- in -- as increments on top of the prevailing flow. So you'd need more capability. If you were going south, somewhere in between.

And now the other thing is this power moves thousands of miles -- a thousand miles from California to -- to Bonneville and from -- and even BC Hydro has made sales in Southern California as long -- as far back as the 1960s.

And this is -- this is done by displacement. So you don't have to build a new dedicated line from the buyer to the seller to get the trans -- to get the transaction done. What you do is

you find the choke points on the transmission system through the studies and you upgrade the checkpoint -- the choke points to create the capacity that you need. And very often the power will flow by displacement instead of over a dedicated line.

And again, the only time you get a one (1) to one (1) relationship between the buyer and seller is if you have a direct current line. And so when you see transactions over the DC line from the Columbia River, say, to Los Angeles at Sylmar, S-Y-L-M-A-R, those will be what you put into the -- what you put into the terminal of the line is exactly what you get, less losses, at the far end of the line. And that's the only -- that's the exception to the rule.

All of the AC, alternating current, flows, the power flows by displacement. It's a long answer to your question, but let me just say it this way: If I wanted to go to -- if I wanted to go to St. Louis and buy from Union Electric, which now is called Ameren, A-M-E-R-E-N, a coal-fired utility and I wanted to buy power and have it moved, then he would -- that -- that entity, or you -- or Manitoba Hydro would -- would file their application. And then the studies would be conducted to tell you where all the choke poin -- choke points are and -- and those upg -- and the

cost of making the upgrades to relieve the constraints between Ameren and the -- the Manitoba border with Minnesota.

So that's -- that's the way the process plays out. But you wouldn't have to build a new dedicated line all the way to St. Louis to get that power. You'd pay for the upgrades.

MR. BOB PETERS: And until the study is done, you don't know how many upgrades, or where they are, or what they're going to cost?

MR. WHITFIELD RUSSELL: That's right. And they're done in -- and they're done in the order of the queue.

Now, there's an interesting thing in your case here in Manitoba. Because of those multi-value projects that were underway by MISO, what happens is you do the upgrades under the multi-value program is -- multi-billion dollar upgrades have been -- and if your timing is right and you're shrewd, enough you can get your transmission capacity without making large capital investments in upgrades, because just in association with people prior to you in the queue, sometimes capacity becomes available.

And I think that's one (1) of the arguments that I hear in -- in defence of maintaining

the proposed arrangements, that if -- if you didn't go forward with the Pub Service and the Min Power deal, that preferred position in the queue where you're getting east to west access to Minnesota Power and to Pub Service, if you -- if you struck the deal, you'd fall out of the queue and the guy next in the queue would get that capacity, and you'd go to the end of the queue to make a new request.

So there -- there is -- there is sometimes some savings to be realized on transmission upgrades if your timing is right and -- and you make your request when there's capacity available at no upgrade cost.

MR. BOB PETERS: And when you say, "Pub Service," you're referring to WPS?

MR. WHITFIELD RUSSELL: Yes, Wisconsin Public Service. That's our shorthand for that company.

MR. BOB PETERS: Have you studied Manitoba Hydro's transmission capabilities into the United States at this point in time?

MR. WHITFIELD RUSSELL: Beyond -- no, we were -- we were -- we asked many questions about that. We were not permitted to see the studies. It was all declared to be CSI. We did -- now, there is an Appendix N and an Appendix O to the MISO studies and we

have cited some of those in our -- in our report. We did review those studies, because they -- they evaluated, I think, 2,000 megawatts of additional wind in combination with an 1,100 megawatt export from Manitoba. And those studies are available. We can get them for you.

MR. BOB PETERS: I don't think that's necessary. I think we have access to them, as well, as required. But on slide 40 -- I'm sorry, on slide 41, we're still on the same topic that we've been discussing, and that is what has been called the import line. And you reference on slide 41 many of the things we've talked about.

But the suggestion when you presented this slide was that, based on how much money Manitoba Hydro is having to pay Minnesota Power on account of its taking additional ownership and paying additional capital costs, that suggests that there's an incentive there for parties to come in and pick up the cost of transmission?

MR. WHITFIELD RUSSELL: Yes. And I'm referring specifically to Mr. Jacobson's slide 88 on Exhibit 95.

MR. BOB PETERS: Maybe we'll ask Diana to pull that up. I don't have that committed to

memory, perhaps unlike Dr. Jacobson, but sorry about that. So Exhibit Manitoba Hydro 95, slide 88?

MR. WHITFIELD RUSSELL: Yes, sir. And so what this portrays is the various combinations of Pub Service participation in the new 500 kV line and for a 40 percent ownership. I -- I'm not sure what that 40 percent represents. The 66 percent, I understand, are the percentages of cost responsibility borne by Manitoba Hydro under that scenario.

So there's a 66 percent of the -- of the cost of the capital -- capital cost of the line and the O&M for which Manitoba Hydro is responsible, but it's putting in 304 million to own 49 percent. That's how I understood the -- the testimony.

And then I looked at the ongoing O&M, 567 million. And said to myself, That -- that's a very, very disproportionate amount for O&M. I understand it's a present worth number of future O&M, I took it.

And but I understood from the testimony of Mr. Jacobson that that is accounted for in some substantial part by the fixed charges Manitoba Hydro will pay to Minnesota for the ownership costs differential between its 49 percent ownership and the 66 percent responsibility. And those are some fairly

substantial dollars, as I understand it.

(BRIEF PAUSE)

MR. BOB PETERS: While we're on this slide, and I was pausing to consider whether I would go to -- and maybe I will -- go to Manitoba Hydro's Exhibit 139. It's a public -- it's a public record exhibit. It has some redactions on it. It probably has Dr. Jacobson's fingerprints on it, too.

And I'm not sure if you've had an opportunity, Ms. Looker and Mr. Russell, to review this particular exhibit. And I don't even know what date it was filed.

But is it one that you're familiar with?

MR. WHITFIELD RUSSELL: I have not seen this before.

MR. BOB PETERS: All right.

MR. WHITFIELD RUSSELL: It sound -- it sounds to be on point though.

MR. BOB PETERS: Well, if we could just scroll to the next -- to page 2, I think what we get to is a further explanation. There's a series of tables dealing with capital O&M and -- and certain investments in the -- in the line. And I should indicate that

there have been some written questions posed recently to Manitoba Hydro to clarify certain aspects of this.

So the point I want to get to though is Manitoba Hydro is making an investment in this line because WPS has determined it will not be investing in the line.

Is that your understanding?

MR. WHITFIELD RUSSELL: I so understood, yes.

MR. BOB PETERS: And that being the case, and you're showing us on the previous slide that you looked at which was Manitoba Hydro Exhibit 95 and slide 88 of the revenue that would flow from that arrangement to suggest that there's an incentive in there to -- to build or own transmission, does all of this suggest that Manitoba Hydro will be able to, in my words, sell all or part of their interest in this Great Northern Transmission Line if they so desire?

MR. WHITFIELD RUSSELL: I would think there would be interested buyers, yes.

MR. BOB PETERS: And what would be the process in -- in terms of marketing that? Is that a -- is that one (1) where there's an opportunity to put it out to see what the market would pay for them? Or do they have to negotiate with a counterparty?

MR. WHITFIELD RUSSELL: I know that some transmission systems have been sold in their entirety by taking bids. For example, the Consumer's Power System was bought by a company affiliated with Trans-Elect. And then -- but I think some negotiation would be expected. But, you know, it might be preceded by a request for proposal and then evalu -- negotiate with the best bids.

MR. BOB PETERS: All right. On the same -- on slide -- back to slide 41 of Exhibit MMF-31 revised, the third bullet, an indication that certain Minnesota utilities have petitioned the Minnesota Public Utilities Board to consider a competing alternative to the Great Northern Transmission project.

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And you're relying on a Megawatt Daily article of April 17th, 2014, for that information?

MR. WHITFIELD RUSSELL: Yes, and I followed up by phone calls to Missouri River, who was one (1) of the participants.

MR. BOB PETERS: And --

MR. WHITFIELD RUSSELL: And I confirmed the -- what's going on, yes.

MR. BOB PETERS: Well, first of all,

could -- could you, through your counsel, undertake to file a copy of the Megawatt Daily for April 17, 2014?

MR. WHITFIELD RUSSELL: Of -- of course, sure.

--- UNDERTAKING NO. 147: Whitfield Russell Associates to provide a copy of the April 17, 2014, article from Megawatt Daily

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: And in addition to that you said that the utilities have petitioned the Minnesota regulator.

Does that suggest there is opposition to the Great Northern Transmission Line?

MR. WHITFIELD RUSSELL: Yes, they -- the story that I got from my contact was that there was some interest on the part of these other folks to get -- build transmission to Manitoba in -- in lieu of or in addition to. But for this purpose, in lieu of the Great Northern Transmission project.

MR. BOB PETERS: And is it your understanding that that interest in building a transmission line would be available to serve Manitoba

Hydro?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: Is there a public filing that you're aware about as to whether there's any costs associated with that line that would have to be borne by the Manitoba utility?

MR. WHITFIELD RUSSELL: I haven't looked. I expect there is a part of a petition. I don't know.

MR. BOB PETERS: All right. Well, then I'm going to ask --

MR. WHITFIELD RUSSELL: I'd be surprised if there weren't.

MR. BOB PETERS: -- I'm going to ask for some more homework for Ms. Saunders and Mr. Marques, if -- if Whitfield Russell Associates could undertake to determine whether there is, on the public record, indication as to what alternative arrangement is being proposed and whether or not there is any suggestion that Manitoba Hydro would have to contribute financially to that project.

MR. WHITFIELD RUSSELL: Okay. And I do know that the line was going to -- is proposed to go to Fargo, where it would pick up the capex lines for deliveries to the East. But they were also interested

in taking deliveries back to the West, because there's been a very great increase in loads in North Dakota in connection with the Bakken Reserve development, B-A-K-K-E-N.

I was also told that the -- the loop flow problem associated with the Fargo line would not be as significant -- it was likely not as significant for an import line as it would be for an export line.

MR. BOB PETERS: At the risk of sounding like I understand what that means, can you explain to the panel what the loop flow problem is at--

MR. WHITFIELD RUSSELL: Yes

MR. BOB PETERS: -- Fargo?

MR. WHITFIELD RUSSELL: I'm sorry, it was too cryptic. The -- the MISO studies of the proposed Great Northern Transmission Project evaluated both a line to Fargo and a line to -- planned to Blackberry.

And one (1) of the -- even though it's a longer line and more expensive to go to Blackberry, it had in its favour less loop flow would enter Manitoba from North Dakota and Minnesota and make its way through the Manitoba Hydro transmission system and be superimposed on the exports that would go to Black -- Blackberry.

So that -- that loop flow problem would be far worse, apparently, if you go to Fargo than it would be if the line goes to Blackberry. I raised that issue with my contact at the Missouri River Energy System. And his -- his response was that they thought it was less of an issue if Manitoba were importing. But he didn't offer any refined analysis.

MR. BOB PETERS: Well, we'll see if anything you're able to provide to the panel is supported in the filing to that effect. That would perhaps --

MR. WHITFIELD RUSSELL: Okay.

MR. BOB PETERS: -- assist in understanding.

MR. TONY MARQUES: Mr. Peters, just so that I understand what one (1) of the two (2) of us are going to have to do, we are undertaking to determine whether there was anything on the public record or, I suppose, that's not on the public but that can be disclosed, because obviously Mr. Russell has a number of sources, as to whether Manitoba Hydro is able to benefit from any such line that's -- that's being contemplated and whether or not it would be expected to pay in order to participate?

MR. BOB PETERS: Yes. And -- and a bit

more generally, Mr. Marques, there's a sugge -- the -- the one (1) request was for a copy of that -- that article --

MR. TONY MARQUES: Yes, we have that.

MR. BOB PETERS: -- which I don't think was -- which is understood. But then it was to -- to whether or not there is information available that would explain the -- the third bullet on slide 41 where Minnesota utilities have petitioned the Minnesota PUB to consider a competing alternative and, in looking to see what that information is, whether there is any indication as to whether a financial contribution from Manitoba Hydro would be part of that.

Would that assist you, sir?

MR. TONY MARQUES: Yes. Thank you.

--- UNDERTAKING NO. 148: Whitfield Russell Associates to determine whether or not there is information available that would explain the third bullet on slide 41 where Minnesota utilities have petitioned the Minnesota PUB to consider a competing

alternative and, in looking to see what that information is, whether there is any indication as to whether a financial contribution from Manitoba Hydro would be part of that

CONTINUED BY MR. BOB PETERS:

MR. BOB PETERS: And are you able to disclose, Mr. Russell, other than Missouri River, what other Minnesota utilities are involved in the petition?

MR. WHITFIELD RUSSELL: It's NSP, which is part of Excel. And I -- I forgot. I think Great River. Great River and -- and maybe Otter Tail Power, but the article will tell you that.

(BRIEF PAUSE)

MR. BOB PETERS: Did you want a couple of minutes on that matter, or can we just move forward?

MR. WHITFIELD RUSSELL: We can go.

MR. BOB PETERS: All right. Also on page 41, the last bullet talked about firm power sold during an off-peak season commands only about half the

demand charges associated with on-peak firm power during on-peak seasons, correct?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: Would that apply to both firm winter supply as well as diversity exchange purchases?

MR. WHITFIELD RUSSELL: Diversity exchange typically does not have a demand charge, so it would not apply.

MR. BOB PETERS: Well, then what about firm winter supply?

MR. WHITFIELD RUSSELL: A firm winter supply would probably have a reduced demand charge. And I said firm power sold; I should say that the demand charge on the firm power sold tends to be lower, not the entirety of the power.

MR. BOB PETERS: All right. Thank you for that clarification. I want to turn to some of the reliability issues. There was just a couple of questions that...

(BRIEF PAUSE)

MR. BOB PETERS: Perhaps a better approach would be on slide 33.

(BRIEF PAUSE)

MR. BOB PETERS: The upshot from the first bullet point is the point that you made, is that the building of Keeyask and Conawapa is going to use up most of Bipole III capacity, correct?

MR. WHITFIELD RUSSELL: Keeyask would use up six thirty (630) out of the two thousand (2,000), and Conawapa would use it all up.

MR. BOB PETERS: All right. Maybe -- maybe a better chart -- and I'll Diana if she could pull up your pre-filed evidence which is MMF Exhibit 14. And on page 24, there was a chart that I think will help. That was in direct response -- I think the Chairman and -- and yourself had some questions on it.

What you're showing the panel on this chart in the evidence is that Bipoles I and II have a capacity of 3,854 megawatts?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And that -- the -- the existing northern generation that's using the DC line uses up about 3,562 megawatts.

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And the remaining capacity is not sufficient for Keeyask --

MR. WHITFIELD RUSSELL: Correct.

MR. BOB PETERS: -- at least on a -- the way you've presented it here, correct?

MR. WHITFIELD RUSSELL: Correct.

MR. BOB PETERS: And if that's the case, you then add Bipole III at about 2,300 megawatts, at least at the northern end?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And if that leaves a surplus of 1,962 megawatts, that's more than enough room for Conawapa to fit on at 1,395 megawatts, correct?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: So at the end of -- of the -- the Preferred Development Plan, there'd be remaining capacity of 567 megawatts on the Bipole III line?

MR. WHITFIELD RUSSELL: Yes, and -- and there are a couple of refinements needed here. First, the Bipole III only goes to twenty-three hundred (2,300) when Conawapa is added. And second, when Conawapa is added, because the network has a stability limit of forty-seven fifty (4,750), that is the wires can carry their full load but the -- it would be unstable if done so, the Northern Collector System must

be broken up into two (2) pieces.

And when you redo that, there's some considerable testimony by I think Hydro and -- and of course the NFAT itself, a lot of data responses, and by power engineers telling how that works.

My understanding is that the end result is that 300 megawatts at Kettle has to moved over to the AC system and moved south through Winnipeg in that way, one hundred (100) to three hundred (300).

MR. BOB PETERS: All right. And there was a slide that Dr. Jacobson took the panel to in the slide deck, which was Manitoba Hydro Exhibit 95. I believe slide 85. It's close. It's a -- it's a drawing. And I'll look to Ms. Ramage if she has a better guesstimate. Still getting close. There it is there, yes. Thank you very much. Slide -- slide 83.

MR. WHITFIELD RUSSELL: I have it.

MR. BOB PETERS: Have you seen this slide before?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And what you're reminding the panel of is that on both Keeyask and Conawapa coming in service, some of the Keeyask output would be -- I'm sorry, the -- at that point the Kettle output would be moved over to a north-south upgrade

project?

MR. WHITFIELD RUSSELL: Yes, sir.

MR. BOB PETERS: And under the reliability criteria that Hydro used in the Clean Environment Commission proceedings, would Hydro need to build additional north-south transmission after Keeyask and Conawapa comes online, or is this shown here until the Kettle unit on AC the required upgrade?

MR. WHITFIELD RUSSELL: May I have the question reread, or restated? It's -- it's simply -- the reference to the CEC proceeding is what threw me.

MR. BOB PETERS: You had referenced in your materials Manitoba Hydro's reliability standards and -- and what it would need to do for Bipole III when it was before the Clean Environment Commission?

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: And my understanding is that as a result of that analysis, Manitoba Hydro would propose doing what they show the Board here on slide 83 of Manitoba Hydro Exhibit 80 -- 95?

MR. WHITFIELD RUSSELL: I presume that that would be the way they would incorporate Conawapa, yes.

MR. BOB PETERS: Has the cost of this additional transmission been included in the NFAT

analysis, do you know?

MR. WHITFIELD RUSSELL: I --

MR. BOB PETERS: The initial north-south?

MR. WHITFIELD RUSSELL: Yes, I think it's the difference between 2A and 2, the plans for the AC upgrades. I'm not -- I'm not recalling the details, but I do remember that discussion.

MS. GENEVA LOOKER: I -- I do believe that the costs of the north-south transmission project are included in those plans that require both Keeyask and Conawapa.

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: If your question is whether you'd still need the import line with this reconfiguration to provide backup for loss of Bipoles I and II, the answer would be yes.

MR. BOB PETERS: And I was looking at it perhaps from a -- a different perspective. If we go back to page 23 of MMF Exhibit 14.

Where Bipole III was available, if there was a -- an outage on Bipoles I and II, that same ability doesn't exist once Bipole III is loaded with

Keeyask and Conawapa?

MR. WHITFIELD RUSSELL: Correct.

MR. BOB PETERS: And so at that point if we're going to talk to the same reliability standards, are we envisioning that there's a -- a further requirement, if not for the import line, a further requirement for another Bipole after Keeyask and Conawapa are built to improve reliability to the same standard that has been -- that it's being built in the first place?

(BRIEF PAUSE)

MR. WHITFIELD RUSSELL: Well, obviously if we load up Bipole III with Conawapa, and Limestone, and Long Spruce, and in combination with Bipoles -- yeah, you've got a different configuration; a loss of Bipole I and II would be a very different situation here, wouldn't it.

MR. BOB PETERS: Well, let's not get -- let's not get too deep into the -- into that configuration, if we -- if we can, Mr. Russell. But from a -- from a Manitoban's reliability requirement, if Bipole III was supposed to provide a certain level of reliability to us in the case of outages on Bipoles

I and II, that reliability, from your evidence, only exists if Keeyask and Conawapa Power is not already on Bipole III?

MR. WHITFIELD RUSSELL: Correct. And it -- it -- when Keeyask comes on by itself you diminish this reserve and, yes, but it disappears with Conawapa.

MR. BOB PETERS: And if Manitobans want the same reliability level after Conawapa and Keeyask are constructed and after Bipole III is constructed what options does Manitoba Hydro have?

MR. WHITFIELD RUSSELL: I think that's the subject of our -- the rebuttal testimony and the chart at...

MR. BOB PETERS: Slide 49?

MR. WHITFIELD RUSSELL: Forty-nine (49), yes.

MR. BOB PETERS: All right. I'll ask Diana to find, as she has, slide 49 of your PowerPoint.

So can you then explain your answer to the Board using this chart?

MR. WHITFIELD RUSSELL: Yes. As the -- as the Board could see, without the second -- without the orange line, which is the interconnection to the US, the ability of Bipole III to provide reserve would

diminish until 2026. Then with the 300-megawatt upgrade associated with Conawapa, it would prolong the ability to meet the standard until 2030, and then Bipole III couldn't -- couldn't do it anymore. But by adding the AC intertie upgrade to the US in 2020, the ability to backup the loss of Bipoles I and II is extended until 2041. And I'm not sure what additions are represented by the bumps at 2041 and 2044, but that -- that's the general -- that's the general plan for meeting that criterion.

But -- and I want to reiterate that -- that there's no indication here that the amount of capacity would be firmed up with firm purchases as well on the Preferred Plan. You get transmission capacity, but part of the deterministic standard was that the import capacity from the US also be backed up with gas turbines. And this doesn't go to that issue.

MR. BOB PETERS: I -- I understand that point. That would just layer on additional cost --

MR. WHITFIELD RUSSELL: Yes.

MR. BOB PETERS: -- if that was to be the case?

MR. WHITFIELD RUSSELL: Correct.

MR. BOB PETERS: Now, instead of this orange line, what would a fourth bipole look like on

this chart? Would it replicate -- just be slightly higher than this orange line on here or would it be something configured differently?

MR. WHITFIELD RUSSELL: Well, a fourth bipole unloaded would restore the reserve at any -- or increase the reserve against loss of Bipoles I and II at -- at any point in time, as would an increase in the import cap -- the interconnection capability to the United Stated. They're fungible, that's my point.

MR. BOB PETERS: All right. I want to turn to your slide 51, if I could, please. I don't want to get between you and Dr. Jacobson when you're fighting over some exciting things like standard TPL-002, but for those of us who don't read that regularly, the -- the concern that you've voiced is that the N minus 1 event can occur, but firm transfers are not supposed to be curtailed?

MR. WHITFIELD RUSSELL: That's the rule. If you look at the standard, that's the general rule you start with, yes.

MR. BOB PETERS: And you've indicated Manitoba Hydro appears to have employed, or does employ, some special protection systems to deal with its system that could meet operating reliability levels?

MR. WHITFIELD RUSSELL: It doesn't meet the standard. What it does is it's grandfathered. And MISO has grandfathered it. They're willing to live with it. And it can -- so long as the amount of curtailment from the SPS is not increased, it can -- it can continue on. Now, that doesn't change the standard, however. It -- it does not meet the standard.

MR. BOB PETERS: All right. And in terms of this Footnote B that's been talked about by yourself as well as other witnesses, has NERC provided an opinion or a clarification on whether the special protection systems qualify under Note B?

MR. WHITFIELD RUSSELL: I'd be surprised if there weren't some -- because the -- the reliability standards do address SPS, but I have not studied that. There was a dispu -- you -- you're going to be surprised -- there was a contested proceeding at FERC with respect to this footnote. And -- and it arose because the NERC reliability standards are being applied to the jurisdictional utilities, and financial penalties will be imposed for failure to meet the standards. So it became very important how this was -- was interpreted.

But the -- the focus was entirely upon

the first sentence of Note B, whether you could curtail a radio customer or a local network customer connected to or supplied by the faulted element. I don't see -- I never saw any dispute or interpretation on the SPS.

(BRIEF PAUSE)

MR. BOB PETERS: You'd indicated, Mr. Russell, that you'd be surprised if the NERC hadn't provided some clarification on Footnote B and whether or not a special protection system is -- is -- qualifies under that footnote.

Did I understand that correctly?

MR. WHITFIELD RUSSELL: Yes, there are a number of SPSs around the country; New England, many of them in California, and there is, of course, this one which is highly prominent.

MR. BOB PETERS: And does it change your view if -- if the SPS is qualified under Footnote B and accepted under Footnote b by -- by NERC?

MR. WHITFIELD RUSSELL: If -- if they -- if they confronted the issue and addressed it and resolved it, I guess that it lends some weight to Manitoba Hydro's position. I'm just unaware of it.

MR. BOB PETERS: And is -- and I'm not

saying it does exist. I'm just wanting to know what your position would be if it did exist.

MR. WHITFIELD RUSSELL: Well, it -- the point is this: This is quasi-firm power. So if I'm buying power from Manitoba Hydro -- we had a very similar situation in California where firm transmission meant quasi-firm because it was subject to an SPS and had to be curtailed. So in terms of the buyer, it seems to me that the use of the SPS on an N minus 1 transaction reduces the price that Manitoba Hydro might otherwise get for that firm power. That is, if there was enough AC backup to continue the transaction afterwards and allow for a controlled adjustment -- system adjustment, I think that would increase the value of the power and it could be sold for more.

MR. BOB PETERS: I'm going to ask one (1) last undertaking then, Mr. Russell. You said you hadn't done -- you weren't aware of -- of any clarification in this specific situation here, and don't take from my question that I'm aware of there being any. But if you could just undertake through your counsel to advise this panel whether or not NERC has provided an opinion on whether the SPS qualifies under Footnote B, that would be appreciated.

MR. WHITFIELD RUSSELL: Okay. I will

endeavour to do so if my counsel permits.

MR. BOB PETERS: Well, you'll have to explain it to them first.

MS. JESSICA SAUNDERS: We were able to follow. Thank you.

MR. BOB PETERS: It wasn't -- it wasn't you, Ms. Saunders, I was concerned about.

--- UNDERTAKING NO. 149: Whitfield Russell Associates to advise whether or not NERC has provided an opinion on whether the SPS qualifies under Footnote B

MR. BOB PETERS: Okay. That's enough. Mr. Chairman, those are my questions of Mr. Russell and Ms. Looker. I'd like to thank them very much for their cooperation.

THE CHAIRPERSON: I have a few questions that I want to resolve in my head because, you know, frankly, you've been somewhat dismissive of some of the evidence that we've heard in these proceedings in respect of getting regulatory approval in Minnesota in particular.

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: Yet we've heard lots of evidence to the contrary, and now you're suggesting to us that what we heard about the difficulties of getting approval from Minnesota are being exaggerated. And I have some problems with that because, you know, I don't know.

Have you been before the Minnesota regulator?

MR. WHITFIELD RUSSELL: Yes, I have.

THE CHAIRPERSON: In respect of transmission?

MR. WHITFIELD RUSSELL: Yes. I've testified there on a merger case of what was called Primergy, which failed, and it seems to me I've testified there on the Arrow headline.

THE CHAIRPERSON: So -- so this was a recent case or --

MR. WHITFIELD RUSSELL: No. This -- the Arrow headline was -- must have been eight (8) or ten (10) years ago.

THE CHAIRPERSON: Yeah. I guess that's -- that's part of the difficulty I have, you know, it's you being -- you -- you asking us to draw conclusions based on the experience you've had some time ago with

respect to what the Minnesota regulator will do.

Now, I -- I grant you your considerable experience in transmission issues generally without you having to state your knowledge of NERC and FERC and so on. But the reality is that, you know, I have to believe that -- that Man -- Manitoba Hydro had to work really hard to put a proposal before the regulator that they think they can sell, and its partner.

So now you're suggesting that -- that we should abandon that approach in favour of redirecting energy flows within that state and so on. So increase my level of confidence.

MR. WHITFIELD RUSSELL: All right. Let -- let me say it this way, Mr. -- is it Gosselin, Mr. Gosselin?

THE CHAIRPERSON: Yeah.

MR. WHITFIELD RUSSELL: The general rule of thumb that all of us in this business know is FERC has jurisdiction, exclusive jurisdiction, over transmission, access, not -- and -- and that -- that jurisdiction has been implemented through these open-access transmission tariffs. They've been in place since 1996 and is a well-defined and understood policy by which you ask for and obtain upgrades to the transmission system with a queue and application and

studies and milestones.

In fact, you know, the -- if you wanted Minnesota or MISO to -- to do it, they -- they have to respond to you in a specific time. If you pay the bill, they have to give you the study in forty-five (45) days. If you pay the next bill and you like the study, they'll do the facilities design in the next one eighty (180) days. And then after that, you proceed to your interconnection or transmission arrangement. I think it's within eighteen (18) months. So it's -- it's a very structured, mandatory procedure.

Now, if Minnesota were to inject themselves into that procedure and start denying people access to transmission in Minnesota on some basis unrelated to FERC's primary jurisdiction, that sets up a fight between those two (2) jurisdictions. There have been a number over the decades I've been in the business. FERC usually prevails.

The second is this: This issue became so frustrating to the industry that Congress passed something called the National Interest Electric Transmission Corridor Legislation. And it's -- it's -- and I'll confess, it's been off to a rocky start. There have been some -- some appeals which have frustrated one (1) of the corridors that were

designated.

But the general rule is this. If you have enough need for transmission to be built and you've got a state or states which is obstructing the need for this transmission, FERC, through the -- in the NIETC legislation, can override that by designating a corridor, and then it becomes a federal matter. It -- it's merely another way of reinforcing the general rule that transmission is under the primary jurisdiction of FERC.

So that's -- that's how I view the posture. Yes, Minnesota no doubt could frustrate Manitoba in trying to obtain transmission through Manitoba, but maybe not through North Dakota, maybe not through -- you know, down to Fargo.

So it's a -- to me, it's -- it's a problem. We all litigate for a living, and we know how it can hold you up and be expensive. But as a matter of ultimate outcome, I have no doubt that Manitoba and its opposite parties wanting to transact power could make the case and get transmission service.

THE CHAIRPERSON: Yeah, and -- and that -- you know, we're talking -- again, what you've just cited to me is a generalized approach to transmission in the United States and so on. But there are

responsibilities in -- that -- that accrue to the -- to the state, relative to the responsibilities that accrue to FERC.

I mean, for example, renewable energy standards are state driven, aren't they?

MR. WHITFIELD RUSSELL: Oh, yes.

THE CHAIRPERSON: Yeah. So --

MR. WHITFIELD RUSSELL: Yes.

THE CHAIRPERSON: -- I mean, there are a number of elements here that go beyond FERC's jurisdiction that relate directly to the responsibility of the state. And -- and in this case, the state is being asked to consider a particular proposal. And you can't just say, We're going to resubmit another proposal expecting that there'll be a -- a counterparty willing to -- to stand shoulder to shoulder with Manitoba Hydro.

I mean, you'll -- you'll concede that much, if there were -- there is at least something that is available to consider in respect of what Manitoba has put before us, and you're -- you're suggesting that it would relatively easy to come up with another proposal.

And I'm -- I'm having trouble with that.

MR. WHITFIELD RUSSELL: And -- and let

me say there's another middle ground here, which is you've got a proposal on the ground. You've got the parties that agreed to it in Minnesota and -- and Pub Service and Manitoba. And if -- if you can't go forward with the line as planned, you can go forward with a rearrangement of the economic conditions and renegotiate that, but you wouldn't change the 750 megawatt line.

I'm not saying that that's something you want to do or undertake, but you don't lose the opportunity to build this line simply because you alter the economic terms under which it's built.

MS. GENEVA LOOKER: I would just like to point out that at that at -- one (1) of our conclusions, I believe, is that we do favour a second interconnection to the US. So it is not that we are anti this line.

MR. WHITFIELD RUSSELL: Right.

MS. GENEVA LOOKER: We see a lot of benefits, especially reliability benefits, to this line, or another line like it to the United States.

THE CHAIRPERSON: In this case it's not available to us. I mean, we can -- we can surmise that there's another proposal that could be put on the table at some point, but it's either we -- we support the

notion of this line, or we don't support it. We -- we have no alternative that -- that's before us.

So coming back to the original point, I mean, does this line satisfy what you've -- you've expressed as support for an intertie?

MR. WHITFIELD RUSSELL: Well, yes. I think our -- our original pitch is that this AC interconnection, especially one that was reinforced, would have been a substitute for Bipole III. And then when you get to Keeyask and Conawapa, Bipole III would be a part of that -- that analysis and that incremental investment required.

It's too late to go back and rewrite history. And so how -- how you proceed from here with respect to pursuing -- the -- the real issue here is pursuing elements of the LCA No New Generation case while still keeping that 750 megawatt line. And I think there is probably room to negotiate that with deferrals of Keeyask and Conawapa.

THE CHAIRPERSON: Now, again, I'm having -- now, I'm having trouble again, because you're suggesting that we pursue the new -- new generation when I'd thought you conceded -- you'd agreed with La Capra that that was a hypothetical case that could be used to alter the mix of future generation

possibilities?

MR. WHITFIELD RUSSELL: I do agree with that, yes. But we've got a -- we've got a specific plan for -- for poles and wires going to the US, a 500 kV line, which is indispensable to the La Capra plan. Where it departs from the -- Plan 17 is Keeyask and Conawapa is the first element.

The benefits of the Plan 17 come from the deferrals of Keeyask and Conawapa in-service dates. That's -- that's where the real -- where the real saving is. So to recast the issue here, if you find the Plan 17 to be attractive, and Lord knows it needs that line to make it attractive, then the -- the -- then the process is what can be done to preserve the line while deferring Keeyask and Conawapa. That seems to me what's best for Manitoba. And if that's what's best for Manitoba, why -- why is that, you know, hypothetically not -- not the objective and the -- and the thing we should pursue?

Now, you -- you postulated a good qualification on that. We don't know yet for sure. It hasn't been a fully vetted Plan 17. So the no new generation case, how -- how it fits with a deferral of Keeyask and Conawapa while still maintaining an early completion of the line is -- is the problem to

confront.

And I don't know the answer to that. I'm sorry.

THE CHAIRPERSON: Thank you for those. Ms. Ramage, please?

RE-CROSS-EXAMINATION BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: I just have a couple of quick follow-up questions and some exhibits to file, so don't let me sign off without doing it.

Now, you spoke of requesting transmission service, getting in the queue, getting an application, getting studies done, and that's one (1) line of the process. But can you confirm, to be clear, that while you're doing that part of the requirements is a state certificate of NAIT (phonetic) will be required from the state in which the line is physically located, correct?

MR. WHITFIELD RUSSELL: Typically, yes. Yes.

MS. PATTI RAMAGE: Okay. And in terms of that queue and application and studies, would you accept that Manitoba Hydro went into the queue for this particular project in 2008, that would be six (6) years ago, to get to this point?

MR. WHITFIELD RUSSELL: Yes. And -- and I made the point earlier that by virtue of your position in the queue you're going to get the benefit of a lot of transmission capability without any upgrade cost. We -- I recognize that.

MS. PATTI RAMAGE: Okay. And when we look at the article from Megawatt Daily, and it says that:

> "A group of Minnesota utilities is urging the PUC to consider an alternative to the Great Northern Transmission Project. Great River Energy, Missouri River Energy Services, NSP, Minnesota, and Otter Tail Power want the PUC to more closely study an alternate project that would run into the -- run to Manitoba along Minnesota's western border."

They do not have anything in the queue right now, correct?

MR. WHITFIELD RUSSELL: I don't know.

MS. PATTI RAMAGE: Okay.

MR. WHITFIELD RUSSELL: But they certainly have -- the east-west portion of it is in the

queue of being built. In other words, when you get down to Fargo the capex project is under development and portions of it are complete. So they don't need anything in the queue. They finished the queue on that leg of the triangle.

MS. PATTI RAMAGE: And when -- when tho -- if we assume those utilities wanted to move forward and involve Manitoba Hydro, Manitoba Hydro would have to be part of, for lack of a better term, the solution, correct? It would have to be beneficial to Hydro, too?

MR. WHITFIELD RUSSELL: Yes.

MS. PATTI RAMAGE: And so when we're looking at a project right now that is over six (6) years in the making, you're suggesting that we start all over with a group of utilities that have not put anything down; there -- there's nothing solid to -- to move forward with right now; it's an idea?

MR. WHITFIELD RUSSELL: I -- I don't know where that is. That's correct.

MS. PATTI RAMAGE: Okay. Thank you. Oh, and some exhibits. We have two (2) exhibits to enter before we adjourn for -- till final argument. We'll adjourn the evidentiary portion. I'll get those. I will pass them out.

But they're -- one (1) is Manitoba Hydro

Exhibit 154. It is our Undertaking number 74 revised. This is an undertaking given to the MMF, and they requested additional information be included in it, so we've revised that exhibit and we'll be distributing that.

--- EXHIBIT NO. MH-154 REVISED:
Response to Undertaking 74

MS. PATTI RAMAGE: The other is Manitoba Hydro's response to Undertaking number 142. That will be Exhibit 201. And that is dealing with the -- the section in the contract saying the contracts will require Keeyask. This is a redacted version of that undertaking. There will also be a CSI version of that filed.

--- EXHIBIT NO. MH-201: Response to Undertaking 142

THE CHAIRPERSON: I believe that completes today's proceedings. So that's it for the evidence that we're going to hear. And then what's left for this panel is presentations from the public and closing arguments from the parties.

So on behalf of the panel I'd like to

thank both of you for attending today and for having contributed to these proceedings. And I hope that you have a safe trip back home. So I know that this has been a difficult project for you, as it has been for other participants in this process, so thank you very much for your work so far.

And, everyone else, we'll see each other again on next -- next Tuesday, I believe.

MR. WHITFIELD RUSSELL: Thank you.

MR. BOB PETERS: That would be the 20th of May.

THE CHAIRPERSON: Thank you. Okay. With that, have a good evening, everyone, and we'll see other again next week.

(PANELS STANDS DOWN)

--- Upon adjourning at 4:41 p.m.

Certified Correct,

_____

Cheryl Lavigne, Ms.

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Tab 100

MPA Morrison Park Advisors

Commercial Evaluation of Manitoba Hydro Preferred Development Plan Business Case

Prepared by Morrison Park Advisors
For

Manitoba Public Utilities Board

January 2014

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Executive Summary

Scope of Work

MPA was retained by the PUB to provide a commercial evaluation of the Manitoba Hydro Preferred Development Plan Business Case, as detailed in the NFAT. Specifically, MPA's review is to include

a) Consideration of the overall costs, risks and benefits being assumed by Manitoba Hydro in the pursuit of the Preferred Development Plan, particularly in light of potential alternatives to the Preferred Development Plan which could satisfy provincial and ratepayer objectives (commercial reasonableness of the Preferred Development Plan);

b) Consideration of the costs assumed, risks taken, and compensating benefits expected for each relevant stakeholder of Manitoba Hydro, including ratepayers, the Government of Manitoba, Manitoba taxpayers, and others (relative commercial reasonableness of the Preferred Development Plan for various stakeholders);

c) Consideration of commercial risks being assumed by Manitoba Hydro as part of its export agreements, and specifically how these risks relate to the risks being taken by Manitoba ratepayers in the event that export agreements do not perform according to optimal scenarios (commercial reasonableness of the export aspects of the Preferred Development Plan in relation to the domestic services portions); and

d) Consideration of specific financial impacts and risks being assumed as part of the Preferred Development Plan by the Government of Manitoba and the taxpayers of Manitoba, as they relate to the Province's credit rating, borrowing capacity, potential impact on other budgetary priorities, credit availability, and credit rates in the future.

Summary of Financial Model

MPA has constructed a financial model on Manitoba Hydro's electrical operations in order to address the scope of work put to MPA by the PUB under the NFAT. MPA relied upon the NFAT Business Case, the appendices thereto, and numerous discussions and correspondence with Manitoba Hydro management and employees on the matter of Manitoba Hydro operations, and economic and financial conditions. MPA received SPLASH (Simulation Program for Long-term Analysis of System Hydraulics) output from Manitoba Hydro with respect to the development plans considered under the NFAT.

MPA matched the SPLASH data with the development plans detailed in Appendix 11.4 of the NFAT Business Case, eliminating plans for which pro forma financial statement data was not provided. MPA extracted chained, opportunity export revenue for every given hydrological regime and model year, allowing for the determination of actual, annual opportunity export revenue, calculated for a given supply mix that Manitoba Hydro anticipates to eventuate in a given year. This information and extraction (from SPLASH), and application (to Appendix 11.4) allowed MPA to produce a set of financial

statements (income statement, balance sheet and cash flow statement) for every development plan modelled under Appendix 11.4 under all scenarios, and under all previous hydrology regimes.

In reaching our conclusions contained in this report, MPA has run the All Gas and Preferred Development plans, and Plans 4, 6 and 12 under the 2012 reference Manitoba load for all 99 years of hydrological history through year 2062 (at reference economics, energy and capital, for 495 total runs).

The All Gas and Preferred Development Plans were further run at high and low 2012 Manitoba load for all 99 years of hydrological history through year 2062 (at reference economics, energy and capital, for 396 total runs).

The Preferred Development Plan was further run at 4x 2013 DSM and 1x 2012 DSM (both at 2013 reference Manitoba load) for all 99 years of hydrological history through year 2062 (at reference economics, energy and capital, for 198 total runs).

The All Gas and Preferred Development plans, and Plans 4,6 and 12, were run for 21 different years of hydrological history, for every combination of reference, high and low economics, energy and capital costs, for a total of 546 runs per development plan, or 2730 total runs.

In total, MPA performed 3,819 different runs of the financial model. The financial model, as constructed in the manner detailed above, formed the basis for our financial conclusions reached in this report.

Findings on Ratepayer Total Costs

- Findings are in reference to the average probability weighted present value basis of domestic revenue
- Resource Plans 4 and 6, which include Keeyask, some level of transmission interconnection and natural gas plants, appear to fare consistently better than the other options
- Plans 14 and 12, which include Conawapa, are consistently ranked as more costly to ratepayers than Plans 4 and 6, which include Keeyask but not Conawapa
- Plan 1, the All Gas Plan, ranks poorly when economic variables such as inflation and interest rates are low, but better when they are moderate or high; this is particularly true with respect to the Preferred Plan 14, which is superior to All Gas in the low economics environment but not otherwise
- Plan 1, the All Gas Plan, ranks relatively poorly when the discount rate is lower at 6%, but better when the discount rate is higher at 10%, suggesting that the relative time value of money is an important consideration
- Plan 4, with a 250 MW interconnection, always ranks better than Plan 6, with a 750 MW interconnection

- Similarly, Plan 14 is better than Plan 12 in every case but one, suggesting that an earlier construction and export orientation for the Conawapa facility is better than a later one

- Changing Manitoba demand does not actually affect the total cost to ratepayers over 48 years very much, if all other variables are kept constant; the difference in total cost to ratepayers between High and Low Manitoba demand futures is not more than about 2% in any of the cases

Findings on Government Revenues

As might be expected, the differences between Resource Plans with respect to revenues for the Government of Manitoba are clear, and align with the construction of hydroelectric facilities.

Average Probability Weighted PV of Revenue to the Province of Manitoba
High, Ref and Low Economics, Energy and Capital
(2015-2062)
($ in millions)

	Development Plan				
Revenue	**1**	**4**	**6**	**12**	**14**
NPV @ 6.00%					
Water Rentals	$1,702	$1,883	$1,879	$2,034	$2,091
Provincial Debt Guarantee	$2,614	$3,031	$3,075	$3,561	$3,783
Capital Taxes	$1,584	$1,874	$1,883	$2,229	$2,275

In the Preferred Development Plan (14), Conawapa is built and built soonest, and hence water rental fees are greater, more debt must be guaranteed, and capital taxes are highest.

The differences between Plans (14) and (12), where Conawapa is built a few years later, are very modest. Similarly, the differences between Plans (4) and (6), which both include Keeyask but not Conawapa, are very minor, but these totals are noticeably lower than the Conawapa-based Resource Plans.

Findings on Export Orientation

As might be expected, the Preferred Development Plan (14), which includes the building of Conawapa earlier in time with the intention of signing long-term export contracts, includes the highest export revenues as a percentage of total Manitoba Hydro revenues.

Average Export Revenue as a Percentage of Total Revenue
All Gas and Preferred Development Plan
Reference Economics and Capital
(2015 - 2062)

	Development Plan	
Energy Scenario	**1**	**14**
Reference	9.5%	20.9%
High	11.9%	26.2%
Low	6.4%	14.3%

- Resource Plans which have a higher reliance on export revenues are more sensitive to changes in export prices; this is borne out by reference to the model results if all variables except energy prices are kept constant: for example, average present value costs to ratepayers in Preferred Plan (14) are 10% lower if export prices are higher; whereas in All Gas Plan (1) there is little difference between the total ratepayer costs between scenarios with High and Low export prices

- For government, higher exports mean that more of its revenue from Manitoba Hydro is actually coming from export jurisdictions, rather than ratepayers, which means that, *other things being equal*, the province as a whole should be receiving a net benefit

Findings on Hydrology

- Hydrology is critical to short-term issues, such as the potential for financial distress, but is less relevant to longer term issues such as the present value of ratepayer costs over a 48-year period or longer

- Though hydrology is less critical over longer terms, it does not mean that it is not relevant: even over a 35-year period the standard deviation of water flow is almost 5% of the historical average

- Resource plans heavy in hydroelectric investment, such as the Preferred Development Plan (14), are more sensitive to hydrology, and will therefore demonstrate greater variation in all financial results (including Manitoba ratepayer costs), especially in the short term but also over the longer term, other things being equal

Findings on Financial Distress

- Despite the fact that the most severe situations of financial distress caused by drought overwhelm distinctions between Resource Plans, there are useful distinctions that can be made

- These include sensitivity to hydrology, sensitivity to the timing of distress, and overall financial strength

- Some Resource Plans are more sensitive to hydrology than others

- It is inescapable that the net income of Manitoba Hydro will be more sensitive to hydrology if Keeyask, Conawapa or both are built

- It should be noted that this sensitivity goes both ways: these Resource Plans will be exposed to higher highs and lower lows in net income and other financial indicators based on the future course of hydrology

- Timing is extremely relevant, and there are distinctions between the resource plans

Conclusions

Analysis of the available data and construction of a financial model capable of incorporating hydrology has allowed for the illumination of a number of patterns, and a variety of observations that will, it is hoped, assist the PUB in making its recommendations to government on the NFAT Review of the Manitoba Hydro Preferred Development Plan.

Key observations have included:

- The ability of Manitoba Hydro to meet its financial targets over the next ten years without increasing rates beyond two times the rate of inflation – under all Resource Plans – is entirely dependent on the continued absence of a significant drought

- Different Resource Plans extend that period of fragility, including the Preferred Development Plan, which should not be expected to enter a time of more financial capacity for 20 years, unless rates are allowed to rise at more than double the rate of inflation for an extended period of time

- In the face of a sustained, severe drought, the choice of Resource Plan is irrelevant to the occurrence of distress, as the financial consequences of such a drought would overwhelm the differences between Resource Plans

- Choice of Resource Plan does affect the occurrence of financial distress due to drought in milder drought cases, and it also affects the magnitude of the problem that would be faced by government in the event of a drought of any kind

- The total, probability-adjusted present value of ratepayer costs over 48 years across all five Resource Plans is likely too narrowly distributed to allow for definitive selection of the “lowest cost” choice. These outcomes are essentially within the margin of error of the many calculations, estimates and assumptions that were required to construct the model

- The consistent patterns of sensitivity of specific Resource Plans to certain variables indicates that model analysis can provide a guide to identifying the concerns that should be part of any decision-making process

- An extremely important inter-generational decision is embedded in the choice of Resource Plan, as costs to Ratepayers will be distributed very differently over time.

Bearing these and other observations in mind, we would suggest the following recommendations:

a) Plans 4 and 6, which were largely indistinguishable from each other, resulted in costs to ratepayers that appear to be lower than other Resource Plans in many scenarios, if only marginally; this suggests that proceeding with Keeyask may be a prudent step to take at this time, but a more thorough review of the proposal to build Conawapa as part of the Preferred Development Plan should be undertaken closer to its final commitment date

b) Given the expected fragility of Manitoba Hydro during the first ten years of any Resource Plan, and beyond that in others, the Government of Manitoba may wish to calculate and reserve some of the funds it generates (e.g., through permits, approvals, income taxes, etc., related to the construction projects) to act as an initial financial buffer for the government in the event of drought and the need for financial assistance to Manitoba Hydro

c) Given the inevitability of a drought at some point in the future, and the expected financial impact that such a drought would have on Manitoba Hydro, particularly in the near term, consideration should be given to the development of an explicit policy on the future course of customer rates in such a situation; this policy could then be shared with credit rating agencies and others to address the potential concern that they may have that in the event of a drought some fraction of Manitoba Hydro debt might be financially unsupported.

1. Introduction

Morrison Park Advisors was retained by the Manitoba Public Utilities Board (hereinafter the "PUB") to assist in the consideration of various commercial aspects of the "Needs For and Alternatives To" (hereinafter the "NFAT") Review of Manitoba Hydro's Preferred Development Plan (hereinafter the "Preferred Development Plan").

1.1. Morrison Park Advisors

Morrison Park Advisors is an independent, partner-owned, Canadian investment bank providing financial advisory services to corporations and governments. MPA focuses on several industry sectors, including the regulated utility/energy infrastructure sector, in which it has substantial background and expertise. We provide independent expert advice to clients involved in regulatory processes; commercial litigation and arbitration; commercial and balance sheet restructuring events; debt and/or equity capital raising; and mergers, acquisitions and divestitures. Our ability to deliver top-tier financial advisory services is based on decades of combined experience and expertise developed at some of Canada's leading investment banks, while serving many of Canada's largest and most sophisticated corporate clients as well as federal, provincial and municipal governments and quasi-government entities.

Information on the MPA partners who participated in the preparation of this Report is available in Appendix A.

For more information on MPA, please visit our website at www.morrisonpark.com.

1.1.1. Independence of MPA

MPA confirms that:

a) neither MPA nor any of its affiliated entities is an associated entity or affiliated entity or insider of Manitoba Hydro or any of its affiliates;

b) prior to the date hereof, MPA has not been engaged as financial advisor to Manitoba Hydro or any of its affiliates; and

c) during the term of its engagement, MPA will not be engaged by Manitoba Hydro or its affiliates as a financial advisor in respect of the NFAT.

1.2. MPA's Mandate and Scope of Work

MPA was retained by the PUB to provide a commercial evaluation of the Manitoba Hydro Preferred Development Plan Business Case, as detailed in the NFAT. Specifically, MPA's review is to include:

e) Consideration of the overall costs, risks and benefits being assumed by Manitoba Hydro in the pursuit of the Preferred Development Plan, particularly in light of potential alternatives to the Preferred Development Plan which could satisfy provincial and ratepayer objectives (commercial reasonableness of the Preferred Development Plan);

f) Consideration of the costs assumed, risks taken, and compensating benefits expected for each relevant stakeholder of Manitoba Hydro, including ratepayers, the Government of Manitoba, Manitoba taxpayers, and others (relative commercial reasonableness of the Preferred Development Plan for various stakeholders);

g) Consideration of commercial risks being assumed by Manitoba Hydro as part of its export agreements, and specifically how these risks relate to the risks being taken by Manitoba ratepayers in the event that export agreements do not perform according to optimal scenarios (commercial reasonableness of the export aspects of the Preferred Development Plan in relation to the domestic services portions); and

h) Consideration of specific financial impacts and risks being assumed as part of the Preferred Development Plan by the Government of Manitoba and the taxpayers of Manitoba, as they relate to the Province's credit rating, borrowing capacity, potential impact on other budgetary priorities, credit availability, and credit rates in the future.

1.3. Report Structure

The Business Case and supporting evidence presented by Manitoba Hydro in favour of the Preferred Development Plan is extremely detailed (the initial filing ran to approximately 5,000 pages, and responses to Information Requests have been similarly voluminous). We have attempted to condense many concepts in a relatively brief narrative in order to highlight critical issues that we believe should be considered by the PUB. In addition to the sections of this Report described below, we have provided Appendices which provide greater detail on certain matters which, while important, would distract from the narrative and its core issues.

Table 1. Report Structure

Section	Title	Matters Addressed
2	Context	• Manitoba Electricity System • Stakeholders and Their Interests • Risks Relevant to Electricity Resource Planning
3	Resource Alternatives	• Features of Plans • Variables that Should be Considered
4	Financial Modeling	• Approach Taken • Findings
5	Specific Issues	• Weighted Average Cost of Capital and Discount Rate • Exports • Potential Impact on Province of Manitoba
6	Costs, Risks and Benefits	• Ratepayers • Government of Manitoba • Relative Distribution Issues
7	Recommendations and Conclusions	• Report recommendations and conclusions

1.4. Note on the Use of Projections and Models

In preparing our Report, we have made use of the following:

a) Information that was made available by Manitoba Hydro through this regulatory process, inclusive of the NFAT Business Case and supporting evidence admitted, responses to all information requests, and direct discussions that were organized by the PUB for Independent Expert Consultants;

b) Information that was publicly available, whether from Manitoba Hydro, the Government of Manitoba, from public authorities such as electricity system and market operators in other jurisdictions, or from general corporate, economic and financial sources;

c) Financial information available through paid subscription services;

d) Information, advice and opinions of other Independent Expert Consultants participating in this regulatory process on behalf of the PUB, in the form of discussions, meetings and reports;

e) Our general experience, qualifications and skills in financial analysis and the preparation of valuations and opinions on fairness from a financial point of view.

A very significant component of the work of this Report involved the use of forecasts, projections and estimates, and in particular those provided by Manitoba Hydro in evidence and in response to information requests. We have not passed any judgment on the validity or reliability of these projections and estimates (except in select cases specifically addressed below), but rather have assumed

that they were prepared with all due care based on the professional qualifications of those responsible for them.

It is critical to point out, however, the fundamental uncertainty that underlies many of the projections in question, particularly as they extend out not only years, but decades. Useful forecasts for the near to medium term are typically based on the belief – sometimes proven by subsequent events to be erroneous – that the future will consist of incremental changes to the practices of the past. However, the longer the time horizon of the forecast, the more likely that changes will cease to be incremental, and become truly unpredictable. What may appear to be reasonable today may at some point in the future – with the benefit of hindsight – look like a terrible mistake, or a massive stroke of luck. Prices change, technology changes, market dynamics change, the relative cost of goods changes: all in unpredictable ways over time.

Technological advances, in particular, can render assumptions obsolete even in relatively short periods of time. The development of hydraulic fracturing in the natural gas industry over the past decade is only a recent example of expectations about future market conditions being totally undermined: widespread expectations a decade ago were that North America would by now be supply constrained and increasingly reliant on expensive imports of natural gas from elsewhere, yet now there is a rush to find ways to export an overabundant commodity that has dropped dramatically in price. In earlier decades similar received wisdom was overturned (for example, there was a time in the mid-twentieth century when many experts believed that nuclear power would render electricity "too cheap to meter".[1] Needless to say, the aspiration was never achieved).

There is a significant danger in assuming that a view of the future from the perspective of today will be very accurate. All such assumptions should be approached with humility, and treated with respect as the best available basis for decision-making, but without claiming them to be more than what they are. Decisions cannot be made without taking a view of the future, but the future may prove unwilling to agree with the forecasts made of it.

It is commonplace that commercial transactions are analyzed using mathematical models, often providing a degree of precision measured in decimal points, which sometimes gives the illusion of accuracy or predictive power. We have used such models in the preparation of this Report. However, these models are only as accurate as the assumptions about the future that underlie them. Since those assumptions must be given a broad range because of the difficulty inherent in predicting the future, especially over decades, the models should and do result in outputs with an equally broad range. This means that mathematical models sometimes may be capable of excluding certain decision options from the realm of reasonable commercial choice, but cannot always point to a single preferred outcome among several. In these cases, decisions still must be made, but they must be rendered on the basis of judgement.

Commercial decisions are ultimately about judgement, and judgement is extremely difficult to quantify.

[1] The phrase was coined by Lewis L. Strauss, Chairman of the United States Atomic Energy Commission in a 1954 Speech to the National Association of Science Writers.

2. Context

The Preferred Development Plan is a long-term resource plan for electricity in the Province of Manitoba. Analyzing its features requires an understanding of the electricity system in the Province, and its expected needs.

2.1. Manitoba Hydro

Manitoba Hydro is the sole utility provider of electricity in the province, and is a Crown Corporation with the mandate[2] to:

- Provide electricity to Manitoba ratepayers as economically as possible, consistent with a safe and reliable system; and
- Exploit opportunities to export electricity and electricity-related services to the benefit of the Province of Manitoba and its ratepayers.

As a Crown Corporation, Manitoba Hydro does not pay dividends to the province of Manitoba (the "shareholder"),[3] nor does it pay income tax. Notwithstanding the organization of the entity on corporate lines – with debt and "equity" on its balance sheet – it is not a profit-maximizing enterprise. By legislation, it is entitled only to seek revenues sufficient to satisfy its operating costs, debt servicing needs, and to maintain reserves for various purposes, including the management of contingencies and smoothing of rates over time.[4] The corporation's "equity" is better understood as a form of reserve fund, and its "profits" in any given year as a contribution to that reserve.

[2] The *Manitoba Hydro Act* describes the objects and purposes as follows:

> 2. The purposes and objects of this *Act* are to provide for the continuance of a supply of power adequate for the needs of the province, and to engage in and to promote economy and efficiency in the development, generation, transmission, distribution, supply and end-use of power and, in addition, are
> (a) to provide and market products, services and expertise related to the development, generation, transmission, distribution, supply and end-use of power, within and outside the province; and
> (b) to market and supply power to persons outside the province on terms and conditions acceptable to the board.

The *Terms of Reference* of the Manitoba Hydro Electric Board specify the following:

> The corporation is charged with responsibilities which include, to ensure a safe, reliable, economical and environmentally responsible supply of energy for Manitoba, and to earn revenues to keep rates low for Manitobans through the export of power and the provision of energy-related services.

[3] Note that in fiscal year 2002-3, the Government of Manitoba received a special dividend payment of $203 million. This payment was specifically required by amendment of the *Manitoba Hydro Act*. See Statutes of Manitoba, c. 41.

[4] Please see *Manitoba Hydro Act*, s. 39(1) and s. 40(1).

By agreement with the shareholder, the target level of "equity" in the corporation is 25% of total capital,[5] as defined by the following formula:

Formula 1. Equity Ratio Calculation

$$\frac{\text{Total Equity} = \left\{\text{Retained Earnings} + \text{Contributions in aid of Construction} + \text{Accumulated Other Comprehensive Income} + \text{Non-controlling Interest}\right\}}{(\text{Long-term Debt} - \text{Sinking Funds} - \text{Cash}) + \text{Total Equity}} = 25\%$$

However, this is a long-term target, which serves as a financial guideline only, not an annual requirement. As a result, the equity ratio floats over time, depending upon actual financial results in any given year, the capital investment program being pursued at the time, and the rates set by the PUB. For example, the equity ratio for the past ten years has been reported as follows:

Table 2. Equity Ratio Performance

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
13%	15%	19%	20%	27%	23%	27%	27%	26%	25%

Source: Manitoba Hydro, *62nd Annual Report*, year ending March 31, 2013

In addition to the equity target, Manitoba Hydro also attempts to meet two other measures of financial health, which are to ensure that its Interest Coverage Ratio ("ICR") is above 1.2, and that typical capital needs (not including major investments such as generation facilities) can be funded through internal resources.[6] The formula in use for ICR is:

Formula 2. Interest Coverage Ratio Calculation

$$\frac{\text{Net Income} + \text{Interest Payments on Debt}}{\text{Interest Payments on Debt}} = \text{ICR}$$

In essence, targeting a minimum ICR of 1.2 means that Manitoba Hydro will organize its affairs – and seek rates from the PUB – consistent with maintaining a 20% cushion of annual cash availability over and above its expected costs of interest.

[5] The 75:25 target ratio was first established in September 1995 by the Manitoba Hydro Electric Board. Please see the response to Information Request MPA/MH I-011a.

[6] The Capital Target is 1.2 times typical capital needs, not including major generation or transmission projects, according to the most recent Debt Management Strategy, April 2012, filed with the PUB as part of the General Rate Application.

Over the past ten years, the company's performance on this measure has been as follows:

Table 3. Interest Coverage Ratio Performance

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
0.17	1.25	1.77	1.23	1.69	1.49	1.32	1.27	1.10	1.15

Source: *62nd Annual Report*

The notably low performance in 2003-04 coincided with a drought that year, which dramatically affected the company's net income, in fact resulting in losses for that year (since net income was negative, the resulting ICR for the year was below 1.0; ICR can actually be negative itself, if losses in a year are greater than interest payments).

Manitoba Hydro has two sources of capital: internally generated cash flow, and debt. Long-term debt resources are provided by advances from the Government of Manitoba.[7] The Government of Manitoba raises debt from Canadian and international capital markets in the amounts and with the terms and conditions agreed upon with Manitoba Hydro, and then provides that debt on a back-to-back basis, with the addition of a "debt guarantee fee", currently equal to an annual payment of 1% per year on all outstanding long-term debt. Given that the debt is raised by the Government of Manitoba directly on its own account, and then subsequently advanced by the Government to Manitoba Hydro, the Government and taxpayers of Manitoba are directly liable for the full amount of the debt, regardless of the ability of Manitoba Hydro to make good on its annual interest and principal payments to the Government.

Crucially, notwithstanding the fact that the Government of Manitoba raises the required long-term debt for Manitoba Hydro, and on its face this debt is debt of the Province, credit rating agencies and the capital markets do not in practice treat that debt as debt of the province, but rather as debt supported by Manitoba Hydro and its ratepayers.[8] This is a very important element in the calculation of the Province's credit-worthiness, and hence the overall credit rating on provincial debt. This issue will be addressed further below, in section 4 (financial distress).

2.2. Manitoba's Electricity System Resources

Virtually all electricity users in Manitoba are connected to Manitoba Hydro's electricity system.[9] Manitoba Hydro currently serves approximately 550,000 customers, and does so with a generation system amounting to over 5,500 MW peak capacity. More than 90% of the generation resources are

[7] Manitoba Hydro issues a small amount of debt on its own account through Manitoba Hydro bonds, however the vast majority of debt is through Government of Manitoba advances. As per the March 31, 2013 Annual Report, Government advances amounted to $9,775 million out of total long-term debt of $10,012 million.

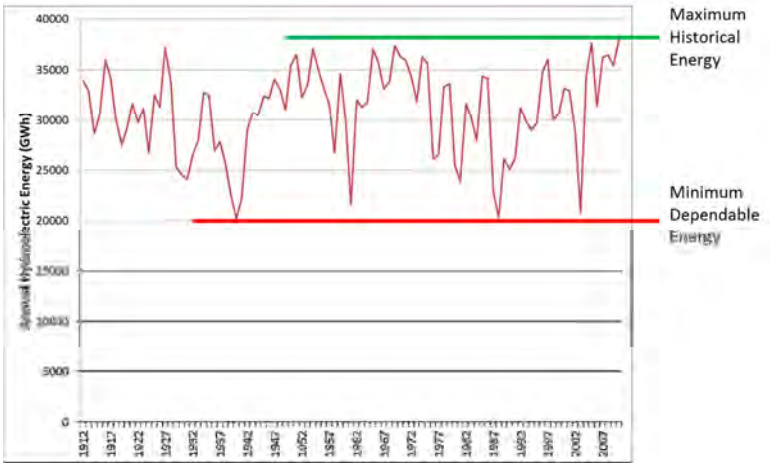
[8] See for example *Credit Analysis of Province of Manitoba*, Moody's Investor Service, July 23, 2013, p. 3: "Roughly one third of the province's total direct and indirect debt is attributed to Manitoba Hydro (issued and on-lent by the province) and is considered to be self-supporting."

[9] A small number of remotely located customers are served through standalone diesel generators.

water powered, which puts Manitoba into a select group of "hydro" jurisdictions, which includes Quebec, British Columbia, Newfoundland & Labrador, Norway, Paraguay, and Iceland.[10]

Like all other predominately water powered systems, Manitoba Hydro must manage the reality of ever-changing annual precipitation. In any given year, water flow through hydroelectric generation facilities can be much higher or much lower, resulting in very different levels of annual energy production. As Figure 5.8 from the NFAT Business Case makes clear, the lowest water flow of the past 100 years was only 47% of average, while the highest year was 168% of average.[11] That is a range of more than 3.5 times the water flow from lowest year to highest year on record. Yet for reasons of reliability, it is only safe to count on the lowest levels as "dependable" energy. If Manitoba's current hydroelectric facilities had been in place over the past 100 years, it might have had the following annual performance (note that this is an illustration only, based on a certain set assumptions about reservoirs, water management, transmission facilities, etc.).

Figure 1. Illustration of Hydroelectric Performance



If the system included no other electricity resources, then it would be necessary to ensure that the minimum dependable energy level was sufficient to satisfy all domestic needs. If Manitoba demand were expected to grow in the foreseeable future to the point that demand would exceed minimum dependable energy, then more hydroelectric generation capacity would be required.

In most years, however, the system will produce more (and in some years much, much more) than the minimum level of energy. Since demand is fairly stable on a short-term basis, all of the excess energy in any given year may be exported to neighbouring jurisdictions, or if possible "saved" by filling up water reservoirs and not producing the energy in the first place.[12] To the extent that existing facilities can

[10] Iceland's electricity system is approximately 75% hydro, and 25% geothermal, which is also renewable and relatively inexpensive. Newfoundland & Labrador is currently building a new hydroelectric generation facility – Muskrat Falls – which, once built, will allow for the closure of the Holyrood oil-fired station, and which will result in the province having an electricity system which is 100% supported by wind and water powered generation.
[11] Data from Figure 5.8 provided by Manitoba Hydro in response to Information Request MPA/MH II-021.
[12] In the event that reservoirs are full, and exports have reached the maximum possible based on transmission line capacity, then remaining water will be spilled over dams and not run through generators.

produce more dependable energy than is needed domestically, then that "extra" dependable energy can be exported through firm contracts to other jurisdictions.

In the case of Manitoba today, the Province is not solely dependent on water power: the electricity system includes two thermal energy facilities (one coal unit, and four natural gas units), two wind power facilities (wind power suffers good and bad years like water power, but generally is not as variable, and on its own schedule, not correlated to water flow), and the ability to import electricity from other jurisdictions. All of this means that total dependable energy is somewhat higher than what can be relied on from Manitoba Hydro's hydroelectric generation facilities.

In order for thermal plants to be maintained in good working order and available when needed, they have to be operated for a small percentage of any week, regardless of whether there is sufficient water power to meet needs. It is the nature of wind turbines that they produce energy whether needed for system purposes or not, so they also increase by a small amount the system's total output every year. Imports, however, need only be purchased when they are needed. The combination of these factors means that total system energy output is always greater than annual water power output, and in years where water is extremely low, other resources ensure that the system's minimum total energy is delivered.

Currently, Manitoba's electricity system has the following output characteristics:

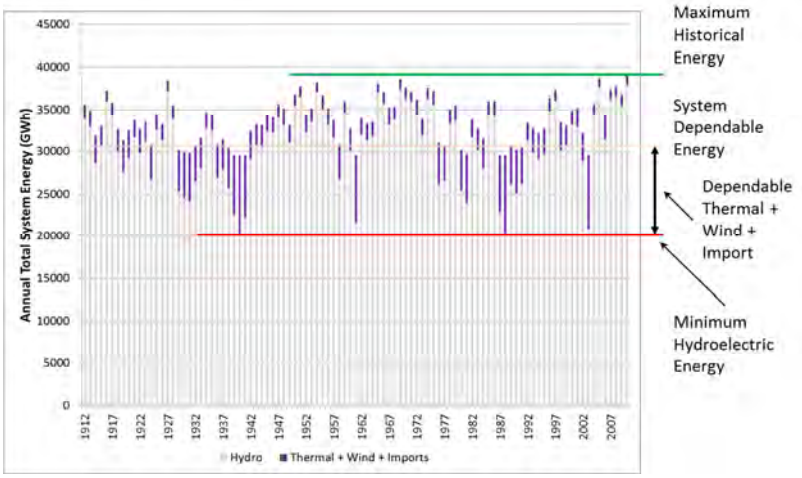
Table 4. Manitoba System Resources

System Dependable Energy	**Energy (GWh)**
Minimum Dependable Water Power	21,950
Dependable Energy from Thermal, Wind & Imports	8,303
Total System Dependable Energy	30,253
Maximum Water Power Potential	38,000 (approx.)

Source: NFAT Business Case, Appendix 4.2; IR MPA/MH II-022

The following chart depicts how Manitoba's current electricity system would have performed if it had been in place over the past hundred years, assuming that demand in every year was equivalent to today:

Figure 2. Illustration of Manitoba Electricity System



In addition to measuring the total annual energy production of the Manitoba electricity system, it is also important to note the peak system capacity: the amount of power that the system can supply at any given moment to all of its customers. Because Manitoba's hydroelectric facilities are supported by a system of reservoirs and water control structures, they can be managed so that they operate at higher power output levels at certain times of the day or year, and at lower power output levels when less electricity is likely to be needed. In this way, even in years with less water flow the system can operate at peak capacity at critical times. Thermal facilities can always generate their peak capacity (unless they are out of service), and usually at short notice. Imports can only be relied upon if firm capacity contracts are in place for expected peak periods of time. Fortunately for Manitoba, the province's peak requirements occur in the winter, while in neighbouring jurisdictions peak requirements occur in the summer, so imports are generally available during Manitoba's periods of peak need. Finally, wind power is unreliable on an hourly basis, so it cannot be counted upon for peak capacity. Currently, Manitoba Hydro's system has the following peak capacity characteristics:

Table 5. Manitoba Peak Capacities

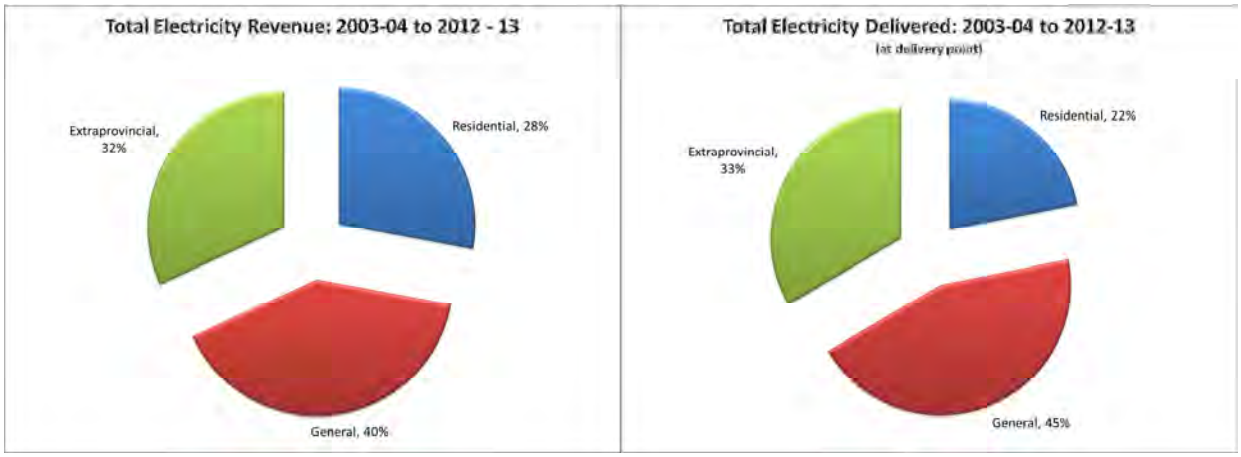
Total System Peak Capacity	**Capacity (MW)**
Hydroelectric Peak Capacity	5,177
Thermal	517
Contracted Imports	550
Total System Peak Capacity	6,244
2012-13 Manitoba Peak Demand	4,535 (approx.)

Source: NFAT Business Case, Appendix 4.2; *62nd Annual Report*

Revenues for Manitoba Hydro consist of the sum total of domestic ratepayer charges, contracted export revenues, and revenues from opportunity exports. Over the past ten fiscal years from 2003-04 to 2012-13, export revenues have represented approximately 32% of total Manitoba Hydro revenues from

electric operations (not including "other" revenues from consulting, etc.).[13] Exports delivered at the Manitoba border equaled approximately 33% of total energy delivered to customers.

Figure 3. Manitoba Hydro Electricity Revenues and Deliveries



Source: *62nd Annual Report*

Since the relative domestic and extra-provincial proportions of revenues and delivered exports was about the same, this means that the price per unit of energy for Manitoba ratepayers (on average for all ratepayers over the ten-year period) was about equal to the price paid by export jurisdictions for power received from Manitoba. *However, it is crucial to note that for Manitoba ratepayers, this was the all-in price for power, whereas customers outside Manitoba had to pay transmission, distribution and other costs in addition to the price paid to Manitoba for the raw energy received*. The result is that Manitoba ratepayers had a total average cost of electricity – including generation, transmission, distribution and all other services - over that ten year period that was much lower than surrounding jurisdictions. This is consistent with the view that electricity costs in Manitoba are relatively very low.

Hydro-Quebec produces an annual survey of electricity costs in twenty-one different cities across North America. They compare the total cost of electricity, before taxes, for seven different customer profiles ranging from typical residential customers to the largest industrial consumers (customers are classed based on monthly energy consumption and monthly peak demand). Winnipeg, and by extension the rest of Manitoba, ranks among the three lowest cost jurisdictions included in the survey in every customer category.[14] This status as a low-cost electricity jurisdiction is a competitive advantage for the province. Critically, in the two categories for the very largest customers, Manitoba is the lowest cost jurisdiction surveyed, with a 5% cost advantage over the next jurisdiction for the largest customer class, and a 10% cost advantage over the next jurisdiction in the second largest customer class.

[13] *62nd Annual Report*, for the year ended March 31, 2013, Manitoba Hydro, data from pages 98-99.
[14] Please see *Comparison of Electricity Prices in Major North American Cities, 2013*, by Hydro Quebec. Available online at www.hydroquebec.com.

2.3. New Resource Needs and Opportunities

Manitoba Hydro has identified that existing electricity resources will no longer be sufficient to meet domestic needs sometime during the mid- to late-2020s. This is claimed for both annual energy production and peak capacity. Moreover, since Manitoba Hydro currently has ongoing contractual obligations for dependable exports, the need for additional resources will occur even earlier.

In Chapter 4 of the NFAT Business Case, Manitoba Hydro describes their Planning Criteria, the history and expectations of demand growth in Manitoba, the past and expected future success of demand-side management programs ("DSM") to curb demand growth, and the resulting timing of the need for new resources.

Other experts retained by the PUB have examined closely the assumptions, methodologies and conclusions relied on by Manitoba Hydro to estimate the growth in domestic demand.[15] To the extent that there is doubt about the near-term expectations for Manitoba demand growth, or the ability of DSM programs to economically curb that growth, it is largely the timing of the need for new resources that would be affected. In the longer-term, however, the assumption that Manitoba demand will continue to increase relentlessly into the future is more controversial, and will be addressed further below in the discussion of risks in section 4.2.2 (Impact of Manitoba Demand).

In addition to growing Manitoba demand for electricity resources, Manitoba Hydro has identified new export opportunities. Several term sheets have been negotiated with counterparties interested in contracting with Manitoba for firm exports of electricity, if – but only if – Manitoba proceeds with new construction of hydroelectric generating stations.

The vast majority of Manitoba electricity exports are destined for utilities in the United States. Manitoba sells a small portion of its available exports to Ontario and Saskatchewan, but in the fiscal year 2012-13 approximately 88% of its export revenues were from sales to the United States.[16]

The Midcontinent Independent System Operator (MISO) is the organization which operates the multi-utility electricity transmission grid into which Manitoba Hydro sells most of its exports. MISO has a peak summer generation capacity of over 100,000 MW, and is many times the size of Manitoba's electricity system when measured by generation resources, customers and total energy consumption. Its resources are based largely on coal and natural gas-fired generation facilities, with a substantial and growing amount of wind power resources.[17] Given its reliance on coal and natural gas facilities which can run almost constantly when needed, the MISO market does not face any shortage of annual power output, but instead planning issues centre on the need to replace retiring coal capacity, and the need to reduce the carbon footprint of electricity output in the future.

[15] Please see reports submitted to the PUB by Elenchus Research Associates Inc. on the load forecast and DSM.
[16] *62nd Annual Report*, p. 49.
[17] Please see, for example, *2012 State of the Market Report for the MISO Electricity Markets*, June 2013; available online at www.misoenergy.org.

Given these characteristics, it is understandable why MISO utilities would only be interested in hydroelectric power from Manitoba: they have their own coal, natural gas and wind resources, and would have no economic need to import those from Manitoba Hydro (in fact, importing them would likely be uneconomic, because it would entail transmission costs to bring power across long distances). On the other hand, hydroelectric energy is carbon-free like wind, but if supplied in the form of a firm energy contract, would be much more reliable, and help them to meet their capacity needs while also reducing their system's carbon output.

Currently, when an export market buys power from Manitoba, it is 90%+ "carbon free", given Manitoba's generation mix. If Manitoba were to build new hydroelectric generation facilities, then its power would still be 90%+ carbon free (in fact, the figure would rise to 95%+). However, if Manitoba builds natural gas-fired facilities, or meets its needs in some other way, then it may no longer be able to claim that it meets that high standard of "carbon free" production. It is not unreasonable to believe, in these circumstances, that if Manitoba Hydro builds additional hydroelectric generation facilities, it would find willing buyers for firm energy contracts – at *some* price – for the sale of a substantial portion of the excess dependable energy that would be expected to be available post-construction.

2.4. Stakeholders and Their Interests

2.4.1. Manitoba Ratepayers

Manitoba Ratepayers benefit from Manitoba's electricity system, but are also obligated to pay all of Manitoba Hydro's costs, less whatever revenue can be earned from exports. Ratepayers are the primary stakeholder in Manitoba's electricity system, and hence in the consideration of Manitoba Hydro's Preferred Development Plan. Ratepayer interests are fairly straightforward to identify: they want safe, reliable electricity services at the lowest possible cost over time. In considering a forward-looking resource plan such as the Preferred Development Plan, however, it is not possible to specifically forecast future costs, because they depend on a great many variables that will only be known for certain in retrospect, as will be discussed much more extensively below. As a result, it is better to formulate ratepayer interests as: safe, reliable electricity services at the lowest possible *risk-adjusted* cost over time.

The notion of *time* also raises complications when considering ratepayers as a collective. Given that the Preferred Development Plan and its alternatives would play out over many decades, and that electricity costs over such a period would necessarily fluctuate, the costs and benefits of any alternative might be distributed differently between ratepayers over the next twenty years, for example, and ratepayers for the subsequent twenty year period, or the period after that. Inter-generational equity between ratepayers is therefore an issue which should be given consideration when reviewing Manitoba Hydro's options. This will be discussed further below, in section 4 (financial analysis).

2.4.2. Government of Manitoba

The Government of Manitoba, on behalf of the taxpayers and citizens of Manitoba, is the sole shareholder of Manitoba Hydro, and hence is also an obvious stakeholder in the decision to be made. The Government's interests, however, are more complex than for ratepayers, and include several priorities:

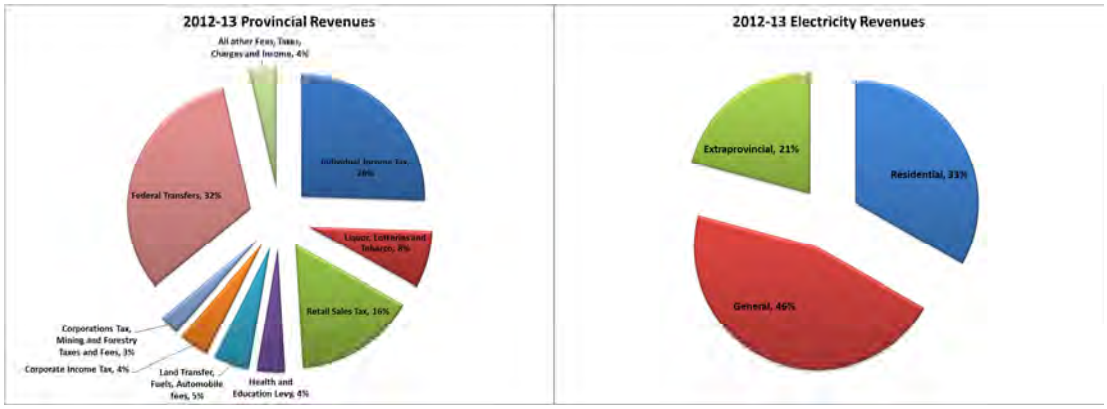
- *Ensure Competitive Electricity Rates*: As has already been noted, Manitoba currently benefits from very low electricity costs as compared to most jurisdictions in North America. This is clearly a competitive advantage for the province, as it may help attract industrial consumers of electricity to the province, who in turn are responsible for jobs and economic development. In addition, since electricity is part of the cost of doing business in every industry – to a greater or lesser degree – keeping electricity costs low generally makes Manitoba businesses more competitive than they would otherwise be. From the perspective of the Government of Manitoba, keeping rates competitive with other jurisdictions is therefore an important goal. However, it is not clear that it is necessarily important for Manitoba to attempt to *maximize* this goal: i.e., to be competitive with other jurisdictions, electricity costs do not need to be "as low as possible", only lower than elsewhere. If rates in other low cost jurisdictions are rising – for example by the rate of inflation – then Manitoba does not harm its competitive position by allowing its rates to rise by a similar amount.

- *Maximize Tax Revenue, Fees and Charges Paid to Government*: Manitoba Hydro does not pay dividends or income tax to the Province, but it does provide several other revenue streams to government. Water "rental" fees are calculated based on the flow of water through Manitoba Hydro's hydroelectric facilities. This is essentially a mechanism for the government to directly capture a fraction of the revenue associated with hydroelectric production. Capital taxes are based on the total equity and debt capital being put to use in Manitoba Hydro. Both of these items are considered operating costs for Manitoba Hydro, and are recovered from ratepayers. All other things being equal, it would be reasonable for the government to prefer options where its revenue streams were greater. For the government, these revenue streams are an alternative form of tax, which benefits the provincial budget. It could be objected that if these taxes were not charged to Manitoba Hydro, then electricity costs would be lower, and the government could simply increase some other tax to compensate. However, it is notable that "ratepayers" are not economically identical to "taxpayers", and hence there is a distributional impact of collecting government revenue through water rentals and capital taxes on Manitoba Hydro.

  As noted in the charts below, individuals and families pay a much larger portion of government revenues (through income tax, liquor/lottery/gaming taxes, retail sales tax, etc.) than they do electricity costs (the Residential customer class provided 33% of Manitoba Hydro's electricity revenues in 2012-13, but personal income taxes and liquor/lottery/gaming taxes represented 34% of Provincial revenues, and then a large share of retail sales tax, land transfer tax and other revenue line items would have to be included). On the other hand, Manitoba businesses and

institutions pay a far greater portion of electricity costs than they do government revenues. Clearly, government could substitute new provincial taxes for the revenue streams that are embedded in electricity costs, and if they did so electricity would become less expensive, but it would not necessarily be a simple substitution.

Figure 4. Taxbase and Ratebase Comparison



Source: Manitoba Estimates, 2013; *62nd Annual Report*

- *Minimize Risk of Default on Guaranteed Debt:* As noted above, the Province of Manitoba guarantees almost all debt incurred by Manitoba Hydro. While the government charges a fee for providing this guarantee, it is a potentially serious burden on the taxpayers of the province. In considering the Preferred Development Plan and its alternatives, a significant issue for government is minimizing the risk that the province would ever be required to make good on the guarantee.

On its face, the legislative requirement that ratepayers cover all costs of Manitoba Hydro (after export revenues are deducted) seems to mean that the government would never be called upon to pay Manitoba Hydro's debts. After all, if Manitoba Hydro needs more revenue to pay its costs, then it can simply request that the PUB raise customer rates. However, in an extreme situation of financial distress for Manitoba Hydro (for example, caused by a prolonged drought), the need to pay debt costs may conflict with the need to maintain competitive electricity rates. For example, if electricity costs were to rise dramatically, implying the need for a substantial rate increase, large manufacturers might threaten to close their doors and move production to other jurisdictions unless the government intervened to provide assistance. If rates were kept low, and Manitoba Hydro simply absorbed the financial losses for a period of years, then Manitoba Hydro's status as a financially self-supporting entity would be called into question. Credit rating agencies, which currently do not include Manitoba Hydro debt as an obligation of the Province of Manitoba, may reconsider that position, at least for a portion of Manitoba Hydro's debt, which could have significant implications for the government. What this illustrates is that despite the legislation under which Manitoba Hydro operates, a situation of financial

distress could force the government to make a difficult political decision. Avoiding the potential for such situations to arise is therefore assumed to be a priority for the government.

- *Maximize Job Creation and Economic Development:* Any infrastructure development plan will entail construction and engineering employment, purchase of supplies, etc., and depending on where that construction occurs, a range of indirect employment and economic development activity that benefits different communities across the province to varying degrees. Maximizing these benefits is an obvious interest of the government in considering the Preferred Development Plan and its alternatives. Not incidentally, the economic activity that is generated by construction of large infrastructure also has secondary benefits in increasing government income and sales tax revenues, as companies and their employees benefit in the form of profits, salaries and wages. However, infrastructure development must be paid for in the form of electricity rates over time, and higher electricity rates can lead to a loss of business competitiveness for the province with an attendant impact on jobs, so the maximization of job creation and economic development over the long-term is a more subtle issue than it immediately appears.

- *Protect the Environment:* Any major infrastructure development will have potential impacts on the environment that must be understood and potentially balanced against other economic and social impacts. In the case of the Preferred Development Plan and its alternatives, very different potential impacts would be felt depending on the choice made. Some alternatives entail direct impacts on land, flora and fauna through flooding, road construction, etc., while other alternatives entail air emissions including carbon, oxides of nitrogen, ground level ozone, etc.

2.4.3. Other Stakeholders

In addition to ratepayers and the Government of Manitoba, three other groups bear mentioning as stakeholders in the decision-making process about the Preferred Development Plan: First Nations, "the environment" as represented by Environmental Groups, and the Federal Government.

- First Nations have partnered with Manitoba Hydro in the past on the development of the Wuskwatim hydroelectric generation facility, and similar arrangements may be expected to apply to the proposed Keeyask and Conawapa facilities. Given the economic benefits that such partnerships could bring to affected First Nations, they have a clear interest in the decision. In addition, since the above facilities are located in lands of traditional concern to First Nations, potential environmental and social impacts should be taken into account.

- Environmental groups often challenge government, business and institutional proponents of large projects with respect to the environmental impacts that a proposed project will engender. With a single-minded focus on protecting the environment, and on understanding and mitigating against potential environmental impacts which may not previously have been brought to light, environmental groups are sometimes a stand-in for "the environment" as an independent stakeholder in a decision-making process.

- Given Canada's constitutional and fiscal relationships, the Government of Canada is often considered to be the ultimate guarantor of provincial credit.[18] Given the debt guarantee provided by the Government of Manitoba to Manitoba Hydro, the Government of Canada can, in some remote sense, be thought of as a guarantor of the debt that would be incurred through the Preferred Development Plan or its alternatives. In addition, the Government of Canada, through its authority over navigable waters, inter-provincial environmental issues, and First Nations, has other, more direct interests in the outcome of the decision-making process.

Notwithstanding the notional importance of these three stakeholder groups, it is fairly clear that their concerns overlap in important ways with those of the Government of Manitoba, even if they may not be perfectly captured. As a result, these additional stakeholder groups will not be included in any further analysis in this report, which will limit itself to considering the interests of the two main stakeholders, Manitoba ratepayers and the Government of Manitoba.

[18] In the *Credit Analysis* cited above in note 7, Moody's Investor Service states on p. 5, "Moody's assigns a high likelihood that the federal government (Aaa, stable) would act to prevent a default by Manitoba. The high likelihood of support reflects Moody's assessment of the incentive to the federal government of minimizing the risk of potential disruptions to capital markets if Manitoba, or any province, were to default, as well as indications of a moderately positive federal government policy stance as illustrated by the flexibility inherent in the system of federal- provincial transfers."

3. Resource Options

In the Business Case, Manitoba Hydro described multiple electricity resources that could be constructed in Manitoba to meet anticipated demand. Furthermore, a variety of alternative combinations and sequences of resources were considered. Many options were discarded because of environmental concerns or legislative restrictions (e.g., coal and nuclear), while other options were not pursued because they are currently prohibitively expensive compared to current Manitoba Hydro rates (e.g., solar). The options which were fully analyzed in the Business Case included various combinations of new hydroelectric stations, natural gas-fired stations, and new transmission interconnections with the United States.

One option that did not appear to be thoroughly addressed in the Business Case was the possibility of largely avoiding new construction through aggressive demand side management programs to flatten the growth of domestic demand, coupled with new transmission interconnections that could provide greater peak import capacity and higher total system dependable energy. In response to intervener and expert consultant requests, Manitoba Hydro is providing additional information to address this possible option, but did not do so in time for the preparation of this report. As a result, consideration of this option was not included here.

3.1. Resource Plans and Individual Elements

In the Business Case, Manitoba Hydro provided descriptions and partial analysis of fifteen Resource Plans, and full analysis including financial models for eight Resource Plans. Each included various combinations and timelines for several potential resources. Of these eight plans, the "All Gas" (Plan 1) and Preferred Development Plan (Plan 14) are the most significant contrasts in overall resource strategy, as they are furthest apart on two orientations: gas vs. hydroelectric, and domestic focus vs. export focus.

Of the remaining six plans that were fully modeled by Manitoba,[19] we dismissed three (plans 2, 7, and 13) because they were essentially similar to other plans, but with less transmission.[20] Even cursory comparison of Manitoba Hydro's analysis of plans having similar generation resources coupled with larger transmission shows the pattern that financial results are superior with additional transmission capacity. This is consistent with received wisdom in resource planning that transmission interconnections provide substantial system benefits.

For the purposes of our analysis, we limited our focus to the following five Resource Plans.

[19] Seven plans were not fully modeled (3, 5, 8, 9, 10, 11, 15) because they were either slight variations on others, or they were demonstrated to be clearly inferior through the first two stages of Manitoba Hydro's analysis.
[20] Plans 2 and 7 include hydroelectric generation but no transmission, and can be contrasted unfavourably to Plans 4, 6, 12 and 14 that all include transmission. Plan 13 includes Keeyask and Conawapa, but only a 250 MW interconnection, whereas both Plans 12 and 14 include a 750 MW interconnection.

Table 6. Resource Plans Examined

Plan	Elements
1	*All Gas* • Single cycle natural gas units are added in 2022-23, 2025-26, 2028-29, 2034-35, 2047-48 • Combined Cycle natural gas units are added in 2031-32, 2037-38, 2040-41, 2044-45
4	*K19/Gas24/250MW* • Keeyask Hydroelectric Station in 2019-20 • 250 MW Transmission Interconnect in 2020-21 • Single cycle natural gas units are added in 2024-25, 2029-30 • Combined Cycle natural gas units are added in 2032-33, 2038-39, 2041-42, 2045-46
6	*K19/Gas25/750MW(WPS Inv.)* • Keeyask Hydroelectric Station in 2019-20 • 750 MW Transmission Interconnect in 2020-21 • Interconnect will be partially owned and funded by a US investor • Single cycle natural gas units are added in 2025-26, 2026-27, 2028-29, 2031-32, 2033-34, 2045-46, 2047-48 • Combined Cycle natural gas units are added in 2042-43
12	*K19/C31/750MW* • Keeyask Hydroelectric Station in 2019-20 • 750 MW Transmission Interconnect in 2020-21 • Conawapa Hydroelectric Station in 2031-32 • Single cycle natural gas units are added in 2041-42, 2044-45, 2046-47
14	*K19/C25/750MW(WPS Inv.)* • Keeyask Hydroelectric Station in 2019-20 • 750 MW Transmission Interconnect in 2020-21 • Interconnect will be partially owned and funded by a US investor • Conawapa Hydroelectric Station in 2025-26 • Single cycle natural gas units are added in 2041-42, 2044-45, 2046-47

Source: NFAT Business Case, Chapter 8

Several basic elements are shared between the above Resource Plans, having the following characteristics when added to the existing Manitoba electricity system:

Table 7. Resource Elements

Resource	Dependable Energy	Maximum Energy	Winter Peak Capacity	Maximum On-peak Exported Energy	Maximum Off-peak Imported Energy
209 MW Single Cycle Gas Turbine	2,460 GWh	2,460 GWh	223MW		
308 MW Combined Cycle Gas Turbine	1,688 GWh	1,688 GWh	325 MW		
Keeyask	3,003 GWh	5,400 GWh	630 MW		
Conawapa	4,650 GWh	7,600 GWh	1,300 MW		
250 MW Intertie	Planning Limits		Depends on contracts	1,144 GWh	208 GWh
750 MW Intertie	Planning Limits		Depends on contracts	3,432 GWh	3,120 GWh

Source: NFAT Business Case, Chapter 7; SPLASH model outputs provided by Manitoba Hydro

The five Resource Plans selected, with their various combinations and timing of resource elements, allow for comparisons of financial performance over time between versions of the Manitoba electricity system with characteristics along several dimensions: Gas/Hydro; Less/More Interconnection; Domestic/Export Focus; Earlier/Later Construction.

- Gas/Domestic Focus vs. Hydroelectric/Export Focus: Plan 1 vs. Plan 14
- Less Interconnect/More Domestic Production vs. More Interconnect/Less Domestic: Plan 4 vs. Plan 6
- Earlier Hydro construction for Firm Export vs. Later for Domestic: Plan 14 vs. Plan 12
- Hydro/Gas vs. Hydro/Hydro: Plan 4 or 6 vs. Plan 14

3.2. Notable Features

3.2.1. Contrasting Impact of Resource Elements

Natural gas generation resources increase the system's dependable energy, but are unlikely to affect maximum annual energy production to a significant degree. In "wet" years, Manitoba Hydro's existing hydroelectric generation facilities are more than sufficient to satisfy domestic needs and create a

surplus for export. In such years, gas generation facilities will operate to the minimum extent. In "dry" years, natural gas units have the effect of increasing substantially the minimum system dependable energy, as well as contributing to peak winter capacity.

Hydroelectric generation resources increase both the system's dependable energy, AND the maximum energy possible in any given year, therefore driving up the average exports that should be expected from the system. Hydroelectric generation facilities therefore are inherently "export-oriented", and beg the question of the electricity system's transmission capacity for export (if there is insufficient export capacity, then in "wet" years water might have to be spilled/wasted).

Transmission interconnections potentially provide benefits for meeting peak capacity needs (if coupled with firm import contracts), and increase the ability to import power in "dry" years and export it in "wet" years. They are multi-purpose resources and can contribute in a variety of ways to system financial performance over time.

3.2.2. Long Term Plan but Near Term Differentiation

All fifteen Resource Plans proposed by Manitoba Hydro include natural gas-fired generation elements, though in some cases not until the 2040s. While in Chapter 7 of the Business Case Manitoba Hydro identified a number of other potential hydroelectric projects in the province,[21] they make no suggestion that any of these could be practical parts of current planning, because based on the stage of current project development and relative prices, they are uneconomic. However, it is notable that there is mention of the possibility that in the future several hydroelectric projects could be combined to create a more competitive alternative.[22] This suggests that choice of a Resource Plan today, such as the Preferred Development Plan (which only includes natural gas-fired generation in the distant future), could later be revisited in light of the opportunity to pursue additional hydroelectric energy. Similarly, even plans which indicate natural gas both immediately and in the longer term could be revisited at any time in the future if it is determined that hydroelectric options have become more attractive.

In short, while the Resource Plans are structured as long term multi-stage projects for the purposes of analysis, their true value is in highlighting the potential longer term implications of resource choices made in the near future. It should be assumed that all Resource Plans are subject to revisit and modification as they unfold.

3.3. Planning Variables

All electricity resource planning exercises entail risks, because they depend very much on future conditions, which are ultimately unknowable in advance. It is highly unlikely in any jurisdiction that there is a choice that is universally superior to all other options in all possible future conditions. Instead, the challenge is consider a wide variety of possible future conditions, and determine if each alternative is

[21] Please see Business Case, c. 7, pages 23 to 28.
[22] Ibid., p. 28.

robust in the way it performs across them. Results of such analysis would indicate the costs, benefits and risks that would be accepted by stakeholders if that option were chosen.

Manitoba Hydro has carefully screened its resource alternatives on the basis of safety and reliability standards. All of the options examined in detail in the Business Case passed those tests. As a result, the expected future performance of the *physical* electricity system is not an issue in the selection among options: all of the options considered would satisfy Manitoba's electricity needs safely and reliably according to the standards and criteria in place in Manitoba. What is at issue is the expected *financial* performance of the various resource options under future conditions that might obtain. There are a number of factors which affect Manitoba Hydro's financial performance, and which will vary in the future, in ways that are increasingly unpredictable further out in time. To the extent possible, testing the resource options consists of imagining plausible future paths for these variables, and calculating how the resource plan would perform in that possible future.

3.3.1. Manitoba Demand

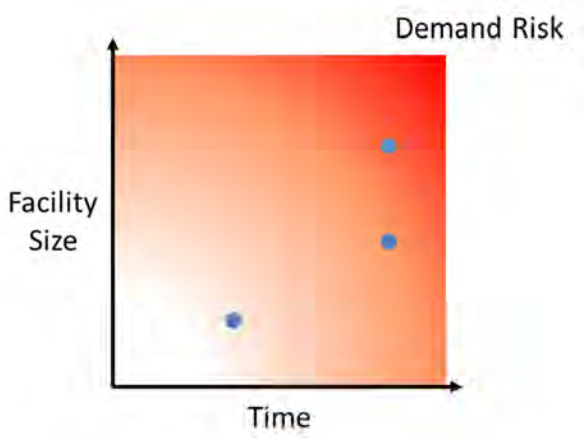
The Preferred Development Plan and its alternatives were created because of a perceived need for new resources. The timing of that need, however, depends very much on the rate of demand growth in Manitoba. If demand growth is relatively high, then new resources will be required sooner, and if relatively lower, then later. The difference can amount to a few years, according to the analysis presented by Manitoba Hydro. One risk is that capital will be spent earlier than necessary, which means that a facility will not be fully utilized for a period of time. This loss of efficiency would be costly to ratepayers, but likely only temporarily.

Considering the different options, the risk of being incorrect about the timing of the requirement for new resources is in some measure proportional to the time required for development and construction of a new facility. For example, a natural gas-fired generation facility may take three years to build and put into service, while a hydroelectric facility may take five to seven. Given uncertainty in demand growth, the further out in time the projection is, the greater the likelihood for error. From this perspective, facilities which can be constructed more quickly have an advantage, because they can be more accurately targeted to the timing of needs.

Over the longer-term, however, the more important risk with respect to demand growth concerns the size and longevity of proposed resources. Large, extremely long-lived resources are susceptible to becoming "stranded assets": facilities which are built to serve a need which never fully materializes, and are therefore inordinately expensive for the purpose they ultimately serve. In the case of electricity resource options in Manitoba, this risk would be expressed in the case of Keeyask or, more likely, Conawapa, where the risk is that domestic Manitoba demand growth in the future could stall long before an additional 1,300 MW of capacity and 5,000 GWh of energy are fully required. The reasons for a long-term change in direction could be many, but most easily conceived of are some change in technology which allows consumers to dramatically reduce their consumption (e.g., a new cooling technology).

It is important to note, however, that "demand" need not specifically apply to Manitoba domestic demand. A new hydroelectric generation facility in Manitoba could, if Manitoba demand is lower than anticipated, simply serve export demand. However, from a financial perspective Manitoba ratepayers would then in effect be investors in a pure export project, rather than electricity consumers of a necessary facility which may for a time be larger than needed.

Figure 5. Demand Risk and Electricity Infrastructure



Gas plants, with a much shorter typical life of only twenty-five years and flexibility in size (smaller units can be built singly or in multiple sets, as required), do not suffer nearly to the same degree from demand risk. Transmission resources, with an average life between the two types of generation facilities, occupy a middle level of risk, also mitigated by the fact that they are flexible enough to serve several different purposes depending on need (i.e., winter peak capacity, higher exports in "wet" years, higher imports in "dry" years, etc.).

3.3.2. Fuel Availability/Hydrology

Electricity generation plants require inputs – or fuel – to operate. In the case of hydroelectric facilities, this fuel is water that derives from precipitation in relevant watersheds. For thermal plants, that fuel will be coal, natural gas, diesel fuel or some other hydrocarbon or biomass. Fuels for wind turbines and solar panels are self-explanatory.

Manitoba Hydro did not explicitly address hydrology/fuel availability in their financial modeling, except to test the sensitivity of the Resource Plans to a prolonged drought. They assumed that natural gas was available upon request for any number of new facilities. This is now probably a fair and reasonable assumption, given the existing identified natural gas resources in North America (note that ten years ago, before the "shale gas revolution", many analysts believed that North America might run short of

recoverable natural gas resources, and be forced to import liquefied natural gas, which would have represented real concerns about availability).[23]

Critically, Manitoba Hydro assumed average hydroelectric performance in every year throughout their models.[24] This allows them to consider factors which are longer-term than the annual swings in precipitation that lead to more or less hydroelectric generation.

However, review of the information on historical water flows supplied by Manitoba Hydro in the NFAT Business Case Figure 5.8 suggests that changes in water flows can have an impact beyond any one-year or short-term period. For example, on a five-year basis, average water flow has ranged from 70% of average to 130% of average. On a ten-year basis the range narrows only slightly to 80% to 120%. Even on a twenty-five-year basis the range of averages is 90% to 110%. Given that Manitoba is so heavily dependent on hydroelectric energy currently, and will continue to be so for an extended period even in the All Gas Resource Plan, understanding the impact of hydrology on the choice of Resource Plan appears to be potentially important.

3.3.3. Fuel Prices

The price of water as a "fuel" for hydroelectric facilities is set by the government, in the form of the water rental fee. This fee has been stable, and is assumed to continue at its current level for the foreseeable future. To take into account the general increase in prices, it is prudent to assume that the water rental fee will rise by inflation in the more distant future. However, the Government of Manitoba could change the water rental fee at any time of its choosing, which would have an impact on the relative attractiveness of hydroelectricity.

Natural gas prices are extremely volatile, and a review of prices over the past twenty years demonstrates the degree of uncertainty that should be placed on any forward estimates. From the perspective of Manitoba Hydro's production costs, however, fuel prices are not currently very important to financial results. Natural gas-fired generators are a small part of Manitoba generation capacity, and even in the All Gas Resource Plan it will take many years for the system as a whole to become very sensitive to natural gas prices. However, ultimately the balance between hydroelectricity and natural gas-fired electricity would shift significantly enough that fuel prices would have a stronger impact on net income.

Another expert consultant to the PUB has commented on the natural gas price assumptions adopted by Manitoba Hydro, not because of the role of natural gas prices in Manitoba's production costs, but because of the impact of natural gas prices on the next variable addressed.[25]

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[23] See for example the International Energy Agency *World Energy Outlook 2013* for a discussion on natural gas availability. Also see the *BP World Energy Outlook 2035*, or the United States Energy Information Administration *Annual Energy Outlook*.

[24] The average chosen is the average hydroelectric output that would result from the application to the planned hydroelectric facilities in each Resource Plan of the water flows of the past 99 years. In other words, assuming that a Resource Plan contemplated no new hydroelectric facilities, and the continued maintenance and repair of all existing facilities, then approximately 31,000 GWh of annual hydroelectric production would be assumed.

3.3.4. Export and Import Prices

As noted above, over the past ten years Manitoba Hydro delivered a third of its electricity (measured at delivery point) to export markets, largely because the province's hydroelectric generation facilities were producing far more power than was domestically required. At the same time, it improved the financial value of its system by importing power at off-peak times while holding back hydroelectric generation, and then sold power into export markets at peak value times. When needed, especially in the drought year 2003-04, power was imported in large volumes to compensate for diminished hydroelectric production.

Prices paid per MWh of electricity by export customers are fundamental to the value of all of these transactions, and those prices change over time. A certain portion of these sales were through firm contracts, where prices are fixed for the term (generally rising with an inflation and/or other index), but a majority was exposed to whatever price was prevailing in the market. Given the destination for the vast majority of Manitoba's export electricity, the relevant market is the MISO market in the United States.

Prices in the MISO market are fundamentally out of Manitoba's control. MISO is a much larger system, and its supply and demand dwarfs that of Manitoba. At certain times Manitoba's transactions may have an impact on the marginal price in the market (especially regionally, where system congestion effects become important), but Manitoba is essentially a price taker. Another independent expert consultant retained by the PUB has commented in detail on the assumptions and expectations about future MISO prices.[26]

As noted above, building hydroelectric facilities as part of the chosen Resource Plan has the net effect of making Manitoba Hydro's financial results more dependent on export results, whose value will in turn be determined by both the quantity and price. Testing the Resource Plans with respect to a range of potential export/import prices over time is critical to estimating future impacts of the choice being made.

3.3.5. Construction Costs

Until a project is completed, its costs can be estimated, but not known. Given the size of some of the projects being considered, measured both in dollars, complexity and time required for development and construction, the risks associated with construction can be significant.

Manitoba Hydro appears to have made every effort to carefully estimate the cost of constructing different resources, while putting ranges around them to allow for testing of the financial consequences if errors are made. Another independent expert consultant retained by the PUB has provided

[25] Please see the report to the PUB of Potomac Economics.
[26] Ibid.

commentary on the construction cost assumptions made by Manitoba Hydro, and the price ranges that they have assumed.[27]

It is important to note, however, that despite the best efforts of proponents, large construction projects do sometimes go horribly wrong. History includes cautionary tales such as the Darlington Nuclear Plant in Ontario (195% over budget), the "Big Dig" in Boston (190% over budget), the Channel Tunnel (80% over budget), and the Denver International Airport (70%), among many others. Hydro dam projects have faced similar situations on occasion.

More recently and locally, the construction of the Wuskwatim hydroelectric facility in Manitoba suffered from substantial cost increases because of the unexpected rise in prices for commodities such as cement and steel, and the spike in labour and engineering costs driven by infrastructure spending across Canada and the rest of North America.

As a result, it is important to test the performance of Resource Plans in the face of different construction cost scenarios.

3.3.6. Cost of Capital

Manitoba Hydro's capital is a combination of retained earnings and debt. Retained earnings are driven in part by the rates approved by the PUB for electricity in Manitoba, which nominally should include a "return on equity" component in order to ensure that Manitoba Hydro actual earns net income that can be retained.

As noted above, Manitoba Hydro depends on the Government of Manitoba to raise debt from Canadian and international capital markets. Manitoba faces the prevailing rates of interest, and has no control over them over time (except insofar as the Province's state of finances affects its credit rating and hence the premium that must be paid compared to riskless debt instruments). Equity rates on regulated entities are typically set in relation to interest rates. Since interest rates are themselves affected by the general inflation rate, all of these factors often move in concert.

From the perspective of calculating the performance of Resource Plans in the future, various combinations of debt, equity and inflation rates should be tested, as these can have profound impacts on financial performance.

[27] Please see the report to the PUB of Knight Piésold Consulting.

4. Financial Analysis

The five selected resource plans were tested using a financial model.

4.1. Model Design and Construction

The following information from Manitoba Hydro formed the basis of the model:

- Outputs from the SPLASH model for each of the five Resource Plans under various assumptions about energy prices, Manitoba demand, the physical performance of the assets assumed in each Resource Plan, and 99 alternative hydrology patterns based on historical water flows;
- Information on Manitoba Hydro production costs and overhead costs consistent with each of three scenarios for economic variables, including inflation rates, exchange rates with the United States, and interest rates; and
- Information on capital costs for the resource elements in each plan, consistent with the three scenarios for construction costs, and the three scenarios for economic variables assumed by Manitoba Hydro.

In addition, we relied upon – except where specifically noted – the analysis of Manitoba Hydro with respect to the probabilities of occurrence of each of the twenty-seven scenarios suggested for combinations of energy prices, economic variables and construction costs assumed by Manitoba Hydro.

Critical assumptions and calculations in the model include:

- Manitoba electricity rates are treated as a combined, average rate per unit of electricity, with no differentiation between very large, general service or residential customers;
- Annual electricity rate changes for Manitoba domestic customers were restricted to not more than two times the rate of inflation in the economic scenario tested;
- The discount rate used to calculate the present value of cash streams over time was not the weighted average cost of capital used in the scenarios, but was instead either 6% or 10%, corresponding to either a lower or higher “time value of money” for ratepayers;
- The model ends after 48 years (because that is the extent of the data available), and no “terminal value” has been added to try and capture the future beyond that point; instead, specific discussion below will address this issue.

The model produces a full set of income statement, balance sheet, cash flow statement, and regulated rate calculations for Manitoba Hydro from the years 2014-15 to 2061-62.

The model was run over 3,000 times in total, so that multiple runs could be performed on each set of variables chosen by Manitoba Hydro, in combination with a variety of different hydrological patterns.

For additional information on the model, please see Appendix C (Tables of Results of the Present Value of Domestic Revenue).

4.1.1. Note on Uncertainty and Precision

The financial model produces outputs with a high degree of precision; in fact, to a practically infinite number of decimal points. This characteristic should NOT be confused with accuracy. It is simply the nature of mathematical operations that they result in precise outputs.

The model extends out almost 50 years from today. Included in the calculations are projections for prices and growth rates which are in many cases merely straight line extensions into the future of near term assumptions. A slight change in growth rates of certain variables could cause dramatic swings in outcomes, which is why a variety of such growth rates are tested. Similarly, in order to produce results that are "probability-adjusted", Manitoba Hydro assigned likelihoods to different scenarios. Giving a different weight to scenarios would change the probability-adjusted results.

All of this suggests that small differences in model outputs should be regarded with skepticism. The value of such models is in illuminating patterns and highlighting gross differences where they exist.

4.2. Findings on Ratepayer Total Costs

Minimizing risk-adjusted cost over time is the primary interest of ratepayers, after the maintenance of a safe and reliable electricity system.

The financial model calculates the annual payments that Manitoba ratepayers are presumed to make in the future, under each specific set of assumptions and each tested hydrological pattern. In order to meaningfully compare streams of cash flow that fluctuate over time, a discount rate is applied to result in a present value as of the first day of the model (April 1, 2014). In addition, Manitoba Hydro's probability weightings are applied to each set of future conditions, and the results from each set of conditions is then blended based on these weightings.

This process results in the following:

Figure 6. Risk-Adjusted Present Value Cost to Ratepayers

Average Probability Weighted PV of Domestic Revenue
High, Ref and Low Economics
($ in millions)

	Development Plan				
Economics Scenario	**1**	**4**	**6**	**12**	**14**
NPV @ 6.00%					
Reference	$43,912	$43,286	$43,699	$45,390	$44,949
High	$54,201	$53,109	$53,632	$55,632	$55,483
Low	$35,873	$35,121	$35,341	$35,866	$35,532

Average Probability Weighted PV of Domestic Revenue
High, Ref and Low Economics
($ in millions)

	Development Plan				
Economics Scenario	**1**	**4**	**6**	**12**	**14**
NPV @ 10.00%					
Reference	$23,662	$23,593	$23,759	$24,448	$24,343
High	$27,728	$27,886	$28,142	$29,361	$29,550
Low	$20,037	$19,832	$19,906	$20,092	$20,010

Each column in each of the two matrices represents an estimate of 48 years' worth of Manitoba ratepayer costs for the identified Resource Plan. Each matrix has three rows, corresponding to the assumptions made about economic variables, a group which includes inflation, interest rates, and Canada-US exchange rates. The first matrix uses a discount rate of 6% to calculate present value, while the second matrix uses a discount rate of 10%.

Each of the figures represents a probability-weighted average of 189 model runs (i.e., for each of nine different sets of variables, the model was run for 21 different hydrological patterns, then the 48-year stream of domestic revenues in each of the 189 runs was discounted to the present by the discount rate).

The first thing that should be notable is that the range of figures in each matrix is more similar to each other than to the other matrix. Discount rate, representing the time value of money, is extremely powerful, and overwhelms all other distinctions. Since discount rate is a reflection of the average

assumed "time value" of ratepayer money, it does not make sense to combine these figures, but rather to consider each matrix separately.

The second notable fact is that within each matrix, rows of numbers are closer to each other than columns of figures are. This makes clear that the assumptions made about economics, and particularly the inflation rate, overwhelms any difference between Resource Plans. In other words, assuming an average of 2% inflation over 48 years instead of 3% makes a bigger difference to the outcome than choosing one Resource Plan over another. Since inflation over the next 48 years will average either 1%, 2% or 3%, but will not be all three simultaneously, it does not make sense to combine these rows of numbers, but rather consider them separately.

A third fact, less instantaneously obvious, but nevertheless easily calculated, is that within each row, the deviation from the mean of the row is not more than 2.5%. This means that regardless of the Resource Plan chosen, *the model results in total risk-adjusted present value costs to ratepayers over a 48-year period that are all within a maximum of 5% of each other*. In many ways, this is a remarkable result. The Resource Plans are radically different in their choices of infrastructure elements, use of fuels, orientation towards exports, etc., and yet the differences do not appear to translate beyond the marginal. However, it should be recalled that Manitoba Hydro's existing resources total more than 5,500 MW of peak capacity, with maximum annual energy output of more than 38,000 GWh. In the first fifteen years of the five resource plans, between 700 MW and 2,000 MW of peak capacity is added, and maximum system energy is increased by anywhere from 0 GWh to 13,000 GWh. In other words, since the existing electricity system, dominated by hydroelectricity, continues to be the majority of the system for a very long time to come despite the choice of Resource Plan made, it should not actually be surprising that the incremental Resource Plan choice does not have an overwhelming impact on total costs to ratepayers.

There is another contributor to this outcome, however, which can only be discovered through analysis of raw model outputs: prior to the implementation of any of the Resource Plans, the existing system is taking on a substantial amount of debt as a result of system investments (including Bipole III, the most significant single component). This is a particularly heavy burden to bear for the All Gas Resource Plan (1), because that plan is the least export oriented, and hence the least likely to generate "extra" revenues that could help to quickly amortize those debt burdens. For the higher capital plans, the existing debt burdens are less severe compared to the debt burdens being assumed as part of the resource plan itself, and the export orientation also provides much higher net income to compensate for the overall debt burden, and hence differences between the plans which might otherwise have been starker are somewhat muted.

A third factor contributing to the lack of difference between the outcomes of the Resource Plans relates to the treatment of sunk costs in the Keeyask and Conawapa projects. In the All Gas Plan (1), all spending to date on the proposed hydroelectric facilities is written off. For ratepayers, this amounts to an incremental debt burden which must be retired, without any compensating benefits (in the other plans, since the facilities are actually built the sunk costs are an investment with associated benefits, as opposed to a loss to be written off). This fact is inescapable, because real dollars have been spent and

must be recovered from ratepayers. However, the reality of the sunk costs does tend to moderate the differences between the 48-year outcomes of the Resource Plans.

A final observation to make on the matrices is the rank ordering of Resource Plans from lowest ratepayer cost to highest ratepayer cost:

Figure 7. Rank Ordering of Resource Plan Cost to Ratepayers

Discount Rate	**Economic Variables**	Lowest				Highest
6%	Reference	4	6	1	14	12
	High	4	6	1	14	12
	Low	4	6	14	12	1
10%	Reference	4	1	6	14	12
	High	1	4	6	12	14
	Low	4	6	14	1	12

From this rank ordering, some patterns begin to emerge:

- Resource Plans 4 and 6, which include Keeyask, some level of transmission interconnection and natural gas plants, appear to fare consistently better than the other options
- Plans 14 and 12, which include Conawapa, are consistently ranked as more costly to ratepayers than Plans 4 and 6, which include Keeyask but not Conawapa
- Plan 1, the All Gas Plan, ranks poorly when economic variables such as inflation and interest rates are low, but better when they are moderate or high; this is particularly true with respect to the Preferred Plan 14, which is superior to All Gas in the low economics environment but not otherwise
- Plan 1, the All Gas Plan, ranks relatively poorly when the discount rate is lower at 6%, but better when the discount rate is higher at 10%, suggesting that the relative time value of money is an important consideration
- Plan 4, with a 250 MW interconnection, always ranks better than Plan 6, with a 750 MW interconnection; however, returning to the figures themselves it is notable that these two plans are never more than 1% apart from each other in any of the cases
- Similarly, Plan 14 is better than Plan 12 in every case but one, suggesting that an earlier construction and export orientation for the Conawapa facility is better than a later one; however, the difference between these plans is also always less than 1%.

These are patterns and inferences that are drawn based on "probability-adjusted" weighting for groups of possible futures, according to the weights assigned by Manitoba Hydro. In reality, however, only one set of variables will be closer to the true 48-year average. In Appendix C (Tables of Results of the Present Value of Domestic Revenue) the outputs for the model runs for each of the 27 future scenarios have been provided. In each of the 27 scenarios, the domestic revenue results of the 21 hydrological runs have been listed, including high, low and average results, as well as the standard deviation (i.e., there is a two-thirds probability that results will be within one standard deviation of the average, assuming that hydrology is distributed on a normal curve over time, which is the typical assumption). For reference, Manitoba Hydro's calculated "percentage likelihood" for each of the 27 scenarios is also shown.

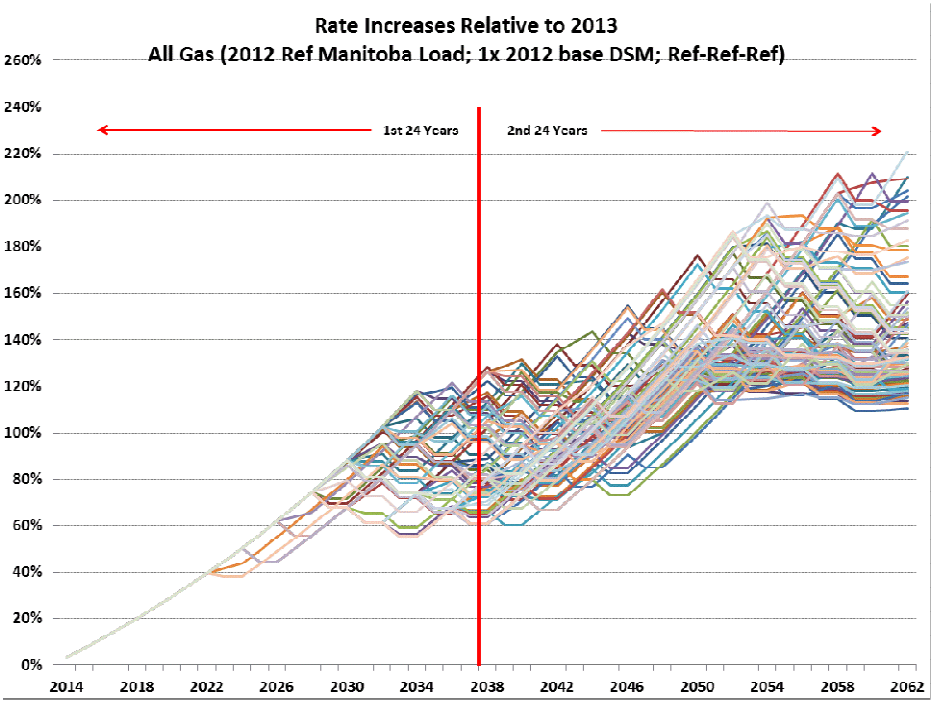
Based on these results, hundreds of other rank orderings of the Resource Plans can be calculated, depending on the scenario examined and the discount rate chosen. In addition, a sense of the impact from some of the possible 35-year hydrology patterns can be understood and compared with the impact of scenario choices.

4.2.1. Time Value of Money and Rates

One of the observations from the rank ordering of the present values of the ratepayer costs was that the ranking of the All Gas Plan, and other Plans, appeared to change depending on the discount rate assumed. To investigate this further, it is useful to examine the expected course of rate increases under the different Resource Plans. Since Manitoba demand is relatively similar across the Resource Scenarios, the pattern of rates essentially indicates the pattern of revenues.

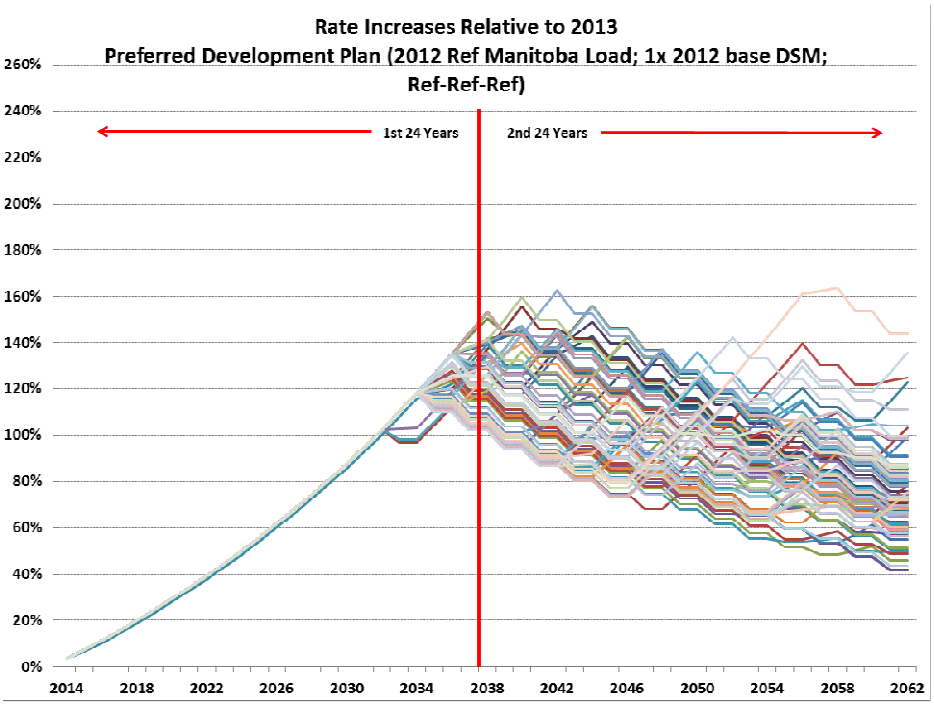
The following chart depicts the pattern of rate increases that results from 99 different hydrological patterns, in a single combination of future variables (Reference economics, Reference energy costs, Reference construction costs), for the All Gas Plan 1.

Figure 8. Rate Increases Relative to 2013 (All Gas)



Next is the same set of runs applied to the Preferred Development Plan 14.

Figure 9. Rate Increases Relative to 2013 (Preferred Development Plan)



Note that both of these depictions assume the same interest rates and inflation rates, the same prices for fuels and exported power, and the same costs of construction materials and labour. They also each depict the same 99 hydrological patterns. The only difference is the choice of Resource Plan, and hence the selection and timing of construction of different electricity resources.

The difference between the two plans could not be made more starkly obvious.

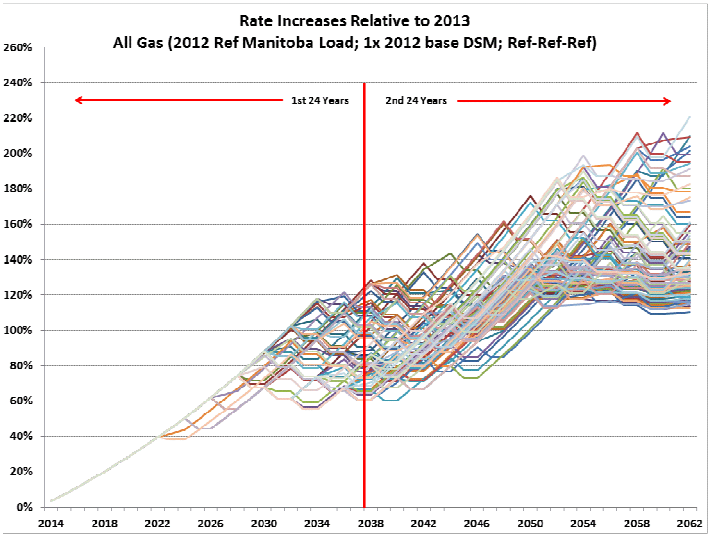
The All Gas Plan consistently imposes the maximum allowable rate increase (set at two times inflation, which is 1.9% per year in this set of variables, resulting in rate increases of 3.8% per year) for the first ten years of the model. After that point, if there are exceptionally "wet" years, the rate increases can in some cases be moderated. By the 2030s, the impact of hydrology can be felt annually, but a general upward trend in rates is seen for the rest of the model, and in particular for the second half of the time. At the mid-point, rates are up anywhere from 60% to 120% compared to 2013. By the final year, rates are up between 110% and 220%.

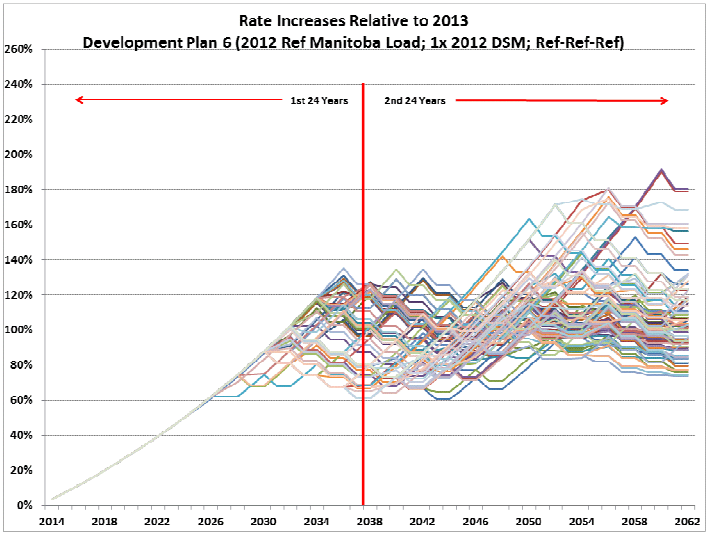
The pattern for the Preferred Development Plan is very different. Maximum rate increases are applied until 2032, when they reach 100% above 2013 rates. Hydrology effects begin to be felt at that point, because rates have reached a level high enough to financially sustain the company. By the mid-point, rates are between 100% and 150% higher than 2013. However, after that point rates actually trend downward, with only a few very "dry" hydrological situations driving up rates in the late period. By the end of the model, rates are between 40% and 140% higher than 2013.

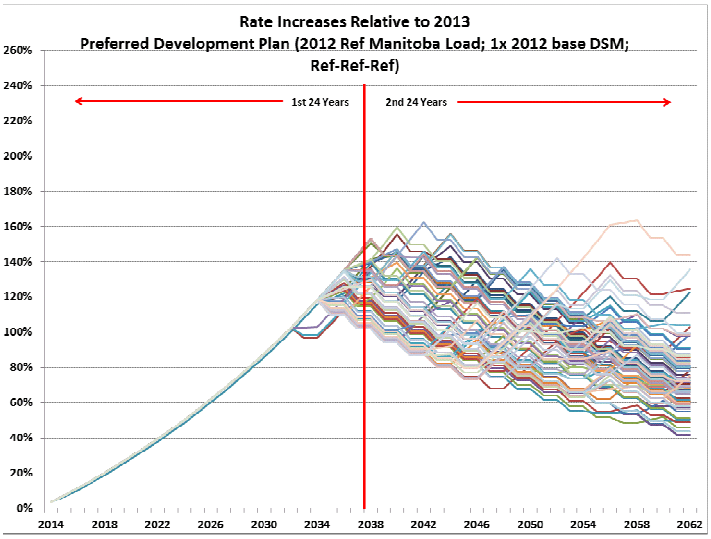
This pattern exemplifies the issue of "time value of money". In the All Gas Plan (1), the first "generation" of ratepayers faces rate increases, but those rate increases are less prolonged and severe than the rate increases expected in the Preferred Development Plan (14). However, for the second "generation" of ratepayers the situation would be reversed, according to the model. If ratepayers have a strong preference to save now and pay later (i.e., they have a high discount rate such as 10% or more), then they would prefer the pattern of the All Gas Plan (1). However, if they are willing to make a sacrifice in the near future to reap sizeable rewards later on (i.e., they have a low discount rate like 6% or less), then they might choose the Preferred Plan (14).

As might be expected, Resource Plans (4) and (6) have patterns that are somewhat between these two extremes. On the next page, the charts for Resource Plans (1) and (14) are repeated, with the chart for Resource Plan (6) placed in between for comparison.

Figure 10. Rate Increases Relative to 2013 (All Gas vs Preferred Development Plan vs Plan 6)







Consideration of these rate patterns also points to the issue of the future beyond the 48th year of the model. If the model were extended out even further, for example for another full twenty-four years (another "generation"), a few additional observations would be warranted:

- The Preferred Development Plan (14), and Plan (12) which also includes Conawapa, would produce lower ratepayer costs than would any of the other three Resource Plans, none of which include Conawapa

- The present value of that presumed set of additional results would be much higher if it were discounted at the low rate of 6% rather than the higher rate of 10%; at a discount rate of 10%, the total value of all years beyond 48 would be less than one twentieth of the total value of the first 48 years; whereas at a 6% discount rate, the total value of years beyond 48 would be several times greater

- For every year the model is extended beyond 48, the more the rank orderings of the Resource Plans will change in favour of Plans 14 and 12, particularly with the lower discount rate of 6%; however, with the higher discount rate of 10%, the shifting of the rank ordering will slow down and eventually stop because of the rapidly declining importance of those future years.

With respect to the issue of time value of money and the varying rate patterns displayed by the Resource Plans, it should be recalled that:

- The second half of the 48-year time period is inherently more uncertain than the first half, in the sense that future conditions are harder to predict so far in advance: technology is always changing, economic growth patterns change, climate may be changing, etc., so making accurate predictions about any variables (fuel costs, export costs, construction costs, the efficiency of equipment in the future, etc.) is that much more difficult;

- On the other hand, some things are undeniably knowable from today's standpoint, such as that waterpower is a very inexpensive "fuel", so that *at some point* facilities like Conawapa always become very attractive assets for ratepayers of the day; an important question is whether ratepayers today and in the near future do or should care about the welfare of ratepayers decades away.

4.2.2. The Impact of Manitoba Demand

All of the analysis to this point has assumed a single pattern for the electricity demand of Manitoba ratepayers in the future. However, as has been noted above and by others, there is considerable uncertainty about what Manitoba demand will actually be, particularly as decades pass.

Manitoba Hydro provided raw SPLASH data for the performance of the electricity system in high and low demand alternative futures for both the All Gas Plan (1), and the Preferred Development Plan (14). When this data was applied to the financial model, the following results for ratepayer costs resulted:

Figure 11. PV of Domestic Revenue (All Gas vs Preferred Development Plan)

PV of Domestic Revenue
Ref Economics, Energy and Capital
(full hydrology regime of 99 years)
($ in millions)

	All Gas			Preferred Development Plan		
	Manitoba Load (2012)			Manitoba Load (2012)		
	Ref	High	Low	Ref	High	Low
NPV @ 6.00%						
Average	$43,675	$43,595	$43,838	$44,073	$44,207	$44,197
Maximum	$45,530	$45,256	$45,711	$46,123	$46,591	$45,811
Minimum	$41,724	$41,648	$41,884	$42,155	$41,649	$42,123
Standard Deviation	$783	$770	$798	$952	$997	$1,031

PV of Domestic Revenue
Ref Economics, Energy and Capital
(full hydrology regime of 99 years)
($ in millions)

	All Gas			Preferred Development Plan		
	Manitoba Load (2012)			Manitoba Load (2012)		
	Ref	High	Low	Ref	High	Low
NPV @ 10.00%						
Average	$23,548	$23,795	$23,241	$24,110	$24,542	$23,550
Maximum	$24,278	$24,436	$23,788	$24,779	$25,474	$23,985
Minimum	$22,839	$22,852	$22,580	$23,497	$23,233	$22,967
Standard Deviation	$365	$417	$295	$317	$458	$290

What these matrices depict is the performance of the two Resource Plans in a single set of future variables (Reference interest rates, Reference fuel costs and export prices, Reference construction costs, etc.), but with three different Manitoba demand curves. Also, each column represents the results of running the model 99 times, for different hydrological patterns, with a resulting average, maximum, minimum and standard deviation resulting from the hydrology. The two cases of a high discount rate and a low discount rate were applied and are shown separately in the first box and the second box.

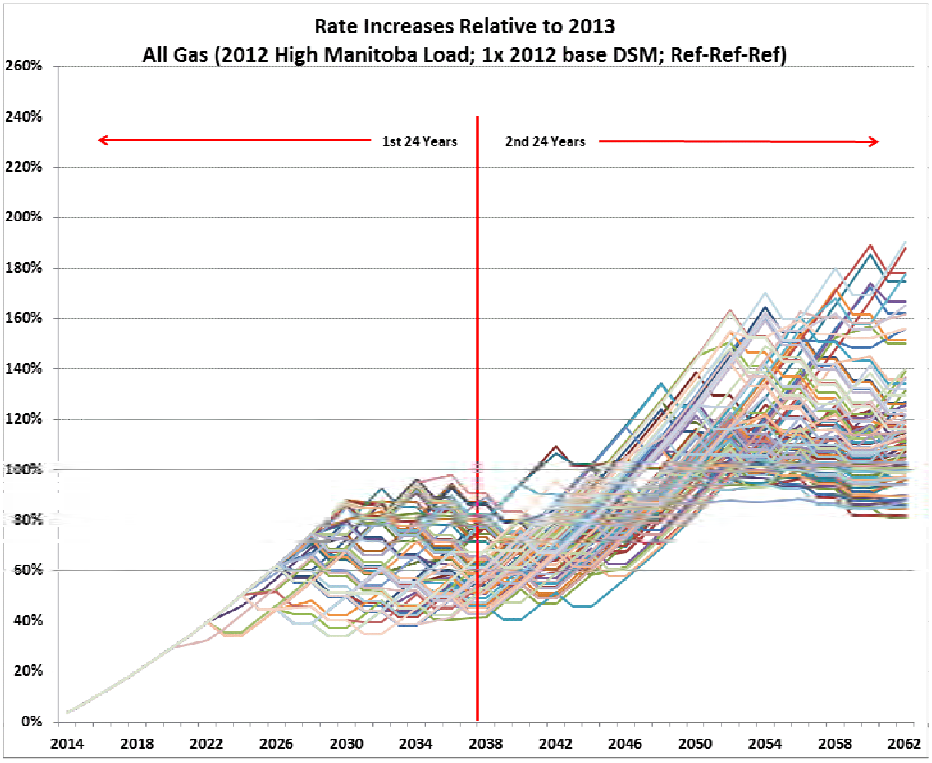
Some observations can be drawn:

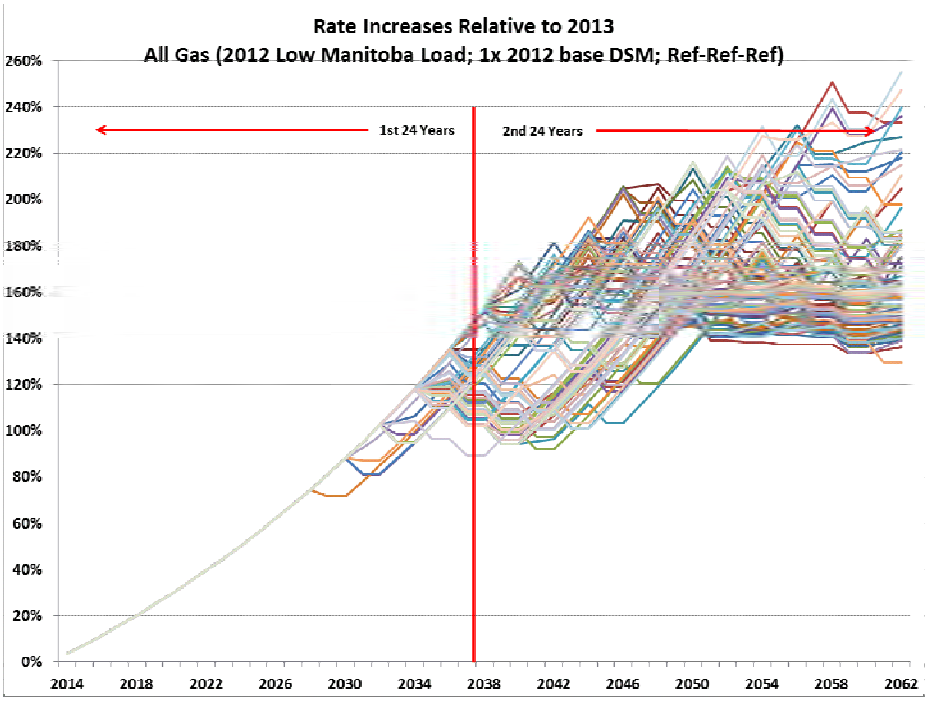
- Changing Manitoba demand does not actually affect the total cost to ratepayers over 48 years very much, <u>if all other variables are kept constant</u>; the difference in total cost to ratepayers between High and Low Manitoba demand futures is not more than about 2% in any of the cases
- On its face, this observation is surprising, because lower domestic demand means that more electricity should on average be exported, while higher domestic demand means that exports are decreased, and domestic ratepayers should be paying a larger portion of Manitoba Hydro's total costs.

To gain more insight into this situation, it is helpful to review the expected rates that Manitoba ratepayers will pay under the High and Low demand futures:

For the All Gas Plan (1), the rate paths are as follows:

Figure 12. Rate Increases Relative to 2013 (All Gas) (2)





Some differences become more apparent:

- When Manitoba demand is higher, the maximum rate increase is applied every year until the early to mid-2020s, but then rates for Manitoba ratepayers begin to diverge based on hydrology

- When Manitoba demand is lower, the maximum rate increase must be applied every year until the mid-2030s before rates begin to diverge based on hydrology
- This suggests that in this scenario, export prices are not high enough to satisfy Manitoba Hydro financial needs, even when export volumes are higher, and the burden is on ratepayers to do so
- In the higher demand scenario, charging Manitoba ratepayers the highest possible rate generates more revenue, which allows for faster retirement of debts, and eventually reduces the rate pressure of debt in later years
- In the lower demand scenario, charging Manitoba ratepayers the highest possible rate does not generate as much revenue because there is less total demand, so debt is not paid as quickly and continues to compound, which creates a heavier burden in later years that results in higher rates per unit of electricity
- When the total resulting revenues are discounted back to today, the result of the varying patterns is that the totals are very similar.

One of the inferences that can be made from these observations is that if export prices were assumed to be higher, then the benefits of lower domestic demand in terms of total ratepayer costs might be greater. Unfortunately, Manitoba Hydro did not provide SPLASH data for such alternative export prices combined with High and Low demand assumptions, so the inference cannot be thoroughly tested.

For the Preferred Development Plan (14), the differences in the rate patterns between the High and Low Manitoba demand assumptions are similar to what is depicted above for the All Gas Plan (1), and the inferences that can be drawn are the same. In short, if export prices are higher in the future, then reducing domestic demand is beneficial for Manitoba ratepayers, but if export prices are lower, then reducing domestic demand only raises cumulative rates in Manitoba, without providing ratepayers with much benefit.

4.3. Findings on Government Revenues

As might be expected, the differences between Resource Plans with respect to revenues for the Government of Manitoba are clear, and align with the construction of hydroelectric facilities.

Figure 13. Average Probability Weighted PV of Revenue to the Province of Manitoba

Average Probability Weighted PV of Revenue to the Province of Manitoba
High, Ref and Low Economics, Energy and Capital
(2015-2062)
($ in millions)

	Development Plan				
Revenue	**1**	**4**	**6**	**12**	**14**
NPV @ 6.00%					
Water Rentals	$1,702	$1,883	$1,879	$2,034	$2,091
Provincial Debt Guarantee	$2,614	$3,031	$3,075	$3,561	$3,783
Capital Taxes	$1,584	$1,874	$1,883	$2,229	$2,275

In the Preferred Development Plan (14), Conawapa is built and built soonest, and hence water rental fees are greater, more debt must be guaranteed, and capital taxes are highest.

The differences between Plans (14) and (12), where Conawapa is built a few years later, are very modest. Similarly, the differences between Plans (4) and (6), which both include Keeyask but not Conawapa, are very minor, but these totals are noticeably lower than the Conawapa-based Resource Plans.

These results are presented here for the lower discount rate, rather than the higher discount rate. This is appropriate because the time value of money for governments is very low. Arguably, for governments, the time value of money should be equal to its weighted average real cost of debt,[28] which would be substantially less than 6%. Using such a discount rate would accentuate further the differences between Resource Plans on this metric.

4.4. Findings on Export Orientation

Again as might be expected, the Preferred Development Plan (14), which includes the building of Conawapa earlier in time with the intention of signing long-term export contracts, includes the highest export revenues as a percentage of total Manitoba Hydro revenues. The chart below compares the revenue from exports as a percentage of total revenue, averaged over 48 years for a variety of hydrology patterns. Economic variables and construction costs are kept constant, but the group of variables including export prices and natural gas prices are tested at High, Reference and Low levels.

[28] Since both government expenditures and revenues typically rise with inflation, and government cost of capital is weighted between short, medium and long-term borrowings.

Figure 14. Average Export Revenue as a Percentage of Total Revenue (All Gas vs Preferred Development Plan)

Average Export Revenue as a Percentage of Total Revenue
All Gas and Preferred Development Plan
Reference Economics and Capital
(2015 - 2062)

	Development Plan	
Energy Scenario	**1**	**14**
Reference	9.5%	20.9%
High	11.9%	26.2%
Low	6.4%	14.3%

This outcome is relevant principally in two different ways:

- Resource Plans which have a higher reliance on export revenues are more sensitive to changes in export prices; this is borne out by reference to the model results if all variables except energy prices are kept constant: for example, average present value costs to ratepayers in Preferred Plan (14) are 10% lower if export prices are higher; whereas in All Gas Plan (1) there is little difference between the total ratepayer costs between scenarios with High and Low export prices[29]

- For government, higher exports mean that more of its revenue from Manitoba Hydro is actually coming from export jurisdictions, rather than ratepayers, which means that, *other things being equal*, the province as a whole should be receiving a net benefit.[30]

4.5. Findings on Hydrology

In any given year, or in any short-term period of a few years, hydrology affects Manitoba Hydro's financial performance more than any other variable tested.

The following table records the results of analysis done on a single year of the model, 2030:

[29] Note that since Manitoba Hydro's "Energy Prices" set of variables includes both export prices AND natural gas prices, for the All Gas Plan (1), higher prices means that exports are more valuable, but domestic production costs rise with fuel prices, with the two effects cancelling each other out to a great degree. The same is true in a lower prices environment, where lower export prices reduce export revenues, but lower gas prices reduce production costs. Since in the Preferred Development Plan (14) there is far less reliance on natural gas generation in Manitoba, the export price impact dominates and the difference between the high price and low price environment is very noticeable.

[30] Note that "other things being equal" is a crucial statement, since if pursuing higher export plans causes Manitoba competitiveness to suffer overall, then receiving a higher percentage of revenues from exports is not necessarily beneficial.

Figure 15. Average Difference Between Highest and Lowest Net Income (All Gas vs Preferred Development Plan)

Average Difference Between Highest and Lowest Net Income By Scenario, or by Year ($ in millions)	**Development Plan**	
	1	**14**
Within each scenario, all modelled years		
Difference, expressed as dollars ($)	$1,501	$1,972
Difference, expressed as % of highest (%)	171.8%	609.1%
Within a given year, all scenarios		
Difference, expressed as dollars ($)	$203	$780
Difference, expressed as % of highest (%)	27.3%	63.8%

What the model captures is that in the year 2030, the results for all of the model runs for both Resource Plans (1) and (14) were extracted. For each Resource Plan, the model was run 567 times (21 different hydrology patterns run separately for 27 different combinations of price variables). For each of the 27 combinations of variables, Manitoba Hydro's net income had 21 different results for the year 2030 based on the hydrology pattern used. The absolute difference between the highest and lowest net income result was recorded, both in dollar terms, and expressed as a percentage of the highest net income result. Then, the 27 different results from the 27 scenarios were averaged, to determine the average maximum impact of hydrology on the net income results of that year. For the All Gas Plan (1), the result was a potential difference in net income of $1,501 million (a swing from $550 million of net income to a loss of $950 million), and for the Preferred Development Plan (14) an even greater potential difference of $1,972 million (a swing from $275 million of net income to a loss of $1,690 million).

The second set of numbers represents holding the hydrology pattern for the year 2030 constant (the hydrology pattern was chosen so that water flow in the year 2030 and for several years before were approximately historically average), and comparing the difference in net income that results by testing all 27 different sets of variables and recording the maximum, minimum and resulting difference. For the All Gas Plan (1), this difference is only $203 million (a swing from $160 million of net income to a loss of $40 million), and for the Preferred Plan (14), the difference is $780 million (a swing from $475 million of net income to a loss of $305 million).

This analysis could be compared for other years and other plans, but the general result will be the same: hydrology drives Manitoba Hydro financial performance in any given year, much more profoundly than the expected range of any other variables will. However, it should be recalled that the historical record of hydrology demonstrates potentially massive swings on an annual basis, but tends towards the mean as longer and longer timeframes are examined.

One way of measuring this is to consider the standard deviation of the 100-year historical record of water flow in Manitoba. Over the entire 100 years, the standard deviation for annual flow is over 20, which means that in any given year, water flow can be expected to be in the range of +/- 20% of the historical average, two thirds of the time (however, fully one third of the time, it will be above 120% or below 80%). If water flow is averaged on a ten year basis, however, the standard deviation falls in half, with two thirds of ten-year averages falling between 110% and 90% of the average water flow. Over a longer period of time, the deviation shrinks further.

Put differently, the change in water flow on an annual basis can be dramatic. In an average year over the past 100 years, water flow was 18% higher or lower than the previous year. Eight times in the past century water flow has changed by +/- 40%! However, these gyrations just mask the fact that water flow tends to return to the mean.[31]

In terms of relevance to the choice of Resource Plans, it can be observed that:

- Hydrology is critical to short-term issues, such as the potential for financial distress, which will be addressed in the next section, but is less relevant to longer term issues such as the present value of ratepayer costs over a 48-year period or longer

- Though hydrology is less critical over longer terms, it does not mean that it is not relevant: even over a 35-year period the standard deviation of water flow is almost 5% of the historical average

- Resource plans heavy in hydroelectric investment, such as the Preferred Development Plan (14), are more sensitive to hydrology, and will therefore demonstrate greater variation in all financial results (including Manitoba ratepayer costs), especially in the short term but also over the longer term, other things being equal.

4.6. Findings on Financial Distress

It should be very apparent from the previous section on the impact of hydrology on Manitoba Hydro's financial results that there are scenarios where Manitoba Hydro may find itself in challenging circumstances. In average water flow years, it is apparent from the modeling that Manitoba Hydro's financial results will be adequate, across all 27 scenarios proposed by Manitoba Hydro, regardless of the choice of Resource Plan. "Adequate" in the sense of meeting its standards for debt:equity ratio in the longer term, keeping its Interest Coverage Ratio above 1.2,[32] and not increasing or decreasing rates by more than double the rate of inflation in any given year.

[31] Note that climate change and other long-term factors such as industrial development and water usage in watersheds can have long-term impacts on the mean water flow reaching Manitoba. This issue is not addressed here.
[32] Note that in some scenarios the ICR falls below 1.2 even in average water years, particularly between 2015 and 2025 when investment is greatest. However, this has already been signalled to the capital markets as an inevitable result of the intended long-term investment program, and there is no reason to believe that such a pattern would be cause for concern.

However, as the historical data makes clear, water flow need not be average, and in fact could at some point be well below average. In that case, Manitoba Hydro's financial results will not be within the planned ranges.

Many of the hydrology patterns applied to the model include "drought" scenarios at some point. If drought is defined as any year in which water flow is below the historical average, then an alarming number of droughts become readily apparent. If drought is defined as any five-year period when average water flow over five years is less than 95% of the historical average, then a more stringent test is being applied. In that case, there have been 37 such periods out of the 97 periods that can be counted in the last 101 years.[33] Very serious droughts with substantial financial impacts on Manitoba Hydro might be defined as five-year periods where average water flow is below 85% of average: there are 12 such periods out of the past 97. Most of these encompass periods centred in the 1930s and late 1980s. The last such five-year period was from 1988-89 to 1992-93.

Notably, the past 20 years have been extremely "wet" by historical standards, with only seven years below the historical average water flow, and a 20-year average of 110% of the historical water flow, one of the best such periods on record.[34]

There have historically been extended periods of serious drought:

- in the seven years from 1918-24 inclusive, every year was below average, and four of the seven years were below 85% of the average
- in the *eighteen* years between 1929-1946 inclusive, only three were above the historical average, and *nine* were 85% or less; this can be considered the "drought of the century" both in terms of length and severity, as it also includes the worst five-year period (from 1936-40, but that is almost equaled by the period 1987-91, when records are more accurate)
- in the sixteen years between 1980-95 inclusive, only three years were above average, and eight were 85% or less, including the severe period from 1987-91, the second-worst five years on record.

According to our model, it is absolutely clear that in the event of a severe, prolonged drought of the sort described here, Manitoba Hydro faces financial distress *regardless* of the Resource Plan selected, AND regardless of which of the 27 scenarios best describes the many variables that affect financial performance. In fact, distress is caused of such magnitude that the distinctions between the Resource Plans and scenarios are not particularly relevant.

The distress caused by a drought manifests itself in several ways:

[33] I.e., given data beginning from 1912 to 2012 inclusive, five-year periods would be counted from 1912-16, 1913-17, etc.
[34] In general, the "wet" decades have been the 50s, 60s, 70s and the 00s, while the 30s and 80s were both very "dry".

- The system's hydroelectric production falls dramatically, which reduces exports and export revenue, increases thermal production and therefore fuel costs, and increases imports and import costs
- The result is reduced operating income
- When depreciation and interest are deducted from operating income, net income will often be negative, which leads to interest coverage ratios below 1.0; in the worst years declines in operating results will be so severe that the interest coverage ratio is actually itself negative, which implies that cash flow before capital investments is insufficient to cover interest
- If net income is negative for a series of years, then retained earnings will steadily decline (possibly to the point of negative equity in the business), while at the same time all capital investments will have to be funded increasingly by debt, which compounds the interest burden for future years;
- Until the drought ends, and net income returns to positive territory, the company will continue to suffer deteriorating financial indicators from the compounding of debt increases.

There are two potential responses to this situation: raise rates, or borrow ever more to fund requirements. However, it should be made clear that solely raising rates to the level required to compensate for a drought is highly unlikely to be the practical solution. In some model runs across Resource Plans, rates would be required to rise by anywhere from 25% to 50% or more for a sustained period in order to maintain Manitoba Hydro's financial probity. Then, several years after the drought ends, rates could again fall steeply. This kind of response would play havoc with the business plans of Manitoba Hydro ratepayers, could undermine the competitiveness of many businesses, and would certainly change the competitive standing of the province with respect to other electricity jurisdictions.

A more realistic scenario is that rates would increase at something more than double the rate of inflation, but that the Government of Manitoba would also fund Manitoba Hydro's business with a combination of additional debt and possibly temporary relief from fees and taxes paid to government (water rental fees, capital taxes, and debt guarantee fees).

Speculating as to the magnitude of allowable rate increases in such circumstances is difficult: would rates be allowed to rise at triple inflation for a few years? Or, perhaps 10% per year? What balance would there be between a willingness to allow an "emergency" increase in the first year of a drought, and subsequent sustained increases when it is determined that drought is continuing unabated? If drought were to become the "new normal" over the course of a decade, would ratepayers/citizens be willing to see a Crown Corporation systematically raise rates during what would likely be seen as a time of hardship for many?[35] Since Manitoba has not faced this type of circumstance for more than 20 years, it is difficult to place a range on the potential response.

[35] For example, in a severe and prolonged drought, it can be expected that the agricultural community would suffer most acutely, creating a public and media awareness of drought, and the typical calls for government support.

A separate question would arise with respect to Manitoba Hydro's firm export contracts. Manitoba's electricity system is designed to ensure that these can be satisfied in all conditions where water flows are above the historic minimum. In "dry" years, however, meeting these firm commitments might require the burning of expensive fuel, making the contracts temporarily uneconomic. However, the contracts contain provisions ("adverse water") where delivery requirements can be suspended in the event of drought, so technically this situation could be avoided. However, actually suspending a firm export contract would be an extraordinary step to take,[36] and could change the standing of Manitoba Hydro as a potential commercial partner for years afterward.

4.6.1. Relative Susceptibility to Distress

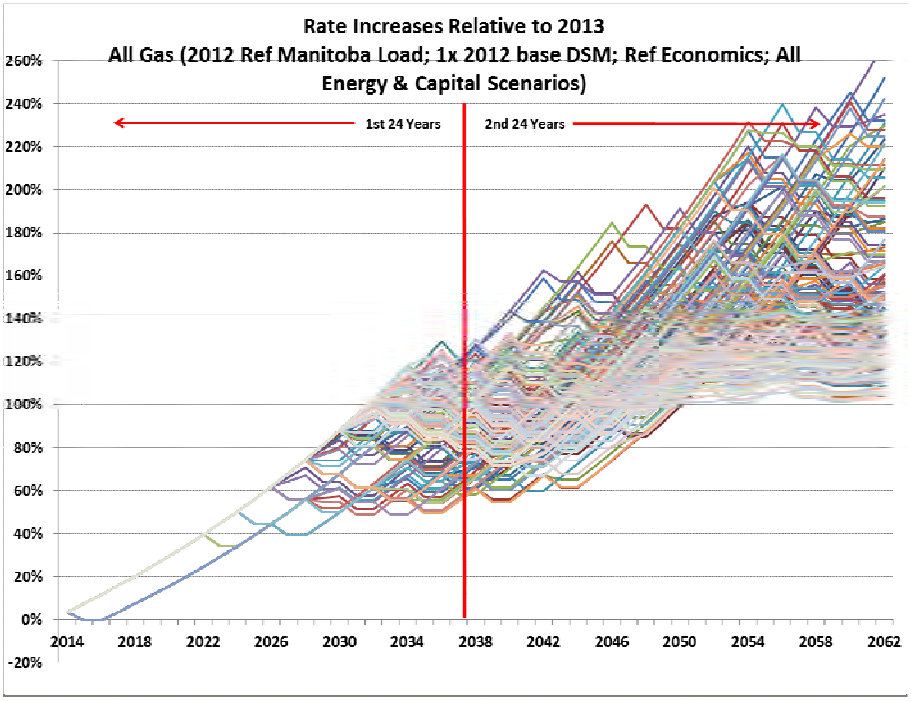
Despite the fact that the most severe situations of financial distress caused by drought overwhelm distinctions between Resource Plans, there are useful distinctions that can be made. These include sensitivity to hydrology, sensitivity to the timing of distress, and overall financial strength.

First, the point made in s. 4.5 above that some Resource Plans are more sensitive to hydrology is relevant. It is inescapable that the net income of Manitoba Hydro will be more sensitive to hydrology if Keeyask, Conawapa or both are built. A less severe drought may not affect Resource Plan 1 enough to drive Manitoba Hydro into distress. It should be noted that this sensitivity goes both ways: these Resource Plans will be exposed to higher highs and lower lows in net income and other financial indicators based on the future course of hydrology.

Second, timing is extremely relevant, and there are distinctions between the resource plans. In the first ten years of the model, all Resource Plans – including the All Gas Plan (1) – assume that rates increase at double the rate of inflation under all of the 27 scenarios and virtually all of the 21 hydrology patterns tested. For example, the following is the rate increase pattern for the All Gas Plan (1) in the 189 model runs that include reference economics (but varying hydrology, fuel costs, etc.).

[36] In 2003-04, when Manitoba suffered a significant one-year drought, all firm contracts were fulfilled and "adverse water" was not declared. However, it is notable that in the two following years after the drought, water flow levels shot up well above historical averages.

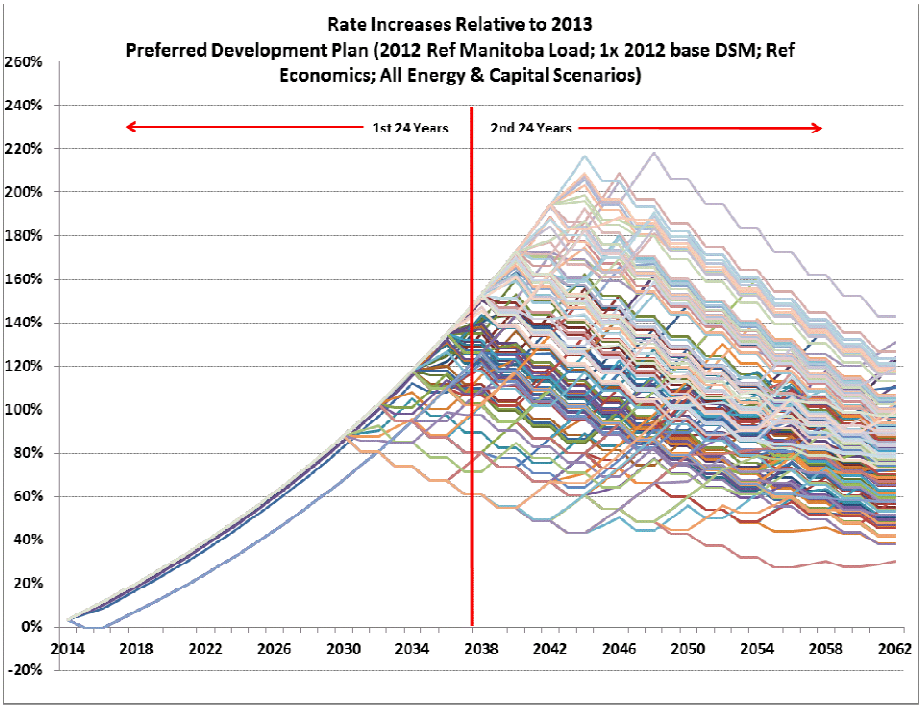
Figure 16. Rate Increases Relative to 2013 (All Gas) (3)



Until the late 2020s, very few model runs out of 189 include anything other than 3.8% annual rate increases. One implication is that Manitoba's competitive advantage with other jurisdictions may be deteriorating from its strong current position based on the steady increases. However, after that point, rate increase moderate in many scenarios and hydrology patterns, indicating that financial stress on the company is abating. To the extent that rates are flattening or declining, Manitoba's competitive rate flexibility could be improving. If a drought were to begin after that point, then the first response would be to return to 3.8% rate increases (which is exactly what many lines on the chart depict), and only then would other options have to be considered.

For the Preferred Development Plan (14), however, timing is different.

Figure 17. Rate Increases Relative to 2013 (Preferred Development Plan) (2)



Here, significant rate differentiation does not begin until the early to mid-2030s. Rates rise at a steady clip for the next 20 years, which must have some competitiveness consequences (depending on developments elsewhere, of course). This means that any financial challenge suffered during those two decades could only be addressed by extraordinary measures, whether in the form of higher rates or declining financial indicators coupled with government support. However, upon reaching the 2040s, rates begin a steady decline under virtually all scenarios, which indicates tremendous capacity to absorb shocks without unduly compromising the province's competitive position.

The third factor is the relative ability of Manitoba Hydro under each of the Resource Plans to absorb the potential deterioration to financial indicators that could be caused by drought. One possible measure of this factor is to compare the maximum negative net income that could occur in a drought year with the size of the interest payment that is due in that year. For example, in s. 4.5 above, the year 2030 was reviewed for Resource Plans (1) and (14) with respect to the potential impact of hydrology and scenario conditions. In the worst modeled case for that year (in the High Economics, High Energy Cost, High Capital Good Costs, with the hydrology of 1988), Resource Plan (1) had a net loss of $1,366 million and an interest coverage ratio of only 0.29x, while Resource Plan (14) had a net loss of $2,896 million but an interest coverage ratio of 0.33x. The size of the net loss caused by the drought in absolute terms was larger, but with respect to its impact on a financial indicator such as the interest coverage ratio it was actually relatively smaller, because of the larger balance sheet of the company in Resource Plan (14).

Such calculations change from year to year, Plan to Plan, and scenario to scenario, and cannot be calculated with confidence without meticulously testing the entire 3000+ model runs. However, a

general assumption can be made that the Resource Plans with larger balance sheets will be better able to absorb these situations over the full life of the model, other things being equal.

4.6.2. Magnitude of Distress

Assessing the relative "magnitude" of the distress to which each of the Resource Plans is susceptible is challenging because of its amorphous definition.

Is the magnitude the absolute size of a possible net loss in a single year? (Adjusted for inflation?) Is the magnitude the absolute size of the operating cash shortfall that might be suffered in the worst situations?[37] (Again, adjusted for inflation?) If government could compensate for temporary financial distress by exempting Manitoba Hydro from payments to government (water, debt guarantee and capital tax), is it the amount by which losses exceed these payments?

The purpose of attempting to calculate the magnitude of distress is to understand the problem in relation to the government, which is providing Manitoba Hydro with a debt guarantee, and which would be concerned if the company were no longer perceived by the credit rating agencies to be "financially self-supporting". The key test can be inferred from comments made by the credit rating agency Moody's in its report on the Province of Manitoba in July, 2013:[38]

> "This Crown Corporation's ability to meet its own financial obligations without recourse to provincial subsidies is a positive credit attribute for the province."

In a "normal" situation, Manitoba Hydro's guidelines target not only an interest coverage ratio of at least 1.2, but also coverage of typical capital spending requirements from internally generated funds. If the company were not able to meet this objective during a one or two-year drought, it would be unlikely that credit rating agencies would reassess their position on the ability of Manitoba Hydro to be self-sustaining.[39] However, if drought conditions continued, and rates were not allowed to rise sufficiently to meet these interest and capital targets, then the shortfall in meeting them would become a focus for attention.

In this case, *longevity* of financial distress caused by drought would be the indicator that the problem had ANY magnitude. Only secondarily, the size of the cash shortfall in successive years would then be an indication of the magnitude of the problem.

Returning to the example mentioned above relating to the model year 2030, if the losses described occurred in only one year, because of a sudden drought, but then in subsequent years financial indicators turned around, then there would be no magnitude to the problem. However, if those net losses were part of a repeating pattern because of a deep and long drought, and there was an

[37] I.e., the amount by which a potential annual net loss exceeded 1.2 times debt interest.
[38] Moody's Investor Service, *Province of Manitoba Credit Analysis*, July 2013, p. 3.
[39] Manitoba suffered a short, sharp drought in 2003-4. The DBRS Credit Report on the Province of Manitoba on June 22, 2004 noted that the province suffered "an unexpected, and likely non-recurring, loss of $359 million at The Manitoba Hydro-Electric Board ("Manitoba Hydro") as a result of unexpectedly low water levels." No further impact occurred, as water flow returned to average and subsequently above average levels in the following years.

unwillingness to drastically raise rates to compensate for the need for revenues, then it would be absolute size of the net loss that would indicate the magnitude of the problem. In short, for Development Plan (1), where the net loss was $1,366 million, the magnitude would be less than for Development Plan (14), where it was $2,896 million.

Moreover, in provincial terms, because of the debt guarantee provided by the Province of Manitoba to Manitoba Hydro, these cash shortfalls would be translated into the form of supported debt. Since these situations occurred in the High economics environment, where the cost of Manitoba Hydro debt is assumed to be nearly 9%, then the magnitude of debt that would be lacking support would be $15 billion in the case of All Gas Plan (1), and over $30 billion in Preferred Plan (14).

It should be noted that hydrology year 1988 was a singularly severe drought year, and there was some recovery in each of these model runs subsequently, so shortfalls of that magnitude would not be repeated. However, the assumption about financial capacity being related to size of balance sheet is reversed with respect to magnitude of exposure to financial distress. In the event of a sustained, severe drought, Resource Plans with a larger balance sheet due to investment in hydroelectric facilities will have a greater magnitude of exposure, commensurate with that balance sheet and amount of debt. Once a drought ends, the sensitivity to hydrology will again become a positive, and quickly return the magnitude of exposure to zero.

In order to test the magnitude of financial distress more carefully, several assumed droughts in the 2020s and 2030s were examined. Sustained, deep drought hydrology patterns were used, with the same pattern used for each of the decades. The Preferred Development Plan (14) was particularly susceptible to drought in the earlier period, facing shortfalls of over $1,000 million per year in a number of years (that represents rate increases of 35% to 50%, depending on the year). However, when the same drought experience is faced in the mid-2030s, no financial distress is experienced. At that point, debt had been declining at Manitoba Hydro for several years, and rates were actually in the midst of falling when the drought occurred. Reversing the rate direction in that situation was sufficient to address the challenge. For All Gas Plan (1), circumstances are reversed: it was able to weather the storm in the 2020s with two years of poor results, but in the example of the 1930s, a sustained $1,000 million shortfall resulted unless rates were hiked systematically.

4.6.3. Cost Overruns

While drought is the most likely and expected source of financial challenges for Manitoba Hydro in considering its Resource Plans, it is not the only possibility. As was described in s. 3.3.5 above, there have been instances around the world where large construction projects have gone horribly wrong, resulting in substantial hardship for stakeholders.

Two observations seem pertinent: first, given that a construction cost overrun would be manifested in Manitoba Hydro's case as an increase in debt, it is only the debt interest amount that would present an immediate challenge. Second, given that it is only changes in revenue of a size potentially caused by hydrology that actually undermine Manitoba Hydro's performance, an overrun would have to be truly massive in proportion to be significant.

For example, a cost overrun of $1,000 million under the High economics scenario would generate a year two debt interest of just under $100 million. In the case of financial distress caused by drought, swings in cash flow of ten times that size were under examined. An unnecessary cash cost of $100 million per year would not be welcomed, but would not undermine the performance of the company (that would even be true at two or three times the size).

This is not to say, however, than an extraordinary construction cost overrun would not be important: such events would change the full 48-year cost to Ratepayers, as follows:

Figure 18. PV of Domestic Revenue (Average Impact of Additional Capital Expenditures on Conawapa)

PV of Domestic Revenue
Average Impact of Additional Capital Expenditures on Conawapa
Preferred Development Plan
Additional capital outlay in 2025 (real 2014 $)
NPV @ 6.00%
($ in millions)

	Additional Capital Cost		
	$0	$1,000	$2,000
PV of domestic revenue	$44,230	$45,016	$45,839
Increase relative to nil increase	0.0%	1.8%	3.6%

While the sensitivity to cost overrun may not be sufficient to undermine the company, it would greatly damage the value proposition of the Resource Plan in question.

5. Specific Issues of Interest

5.1. Cost of Capital and Discount Rate

In Appendix 9.3 of the Business Case, Manitoba Hydro provides details concerning the construction of the High, Reference and Low sets of variables included in the 27 scenarios used in the analysis of the Resource Plans. MPA accepted and utilized these scenarios as preparation for this Report to the PUB, however some observations can be made about the cost of capital which the PUB may find useful. In addition, MPA did not utilize the costs of capital constructed by Manitoba Hydro as discount rates in our financial model, and hence some additional commentary appears appropriate on this issue.

5.1.1. Cost of Capital

The following is a summary of the various components of Weighted Average Cost of Capital (WACC) utilized by Manitoba Hydro.

Figure 19. Weighted Average Cost of Capital (Manitoba Hydro)

Weighted Average Cost of Capital (WACC)

		Nominal			Inflation			Real		
	Ratio	High	Ref	Low	High	Ref	Low	High	Ref	Low
Debt	75%	8.95%	6.30%	3.65%	3.00%	1.90%	1.00%	5.78%	4.32%	2.62%
Equity	25%	11.95%	9.30%	6.65%	3.00%	1.90%	1.00%	8.69%	7.26%	5.59%
WACC	100%	9.70%	7.05%	4.40%				6.50%	5.05%	3.37%

The foundation stone for all calculations is the reference nominal cost of long-term debt (6.30%), based on the consensus forward forecast for long Canada bonds, plus adjustments for the actual cost of debt to Manitoba Hydro. This figure is used to calculate the "real" cost of debt, discounting it for the reference inflation rate (1.90%), which is again based on a consensus forward forecast. At the same time, the cost of equity is assumed to be a fixed amount of 3.00% higher than the cost of debt.

On any given day, a slightly different calculation could be used to calculate the real cost of debt that Manitoba Hydro would be expected to face:

Cost of Canada bond at whatever length of term is desired (typically 10 or 30 years)

\+ Province of Manitoba Spread (over the past 20 years ranging from 0.2% to 1.0%+)

\+ Debt Guarantee Fee (currently 1%, but subject to unilateral change by the Province)

For example, on January 15, 2014, the benchmark Canada Long-Bond traded at 3.12%, and the Manitoba spread was approximately 0.85%. Adding the 1% Debt Guarantee Fee results in a Manitoba

Hydro cost of 4.97%. In comparison, the reference nominal debt rate used in the Business Case is not insignificantly higher.

However, the Canada Long-Bond rate may be implied from the nominal reference cost of debt used by Manitoba Hydro in the Business Case:

Figure 20. Implied Canada Long-Bond (1)

Implied Canada Long-Bond		
Reference nominal debt	6.30%	6.30%
less:		
Provincial debt guarantee fee	1.00%	1.00%
Province of Manitoba spread	0.40%	0.60%
Implied Canada Long-Bond	4.90%	4.70%

By this calculation, the reference nominal debt rate assumes a Canada Long-Bond in the range of 4.70% to 4.90%. Comparison to the history of the Canada Long-Bond, which is readily available on the Bank of Canada website, confirms that a rate in this range was indeed common in the 1920s, early 1930s, 1950s and early 1960s, and again in the first half of the last decade, before the financial crisis in the latter half of that decade.

Similar derivations for the high and low debt rates used in the Business Case appear as follows:

Figure 21. Implied Canada Long-Bond (2)

Implied Canada Long-Bond	**High**	**Ref**	**Low**
Cost of nominal debt	8.95%	6.30%	3.65%
less:			
Provincial debt guarantee fee	1.00%	1.00%	1.00%
Province of Manitoba spread	0.70%	0.50%	0.30%
Implied Canada Long-Bond	7.25%	4.80%	2.35%

Again, reference to the historical record shows that a Canada Long-Bond in the range of 7% has occurred, but only for relatively brief periods in the early 1970s and early 1990s, when the world was entering and then exiting a period of very high interest rates that lasted from approximately 1975 to 1995 (Manitoba Hydro did not include a “very high” rate that would attempt to capture such an economic environment, where the Canada Long-Bond was above 9.00% for thirteen consecutive years). Moreover, a Canada Long-Bond in the low 2.00% range has occurred even more rarely, having occurred

only in the last two years. Even in the 1930s and the 1950s, two periods which are historically recognized for lower interest rates, the Canada Long-Bond breached the 3.00% mark only rarely.

It should be recalled that the purpose of the scenarios is to construct sets of variables that are to be used in long-term models, and used *throughout the duration* of the model. In the case of Manitoba Hydro's "real" economic model, that term is 78 years, and in the case of Manitoba Hydro's nominal dollar model (and MPA's financial model), that term is 48 years. The scenarios should be understood as "averages" that would apply to the whole period in question.

Manitoba Hydro assigned probabilities of 35% for high, 50% for reference, and 15% for low with respect to the cost of debt. By reference to the historical record, there does appear to be strong support for the reference scenario, and some support for the high scenario, but little if any support for the low scenario as it is constructed, at least with respect to the cost of debt.

A similar review could be undertaken for the inflation rate options, set by Manitoba Hydro at 3.00%, 1.90% and 1.00%. Again, reference to available resources suggests that there is ample historical justification for the higher two rates (and even for a "very high" rate for long periods of the last century), but very limited justification for a 1.00% inflation rate as a potential average rate for a fifty-year or longer period.

Finally, Manitoba Hydro constructs its cost of equity by the straight addition of 3.00% to the selected cost of debt. To the extent that this cost of debt already includes the Provincial Debt Guarantee Fee and the Province of Manitoba spread, an equivalent calculation indicates that the notional return on equity that is assumed in the cost of capital is approximately 4.50% above the Canada Long-Bond at any given time.

On this issue, reference can be made to a study undertaken by the Ontario Energy Board in 2009,[40] which included analysis by five economists/experts on equity rates for regulated utilities across North America, with reference to historical market data, regulatory practice in a number of jurisdictions, and a variety of recognized techniques for deriving appropriate equity rates. The conclusion of a lengthy review process (and the availability online as part of that process of a full literature review of equity costs of capital), was that "low risk" transmission and distribution utilities were considered to have an equity cost of capital approximately 5.00% higher than Canada Long-Bonds.

Given Manitoba Hydro's high degree of exposure to hydrology risk, its financial exposure to market export prices, and the ambitious program of construction included in the Preferred Development Plan, legitimate issues can be raised with respect to the adoption of an equity rate of return that is even lower than a "low risk" premium of 5.00%.

[40] *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, Ontario Energy Board, EB-2009-0084.

5.1.2. Discount Rate

Manitoba Hydro chose to utilize its WACC as the discount rate in all of its present value calculations. The justification is presented as follows in s. 9.2.3 of the Business Case:

> The starting point for development of a discount rate is a company's overall cost of financing. As a discount rate is used to guide investment decisions based on uncertainty, a risk premium may be identified to arrive at a discount rate which makes the investor indifferent between cash amounts received at different points in time.

Manitoba Hydro used the reference WACC as its discount rate (either nominal of 7.05% or real of 5.05%) throughout its analysis, except with respect to updated 2013 figures, when the reference real WACC was increased to 5.40% because of increases in some of the underlying consensus forecasts.

Several observations can be offered:

- WACC is the appropriate concept to consider the present value of cash streams in the future for the purposes of an investor considering an investment decision, however, Manitoba Ratepayers are not investors
- While it is true that Manitoba Hydro will source the capital required for its chosen Resource Plan from a combination of debt and retained earnings, and while the retained earnings are at least partially derived from ratepayer revenues, ratepayers can in no sense be understood to be making a voluntary investment decision, particularly given the monopoly nature of the utility service that is being offered, and the decision-making authority that rests in the hands of the government
- Calculation of the WACC, and its use in models predicting Manitoba Hydro's financial results – and hence electricity rates that ratepayers will face – is entirely appropriate given the likely use of the formula in the setting of rates over time by the PUB, however, this does not automatically qualify the WACC for use as the discount rate relevant to all parties considering the Business Case
- From the perspective of ratepayers, or any other stakeholder considering the Business Case, the primary value of the discount rate is in providing a means to compare varying cash streams over time from the perspective of today, in essence, a "time value of money" which is appropriate to that stakeholder
- The primary stakeholders in the Business Case identified in this Report are ratepayers and the Government of Manitoba; notably, neither of these parties is directly and voluntarily investing equity in the project
- It can be argued that governments have very low "time values" of money, given the permanence of the institution, and typically its access to the lowest cost of funds; ratepayers,

however, are a heterogeneous group for whom generalizations are very difficult, and for whom the adoption of a single, blended time value of money may not be appropriate.

While there is an existing literature with respect to the choice of appropriate discount rates to represent ratepayers, we have not pursued this issue further. For the purposes of this report the use of two discount rates was adopted, both nominal, at 6.00% and 10.00%. These rates bracket the rate adopted by Manitoba Hydro, and offer the possible consideration of the various resource plans from more than one perspective.

5.2. Exports

As has been discussed elsewhere in this report, Manitoba Hydro has generated a substantial portion of historical revenues from exports. Of these revenues, a significant portion is directly tied to short-term market prices, while another portion is the result of longer-term firm contracts. These contracts, however, are not specifically tied to any asset, but instead are based on the output of the Manitoba electricity system as a whole. As a result, their length, pricing schedule, and terms and conditions all reflect the underlying export electricity markets and counterparties with which Manitoba Hydro interacts.

These contracts can be contrasted with Manitoba Hydro's own contracts with the wind farms that have been constructed in the province. In those cases, Manitoba Hydro has purchased all of the output of the wind farms for their full expected life, at rates that were negotiated between the parties based on the cost of construction and operation of the wind farm plus an amount meant to represent a return on investment for the wind farm owners. These are classic "infrastructure project" contracts which effectively apportion and minimize the risks and costs of a project for both parties.

Manitoba Hydro has negotiated a number of agreements with parties as part of the development of the Preferred Development Plan, as described in the Business Case. The electricity resources that will be built as part of the Preferred Development Plan are hydroelectric facilities with an expected life of over 100 years. The contracts negotiated, however, have terms which last a fraction of that time. In addition, the price of the contracts is based on prevailing market conditions, and not in any way related to the cost of the electricity resources being built. They are in fact system energy arrangements, similar to the system energy arrangements that Manitoba Hydro has signed in the past. As such, their chief usefulness is in providing Manitoba Hydro with a guaranteed buyer for a portion of the system's expected surplus power, and a firm price for a period of time, which provides additional predictability to cash flows.

Considered more broadly, Manitoba is simply a price taker in the MISO market, whether it is taking prices in short-term markets, or in a longer-term market for bilateral arrangements with specific counterparties. The value of the longer-term contracts negotiated at any time are likely, as Potomac Energy, another independent expert consultant to the PUB, has argued in their report,[41] to be based on the cost of new entry into the MISO market (or in other words, the cost of constructing new supply resources in the MISO market at the time a contract is negotiated). As a result, the longer-term firm

[41] Please see Report to the PUB provided by Potomac Energy on January 15, 2014.

contracts are not mitigating market risk or exposure for Manitoba Hydro, but merely apportioning the market risk accepted in pursuing the Preferred Development Plan.

In this respect, Manitoba Hydro is acting as a "merchant" investor, taking substantial market risk based on expectations, or bets, about the future. While "probabilities" have been placed on different potential futures through the scenario modeling process, fundamental market risks are necessarily imbedded in some Resource Plans to a far greater extent than in others. Prices will either turn out to be high, and ratepayers will benefit, or they will turn out to be low, and ratepayers will have to shoulder more of the burden of Manitoba Hydro costs. Either way, ratepayers can have no certainty in advance, and no choice in the matter.

Given the legislative mandate of Manitoba Hydro to reinvest all earnings, and keep rates as low as possible, it is clearly not a merchant investor. However, the tacit acceptance of risks that would be normally within the scope of a merchant investor suggests the issue deserves scrutiny.

5.3. Impacts on the Government of Manitoba

In s. 4.6, the potential for and magnitude of Manitoba Hydro financial distress was discussed. It was suggested that depending on the choice of resource plan, the timing, and the depth of a drought event, it is possible that for a period of time Manitoba Hydro could suffer a sustained period of financial distress which could result in the view that the company is no longer fully self-supporting. Many factors would play into this conclusion, including the longevity of the distress, and the severity. However, in certain scenarios, if a severe drought were to occur in the 2020s, there is the possibility that the approximate equivalent of $10 billion or more of Manitoba Hydro debt could be viewed as not "financially supported" by rates.

In practice, what this would mean is that the Government of Manitoba would have to lend additional sums to Manitoba Hydro in order for the company to meet its cash requirements (both to pay debt interest and refinance expiring principal, and to finance the purchase of necessary capital goods). The ability of the government to provide such funding is not called into question, but rather it is the potential impact on the view of the Province by credit rating agencies and other capital markets actors that is in question.

5.3.1. Manitoba Financial Profile

Currently, Manitoba is positively viewed by credit rating agencies, and maintains a high rating (Aa1 from Moody's, AA from Standard and Poors and A (high) from DBRS). Recent credit reports, which have been provided as part of the NFAT process, have highlighted the relatively strong and stable economic performance of the province in the years since the financial crisis of the last decade, the varied sources of strength in the province's economy, its population growth through immigration, and the stable fiscal and financial management of the government.

Projecting forward ten, twenty or thirty years to a possible financial distress episode at Manitoba Hydro on the basis of current estimates is a tenuous exercise at best, both because of the time involved, and

because of the vagaries of the credit rating world. In the past twenty years, Moody's has upgraded Manitoba's credit rating three times, while Standard and Poors did so only once in the last fifteen years, and DBRS has not changed its rating for the past 10 years. DBRS rates Manitoba equal to Quebec, but less than Ontario, while Standard and Poors rates Manitoba one notch above Ontario and two notches above Quebec. Managing the perceptions of the capital markets is an art, not a science.

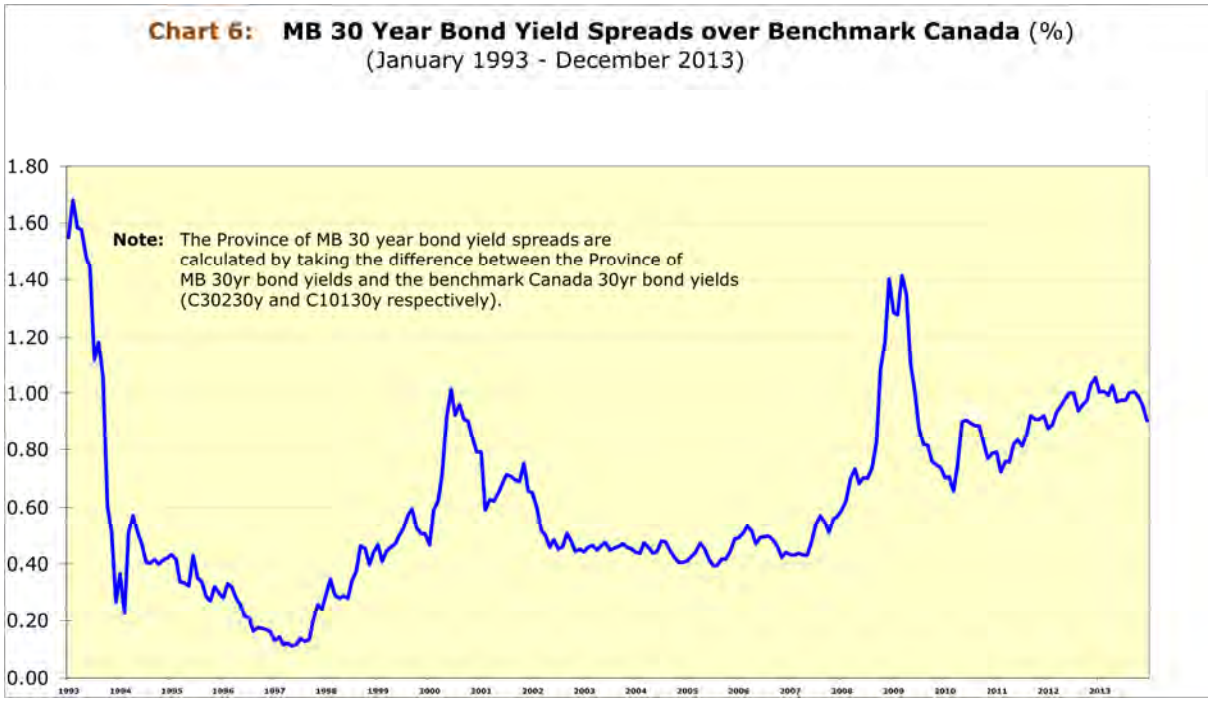
Currently, Manitoba Hydro's debt is considered to be self-supporting, and hence is not included as part of Manitoba's net tax-supported debt. Across the credit rating agencies, Manitoba's net tax-supported debt is calculated to be between $15 and $20 billion, depending on the agency in question. Debt to GDP ratio is calculated as approximately 30% to 35% of GDP. According to a calculation by DBRS, Manitoba's Debt to GDP ratio is similar to that of Nova Scotia and New Brunswick (with whom it shares an A (high) rating), but less than Ontario's 41% (but Ontario is rated higher at AA (low)), and much lower than Quebec at 60% (though the province has the same rating as Manitoba).[42]

Manitoba's GDP growth has been averaging approximately 2% per year in the last five years (while many other jurisdictions suffered severely), yet net tax-supported debt has grown substantially faster. The province is widely expected to pursue a substantial infrastructure program that could dramatically increase debt even further. If, for example, the province's economy continues to grow at 2% per year, then GDP will reach $70 billion in ten years (if the province were to reach a 3% average growth rate, then GDP would grow to $77 billion). However, if tax-supported debt were to grow by $10 billion, then the debt to GDP ratio would rise to approximately 42%, which is the reported level of Ontario today.

In this discussion of credit rating and credit rating agency overviews, it is important to consider the practical impact of these positions. The metric by which provincial credit is judged on a daily basis is the credit spread between a province's bonds and Government of Canada bonds. The following chart, provided to MPA by Manitoba Hydro, depicts the progress of the credit spread over the past 20 years.

[42] Please see the DBRS 2013 Provincial Fact Sheet.

Figure 22. Manitoba 30 Year Bond Yield Spreads Over Benchmark Canada (%)



It is immediately notable that the pattern of the credit spread between Manitoba bonds and Government of Canada bonds does not correspond to rating agency views. In fact, what is more noticeable is major economic trends and events, such as the financial crisis in 2008, the terrorist attack on the United States in 2001, and the Asian credit crisis in 1998. Along the way, the constant gyrations of the credit spread do not seem to be related to the overall stability in credit rating reviews that Manitoba has enjoyed. Finally, both Moody's and DBRS increased Manitoba's credit rating in 2003, after the spread had already declined, and with no apparent further affect once their new positions were announced.

It is quite possible that Manitoba's capital markets position could deteriorate over the next twenty years, but it is also possible that it could improve, through prudent fiscal management, balanced budgets and continued focus on economic development and prosperity. Despite all of that, the credit spread could still widen, or contract, with little to no relation to any local accomplishment or failing.

5.3.2. Context for Potential Manitoba Hydro Distress

As discussed, Manitoba Hydro, particularly in the context of the Preferred Development Plan, is financially sensitive to hydrology. If there were to be a prolonged and severe drought, particularly in the 2020s when the company would be most susceptible to financial distress, then a substantial portion of the company's debt could cease to be considered "financially self-supporting".

There are several issues which should be taken into account with respect to the impact of such a situation on the Province of Manitoba:

- All droughts, even the most severe, eventually end, and with the end of the drought would be the return of revenues and profits for Manitoba Hydro; all of the credit rating agencies and capital markets will understand this reality

- Concern is likely to mount progressively through a drought, with impact on the Province only becoming an issue over time (a one-year event, such as occurred in 2003-04, would simply not register)

- If a severe drought was indeed occurring, it would be affecting far more than just Manitoba Hydro; in fact, Manitoba Hydro would be one of the last focuses of attention, as the agriculture sector, forestry, parks and wildlife and many others affected by drought would gain attention first

- In a situation of severe natural disaster, governments are expected to step in with assistance, which would include not only the Manitoba government but also the Government of Canada (though not necessarily on an issue such as electricity prices)

- Given that the watersheds serving Manitoba Hydro's facilities are spread across several provinces and states, a drought of this magnitude would not be localized, adding to the overall attention to it.

In such a context, Manitoba Hydro would be faced with a drought and deteriorating financial indicators, and need to advocate for rate increases to improve its finances. While only a small fraction of Manitoba's economy is dependent on agriculture, there are still many people in the agriculture sector who would be affected by drought, and who would be resistant to increases in electricity prices. Moreover, insofar as electricity rates will have been rising steadily at 3.8% per year for the next ten years, rate fatigue may well have set in.

If no or only low rate increases are implemented, and a shortfall in cash requirements continues, then several practical consequences will ensue:

- Manitoba Hydro will suffer repeated years of losses, which will reduce equity over time, leading to a deteriorating debt:equity ratio

- For the Province of Manitoba, Manitoba Hydro's earnings appear in the budget as revenues, and losses as expenses, so a drought would have an immediate bottom line impact on the deficit (however, since no dividends are ever paid to the government, credit rating agencies and other sophisticated analysts already deduct Manitoba Hydro earnings from the "adjusted" versions of Manitoba's annual budgets)

- Water rental payments would drop significantly in a drought, which has a real cash impact on provincial budgets, but substantially smaller than the potential impact of losses, as described above

- The provincial government would need to decide what form(s) of relief it would provide to Manitoba Hydro in such a situation, beyond allowing extraordinary rate increases at some level; the choice would likely be between some combination of lending additional funds, or exempting Manitoba Hydro from certain payments

- If the province exempted Manitoba Hydro from any payments, then that step would have immediate budgetary consequences, whereas simply extending additional credit would be a capital account transaction

- An additional consideration would be that lending to Manitoba Hydro would simply be the extension of credit support to ratepayers, not an actual cash transfer between taxpayers and ratepayers, as would be the case if Manitoba Hydro were provided with any kind of tax holiday or exemption; in the case of additional lending, ratepayers would ultimately be responsible for the full amount over time, including underlying interest and the debt guarantee fee.

As with so many issues in the capital markets, perceptions would be crucially important. If prior to the onset of a drought, Manitoba continues to enjoy a strong competitive position with respect to electricity rates elsewhere, then financial distress from an ultimately time-limited drought might simply be perceived as a temporary phenomenon that would eventually resolve itself through steadily increasing rates, and an eventual return of water flow. In that scenario, little to no impact would be expected on the province. On the other hand, if prior to the drought Manitoba Hydro's competitive position had already deteriorated, then the potential to reassign multiple billions of dollars of debt from Manitoba Hydro to the Province could be viewed as a more likely course, with all of its attendant possible impacts.

6. Costs, Risks and Benefits

6.1. Ratepayers

As identified in Chapter 2, the primary interest for Manitoba ratepayers is to pay the lowest risk-adjusted cost for their electricity over time.

In some sense, both the cost and the benefit for ratepayers is the same thing: the monthly bill for the electricity they consume. Through financial modeling, the five Resource Plans were compared across all 27 scenarios and 21 hydrology patterns. The rank ordering of the Resource Plans very much depends on whether a scenario is isolated, or whether several scenarios are allotted probability weights.

Risk is the principal differentiator between the Resource Plans. Choice of a Resource Plan is in large measure a choice about the risks that Manitoba Hydro will be financially sensitive to, and which will be passed on to Ratepayers in the form of rates.

Table 8. Risk and Impacts Across Development Plans

Risk	Impacts
Demand	• Smaller, shorter construction-time resources can be more accurately targeted to expected domestic demand, favouring Plan 1 • All Plans can suffer if domestic demand stalls or declines after resources are built, though larger individual facilities in Plans 12 and 14 face such stranded asset risk to a greater degree; mitigated by the fact that "demand" need not be domestic demand • The impact in the event of lower demand depends on the relationship between export prices and domestic rates at the time the expected demand does not materialize; if prices have to rise steadily for a longer period, as in Plans 12 and 14, then more of this competitive advantage may be lost
Hydrology	• There is a clear difference in sensitivity to hydrology as between the Plans, with Plans 12 and 14 being most affected by water flows • The volatility of water flows translates directly into volatility of cash flows, which can be positive as well as negative
Export/Import Prices (& Fuel Prices)	• There is a clear difference in sensitivity to export markets and market prices between the Plans, with Plans 12 and 14 being most sensitive, but again, sensitivity can be both positive and negative • The reduced sensitivity in Plan 1 to changes in this set of variables may have much to do with the fact that fuel prices and export prices are tied together
Construction Costs	• The absolute magnitude and complexity of building a project like Conawapa increases risks
Interest Rate	• All Plans are dramatically affected by interest rates and inflation assumptions
Technology	• Plans with longer – lived assets forego the possibility of adapting to improvements in technology

It should be recalled, however, that the overall "risk-adjusted" impact of the choice of Resource Plans will only be marginal over the very long term, when considered from a present value perspective. The existing system will continue to be the backbone of electricity supply for many years to come, and the Resource Plans do not change the fundamental hydroelectric nature of the Manitoba electricity system.

The second critical aspect for Ratepayers is the treatment of time: while this is not a risk in the normal sense of the word, there is an apparent difference in intergenerational treatment between the Resource Plans. The rate paths described in s. 4.2.1 make clear that a strong opinion on the time value of money can have an almost deterministic effect on the choice of Plans from a Ratepayer perspective.

6.2. Government of Manitoba

The Government of Manitoba has a clearer set of costs, benefits and risks to consider.

The Preferred Development Plan and Plan 12 both include Keeyask and Conawapa: these Resource Plans would require the largest balance sheet, most guaranteed debt at risk, the longest construction times, and the longest sustained period of initial rate increases. On the other hand, they will provide the most government revenues, generate the most significant construction employment and attendant economic development, and hold the promise of maintaining or improving the province's electricity competitiveness for decades into the future.

From the perspective of the government, the relatively minor distinctions that result based on the outcome of the twenty-seven scenarios is largely irrelevant. The Government's focus is not on having the lowest possible costs, only a competitive cost. While the Preferred Development Plan is virtually guaranteed to require a doubling of electricity rates over the next 20 years, it holds the promise of actual rate declines in the following period and beyond.

The critical issue for the government is the ever-present threat of drought. While there has not been a severe and prolonged drought in Manitoba for twenty-five years, there will inevitably be another one. Timing will matter with respect to the degree of sensitivity to financial stress, and the choice of Resource Plan will determine the seriousness of the impact. The pattern is nearly identical to rates for consumers: The Preferred Development Plan has a heightened sensitivity to drought in the first twenty years, but less sensitivity to drought in the subsequent period.[43]

[43] For consideration of broader economic development issues, please see the Report to the PUB of Typlan Management and Planning. For review of environmental issues, please see the Report to the PUB of MNP. While these issues are of obvious concern to the Government of Manitoba, they are outside the scope of this report.

7. Conclusions

Analysis of the available data and construction of a financial model capable of incorporating hydrology has allowed for the illumination of a number of patterns, and a variety of observations that will, it is hoped, assist the PUB in making its recommendations to government on the NFAT Review of the Manitoba Hydro Preferred Development Plan.

Key observations have included:

- The ability of Manitoba Hydro to meet its financial targets over the next ten years without increasing rates beyond two times the rate of inflation – under all Resource Plans – is entirely dependent on the continued absence of a significant drought
- Different Resource Plans extend that period of fragility, including the Preferred Development Plan, which should not be expected to enter a time of more financial capacity for twenty years, unless rates are allowed to rise at more than double the rate of inflation for an extended period of time
- In the face of a sustained, severe drought, the choice of Resource Plan is irrelevant to the occurrence of distress, as the financial consequences of such a drought would overwhelm the differences between Resource Plans
- Choice of Resource Plan does affect the occurrence of financial distress due to drought in milder drought cases, and it also affects the magnitude of the problem that would be faced by government in the event of a drought of any kind
- The total, probability-adjusted present value of ratepayer costs over 48 years across all five Resource Plans is likely too narrowly distributed to allow for definitive selection of the "lowest cost" choice. These outcomes are essentially within the margin of error of the many calculations, estimates and assumptions that were required to construct the model
- The consistent patterns of sensitivity of specific Resource Plans to certain variables indicates that model analysis can provide a guide to identifying the concerns that should be part of any decision-making process
- An extremely important inter-generational decision is embedded in the choice of Resource Plan, as costs to Ratepayers will be distributed very differently over time.

Bearing these and other observations in mind, we would suggest the following recommendations:

d) Plans 4 and 6, which were largely indistinguishable from each other, resulted in costs to ratepayers that appear to be lower than other Resource Plans in many scenarios, if only marginally; this suggests that proceeding with Keeyask may be a prudent step to take at this time, but a more thorough review of the proposal to build Conawapa as part of the Preferred Development Plan should be undertaken closer to its final commitment date

e) Given the expected fragility of Manitoba Hydro during the first ten years of any Resource Plan, and beyond that in others, the Government of Manitoba may wish to calculate and reserve some of the funds it generates (e.g., through permits, approvals, income taxes, etc., related to the construction projects) to act as an initial financial buffer for the government in the event of drought and the need for financial assistance to Manitoba Hydro

f) Given the inevitability of a drought at some point in the future, and the expected financial impact that such a drought would have on Manitoba Hydro, particularly in the near term, consideration should be given to the development of an explicit policy on the future course of customer rates in such a situation; this policy could then be shared with credit rating agencies and others to address the potential concern that they may have that in the event of a drought some fraction of Manitoba Hydro debt might be financially unsupported.

Appendix A Biographies of MPA Contributors

Pelino Colaiacovo

Pelino is a Managing Director at MPA. In this role he is responsible for origination and transaction execution, financial advisory and capital raising services. Since joining MPA Pelino has focused on advising clients in the energy, utilities, infrastructure and public sectors.

Utility clients have included Hydro One, BC Hydro, Enwin Utilities, Oakville Hydro, Woodstock Hydro, the Nova Scotia Utilities Review Board and the Alberta Market Surveillance Administrator, and more broadly in the energy sector Pelino has worked on a number of M&A and capital raising assignments for renewable energy companies.

Prior to joining MPA in 2005, Pelino was Chief of Staff to the Ontario Minister of Energy from 2003 to 2005. During that time, he assisted in significant restructuring of the Ontario electricity sector, including the drafting and implementation of new legislation, the creation of the Ontario Power Authority, and significant procurements of new electricity generation capacity for the province.

Previously, Pelino spent more than 10 years in management, policy and communications consulting in Canada and the United States, advising clients across a wide range of sectors, including energy, transportation, telecommunications, and healthcare.

Pelino holds a B.A. and an L.Lb., both from the University of Toronto.

Brent Walker

Brent Walker is a Managing Director and co-founder of MPA. In this role he is responsible for transaction origination and execution, financial advisory and capital raising activities across a wide spectrum of industry segments, including energy, technology, government and quasi-government entities and a variety of other commercial sectors.

Utility clients have included BC Hydro, Altagas Utilities, Crown Investments Corporation, Hydro One, Market Surveillance Administrator of Alberta, the Nova Scotia Utilities Review Board, the Ontario Ministry of Energy and many others.

Prior to founding MPA in 2004, Brent spent over 10 years in the investment banking and financial industry. From 1996 to 2004, he was a managing director in Scotia Capital's mergers and acquisitions department, where he was the most senior M&A banker in a number of sectors including power and infrastructure, pipelines, energy midstream and real estate. During this period, he worked on the sale of the Province of Nova Scotia's interest in Nova Scotia Resources Limited, the acquisition of Aquila by Fortis, the proposed privatization of NALCOR and Enmax, and many other utility assignments.

Brent started his investment banking career at Lancaster Financial, Canada's foremost independent M&A boutique which was acquired by TD Bank in 1994.

Brent holds a B.Sc. from Dalhousie University and an MBA from McMaster University.

Benjamin Kinder

Benjamin Kinder is a vice president at MPA. He is responsible for client engagement, transaction design and execution, client development and overall delivery of service.

Prior to joining MPA, Benjamin spent two years in Scotia Capital's investment banking and equity capital markets divisions. While there, he focused on the communications, media and technology sectors, advising clients on mergers and acquisitions, and capital markets transactions.

Benjamin has experience in a number of industry segments including power and infrastructure, regulated utilities, basic materials, technology, media, telecommunications, non-profits and quasi-government entities.

His work has included mergers and acquisitions advisory, restructuring, private capital raising for early and mid-stage companies, expert advisory work for regulators, and strategic advice to the clients in the face of substantial change.

Benjamin holds a Bachelor of Business Administration (B.B.A.) from York University's Schulich School of Business, and a Master of Arts (M.A. Cantab.) from the University of Cambridge.

Appendix B Description of Model

MPA has constructed a financial model on Manitoba Hydro's electrical operations ("MH") in order to address the scope of work put to MPA by the PUB under the NFAT. MPA relied upon the NFAT, the appendices thereto, and numerous discussions and correspondence with MH management and employees on the matter of MH operations, and economic, and financial conditions. MPA relied especially on Appendix 11.4 to the NFAT (Pro Forma Financial Statements), Appendix 11.2 (Projected Escalation, Interest and Exchange Rates), and Appendix 9.3 (Economic Evaluation Documentation). The model runs through year 2062 (inclusive) given that this was the time horizon selected by MH in the presentation of pro forma financial statements in Appendix 11.4, and is denominated in nominal Canadian dollars. All inputs received by MPA and not already presented in nominal Canadian dollars were converted accordingly such that the basis of comparison between all financial data was consistent.

MPA received SPLASH (Simulation Program for Long-term Analysis of System Hydraulics) output from MH with respect to the development plans considered under the NFAT. The SPLASH data detailed forecast adjusted load in the province of Manitoba, and firm and opportunity export demand, on a GWh basis, and the supply mix necessary to balance load and export demand. Crucially, this data was provided for ninety-nine years of hydrological history (1912-2010 inclusive), on a month by month basis, and modelled out to 2048 (or, 2049 as the case may be) given the supply mix and anticipated load and export demand for a given forecast year. Receiving actual, historical hydrological data modelled for a future, anticipated supply mix was crucial to MPA's efforts to model hydrological risk in the system and adequately address the scope of work put to MPA by the PUB.

By hydrological risk in the system is meant the effect of actual annual hydrology on the domestic revenue requirement, domestic revenue, net income, equity ratio, interest coverage ratio and other measures of MH financial risk and performance. The use of average hydrology by the model underlying Appendix 11.4 is instructive in understanding the system over a relatively longer period of time (Appendix 11.4 runs through 2062, inclusive). However, averages mask underlying variability (with respect to hydrology, both flood and drought), and thus MH's ability to realize opportunity export revenue in the event of a drought, or prolonged drought.

SPLASH data included monthly energies at generation for hydro, thermal and import energy (both on and off-peak) to produce total supply, balanced against adjusted provincial load, and firm and opportunity export demand (all on and off-peak). MPA summed all monthly data to annual totals and produced a data set for every variable modelling a given hydrological history (vertical columns) for a future model year (horizontal rows).

Further, MPA created chained data sets necessary to calculate net flow related revenue, including opportunity export revenue (both on and off-peak), and the cost of hydro, thermal and import energy (both on and off-peak). Chained data is created in a series of matrices, one for each variable under each

scenario, and under each development plan, and reflects the historical, physical hydrology experienced by MH through the years 1912-2010. Chained data sets follow a set pattern of down one row and right one column from unchained data, so that the actual hydrology that existed in 1960 (as an example year) may be followed through the model as if that hydrology were experienced in model year 2015 (model year start date). Model year 2016 would then reflect the actual hydrological conditions experienced by MH in the year 1961 given a hydrological start date of 1960. Any hydrological year on record may be selected, and any development plan, under any scenario, may then be considered.

MPA matched the SPLASH data with the development plans detailed in Appendix 11.4 of the NFAT, eliminating plans for which pro forma financial statement data was not provided. MPA extracted chained, opportunity export revenue for every given hydrological regime and model year, allowing for the determination of actual, annual opportunity export revenue, calculated for a given supply mix that MH anticipates to eventuate in a given year. This information and extraction (from SPLASH), and application (to Appendix 11.4) allowed MPA to produce a set of financial statements (income statement, balance sheet and cash flow statement) for every development plan modelled under Appendix 11.4 under all scenarios, and under all previous hydrology regimes.

By way of example, the Preferred Development Plan may be evaluated under twenty-seven different combinations of reference, high and low economic, energy and capital scenarios (3x3x3=27). Further, ninety-nine different historical hydrological patterns (the SPLASH data referenced above) may be run through any one of these twenty-seven possible scenarios to produce 2,673 (3x3x3x99) possible outcomes for the Preferred Development Plan alone. This process may be repeated for any development plan for which information was provided under Appendix 11.4 to the NFAT.

MPA embedded significant functionality into the model to allow for a thorough financial analysis. Such functionality includes selecting hydrological history, economic, energy and capital scenarios, and a development plan; rate increases by implied domestic revenue requirement or percent increase per year; unanticipated capital cost expenditures; term structure on new debt issued, deemed equity component of capital structure and deemed return on equity etc.

In reaching our conclusions contained in this report, MPA has run the All Gas and Preferred Development plans, and Plans 4, 6 and 12 under the 2012 reference Manitoba load for all 99 years of hydrological history through year 2062 (at reference economics, energy and capital, for 495 total runs).

The All Gas and Preferred Development Plans were further run at high and low 2012 Manitoba load for all 99 years of hydrological history through year 2062 (at reference economics, energy and capital, for 396 total runs).

The Preferred Development Plan was further run at 4x 2013 DSM and 1x 2012 DSM (both at 2013 reference Manitoba load) for all 99 years of hydrological history through year 2062 (at reference economics, energy and capital, for 198 total runs).

The All Gas and Preferred Development plans, and Plans 4,6 and 12, were run for 21 different years of hydrological history, for every combination of reference, high and low economics, energy and capital costs, for a total of 546 runs per development plan, or 2730 total runs.

For example, Development Plan 4 was run for 21 different years of hydrological history under 26 different combinations of reference, high and low economics, energy and capital costs (the ref-ref-ref scenario detailed above is excluded here, where all 99 years of hydrological history were considered).

In total, MPA performed 3,819 different runs of the financial model. Given that a full reckoning of the All Gas and Preferred Development Plans, and Plans 4,6 and 12 considered under only 2012 reference load conditions would have required 13,365 total runs of the model, MPA used professional judgment in the determination of what hydrological years to consider, under a given economics, energy and capital cost scenario and under a given development plan. While Appendix 11.4 to the NFAT considered plans 2,7 and 13, MPA did not further consider those development plans given the base similarity between those plans and others considered by MPA.

The twenty-one years of hydrology considered by MPA are a sampling of the ninety-nine years of actual hydrological history, and include the years 1912, 1916, 1920, 1928, 1932, 1936, 1940, 1948, 1952, 1956, 1960, 1968, 1972, 1976, 1980, 1988, 1992, 1996, 2000, 2008 and 2010.

All decades of hydrological history were included by MPA in our analysis of MH, and include both drought and flood years.

The financial model, as constructed above, formed the basis for our financial conclusions reached in this report.

Appendix C

Tables of Results of the Present Value of Domestic Revenue

PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
All Gas
NPV @ 6.00%
($ in millions)

		Energy and Capital									
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$56,907	$57,989	$55,996	$58,177	$58,815	$57,431	$55,503	$56,546	$54,613
	Minimum	$51,485	$53,145	$51,100	$52,283	$53,360	$51,374	$52,253	$53,444	$51,346
	Average	$54,025	$55,133	$53,085	$54,996	$56,139	$54,150	$53,620	$54,748	$52,693
	Standard Deviation	$1,284	$1,233	$1,225	$1,762	$1,707	$1,768	$772	$738	$732
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$45,530	$46,121	$44,736	$46,076	$46,726	$45,483	$44,922	$45,742	$44,289
	Minimum	$42,312	$43,171	$41,692	$41,723	$42,777	$41,154	$42,856	$43,559	$42,381
	Average	$43,791	$44,515	$43,182	$44,107	$44,842	$43,553	$43,695	$44,453	$43,116
	Standard Deviation	$786	$760	$762	$1,163	$1,090	$1,168	$465	$491	$451
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$36,730	$37,069	$36,394	$37,176	$37,752	$36,892	$36,242	$36,711	$35,914
	Minimum	$35,104	$35,630	$34,833	$34,577	$34,811	$34,378	$35,233	$35,632	$34,932
	Average	$35,806	$36,283	$35,470	$35,981	$36,332	$35,633	$35,717	$36,182	$35,351
	Standard Deviation	$401	$406	$398	$706	$745	$672	$291	$351	$264
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

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PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
All Gas
NPV @ 10.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$28,677	$29,091	$28,358	$28,978	$29,349	$28,719	$28,677	$28,906	$28,193
	Minimum	$26,745	$27,113	$26,362	$26,118	$26,472	$25,769	$27,376	$27,742	$27,065
	Average	$27,606	$28,044	$27,310	$27,446	$27,853	$27,161	$27,884	$28,251	$27,546
	Standard Deviation	$528	$530	$537	$845	$873	$833	$341	$302	$284
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$24,278	$24,427	$24,031	$24,393	$24,566	$24,200	$24,110	$24,382	$23,899
	Minimum	$23,040	$23,325	$22,852	$22,369	$22,756	$22,203	$23,420	$23,657	$23,266
	Average	$23,623	$23,868	$23,425	$23,441	$23,674	$23,265	$23,724	$23,988	$23,534
	Standard Deviation	$321	$317	$322	$581	$576	$591	$185	$193	$180
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$20,292	$20,394	$20,200	$20,390	$20,557	$20,313	$20,201	$20,331	$20,083
	Minimum	$19,781	$19,954	$19,701	$19,287	$19,374	$19,214	$19,893	$20,021	$19,808
	Average	$20,020	$20,163	$19,922	$19,965	$20,070	$19,861	$20,039	$20,175	$19,931
	Standard Deviation	$130	$124	$135	$310	$321	$302	$87	$98	$78
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Development Plan 4
NPV @ 6.00%
($ in millions)

		Energy and Capital									
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$55,098	$56,837	$54,109	$54,795	$56,399	$52,670	$56,351	$58,088	$55,194
	Minimum	$49,822	$51,713	$48,829	$46,275	$48,965	$44,491	$52,956	$54,681	$51,913
	Average	$52,474	$54,067	$51,355	$51,245	$53,053	$50,005	$54,324	$56,053	$53,078
	Standard Deviation	$1,403	$1,313	$1,392	$2,096	$2,028	$2,140	$812	$790	$802
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$44,591	$45,625	$43,764	$43,962	$45,003	$42,990	$45,232	$46,441	$44,568
	Minimum	$41,625	$42,458	$40,729	$39,241	$40,441	$38,635	$43,336	$44,499	$42,624
	Average	$42,878	$43,916	$42,135	$41,868	$42,909	$41,081	$44,192	$45,298	$43,411
	Standard Deviation	$733	$816	$757	$1,271	$1,218	$1,145	$475	$486	$468
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$35,713	$36,253	$35,504	$35,331	$35,942	$35,128	$36,456	$36,815	$35,678
	Minimum	$34,134	$34,736	$33,898	$32,574	$33,654	$32,550	$35,243	$35,673	$34,765
	Average	$34,947	$35,420	$34,458	$34,165	$34,757	$33,763	$35,706	$36,327	$35,202
	Standard Deviation	$396	$450	$408	$699	$652	$707	$357	$350	$301
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

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PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Development Plan 4
NPV @ 10.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$28,540	$29,327	$28,114	$28,195	$28,918	$27,524	$29,274	$29,935	$28,803
	Minimum	$26,380	$27,274	$26,164	$24,752	$25,515	$24,219	$28,092	$28,681	$27,578
	Average	$27,628	$28,273	$27,175	$26,718	$27,392	$26,257	$28,608	$29,234	$28,140
	Standard Deviation	$542	$562	$521	$884	$889	$864	$308	$318	$295
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$24,089	$24,417	$23,825	$23,812	$24,165	$23,452	$24,321	$24,736	$24,129
	Minimum	$23,051	$23,258	$22,649	$21,823	$22,174	$21,363	$23,717	$24,146	$23,485
	Average	$23,476	$23,827	$23,199	$22,810	$23,229	$22,532	$24,017	$24,384	$23,746
	Standard Deviation	$291	$315	$321	$613	$588	$590	$184	$173	$179
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$20,034	$20,177	$19,990	$19,877	$20,078	$19,821	$20,269	$20,378	$20,066
	Minimum	$19,497	$19,693	$19,411	$18,737	$18,945	$18,546	$19,941	$20,061	$19,780
	Average	$19,795	$19,935	$19,626	$19,401	$19,603	$19,254	$20,064	$20,238	$19,913
	Standard Deviation	$143	$150	$160	$336	$310	$342	$102	$93	$96
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

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PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Development Plan 6
NPV @ 6.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$55,404	$57,432	$54,431	$54,721	$56,142	$53,104	$58,484	$58,390	$55,712
	Minimum	$50,590	$52,381	$49,375	$47,373	$49,295	$45,445	$53,577	$55,109	$52,346
	Average	$52,975	$54,588	$51,879	$51,838	$53,336	$50,587	$54,969	$56,469	$53,616
	Standard Deviation	$1,336	$1,309	$1,442	$2,016	$1,982	$2,060	$1,087	$830	$817
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$44,919	$46,090	$44,435	$44,883	$45,085	$43,233	$45,748	$46,953	$44,925
	Minimum	$41,890	$42,964	$41,126	$39,668	$41,212	$39,241	$43,754	$44,793	$43,034
	Average	$43,301	$44,312	$42,511	$42,317	$43,355	$41,497	$44,585	$45,724	$43,851
	Standard Deviation	$822	$809	$807	$1,308	$1,159	$1,195	$493	$567	$456
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$36,034	$36,444	$35,644	$35,336	$36,004	$35,193	$36,456	$37,056	$36,081
	Minimum	$34,472	$34,870	$33,898	$33,214	$33,654	$32,550	$35,373	$35,947	$35,061
	Average	$35,135	$35,679	$34,685	$34,397	$34,967	$33,977	$35,903	$36,576	$35,448
	Standard Deviation	$436	$454	$451	$676	$661	$737	$327	$353	$297
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

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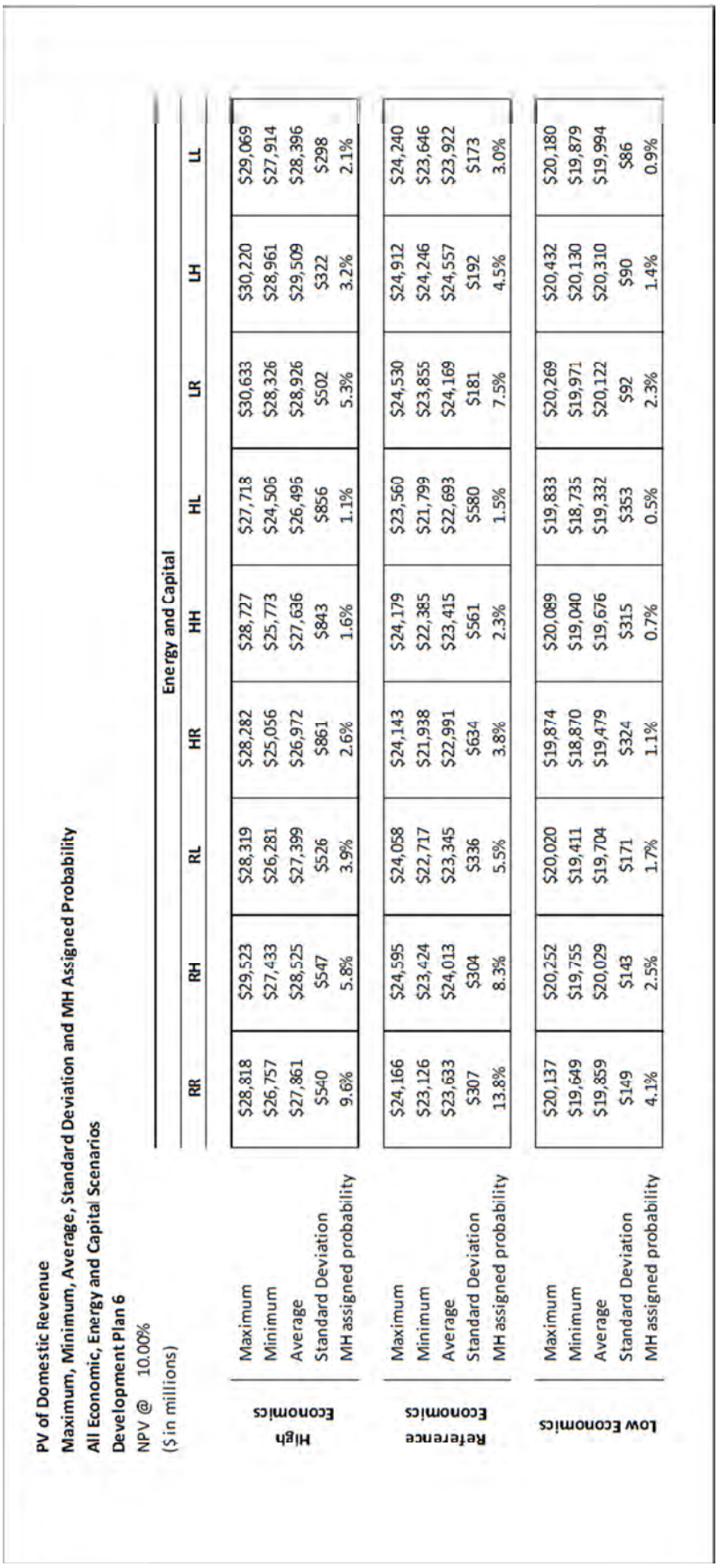

PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Development Plan 6
NPV @ 10.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$28,818	$29,523	$28,319	$28,282	$28,727	$27,718	$30,633	$30,220	$29,069
	Minimum	$26,757	$27,433	$26,281	$25,056	$25,773	$24,505	$28,326	$28,961	$27,914
	Average	$27,861	$28,525	$27,399	$26,972	$27,636	$26,495	$28,926	$29,509	$28,396
	Standard Deviation	$540	$547	$526	$861	$843	$856	$502	$322	$298
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$24,166	$24,595	$24,058	$24,143	$24,179	$23,560	$24,530	$24,912	$24,240
	Minimum	$23,126	$23,424	$22,717	$21,938	$22,385	$21,799	$23,855	$24,246	$23,646
	Average	$23,633	$24,013	$23,345	$22,991	$23,415	$22,693	$24,169	$24,557	$23,922
	Standard Deviation	$307	$304	$336	$634	$561	$580	$181	$192	$173
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$20,137	$20,252	$20,020	$19,874	$20,089	$19,833	$20,269	$20,432	$20,180
	Minimum	$19,649	$19,755	$19,411	$18,870	$19,040	$18,735	$19,971	$20,130	$19,879
	Average	$19,859	$20,029	$19,704	$19,479	$19,676	$19,332	$20,122	$20,310	$19,994
	Standard Deviation	$149	$143	$171	$324	$315	$353	$92	$90	$86
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Development Plan 12
NPV @ 6.00%
($in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$57,081	$59,474	$55,311	$55,565	$57,430	$53,814	$61,054	$62,606	$58,357
	Minimum	$52,434	$54,113	$50,946	$48,504	$50,384	$46,839	$54,269	$58,924	$55,188
	Average	$54,634	$56,612	$53,208	$52,125	$54,235	$50,463	$58,032	$60,575	$56,571
	Standard Deviation	$1,310	$1,438	$1,297	$2,067	$1,905	$2,056	$1,268	$948	$798
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$46,557	$47,630	$45,605	$44,883	$46,191	$44,024	$48,879	$50,445	$47,630
	Minimum	$42,873	$44,222	$42,130	$39,944	$41,472	$39,161	$46,176	$47,847	$45,065
	Average	$44,727	$46,066	$43,699	$42,409	$43,889	$41,366	$47,375	$48,994	$46,174
	Standard Deviation	$1,100	$1,087	$1,092	$1,405	$1,481	$1,402	$785	$699	$721
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$36,197	$37,141	$36,053	$35,467	$36,053	$34,870	$37,326	$37,640	$36,970
	Minimum	$34,693	$35,371	$34,064	$33,124	$33,696	$32,410	$36,275	$37,127	$35,731
	Average	$35,526	$36,275	$35,044	$34,182	$34,852	$33,504	$37,008	$37,539	$36,507
	Standard Deviation	$489	$504	$560	$800	$724	$751	$294	$152	$332
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

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PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Development Plan 12
NPV @ 10.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$29,951	$31,003	$29,323	$29,156	$30,093	$28,478	$31,419	$32,053	$30,534
	Minimum	$27,926	$28,762	$27,259	$25,875	$26,718	$25,349	$27,910	$30,850	$29,291
	Average	$28,996	$29,844	$28,363	$27,613	$28,507	$26,944	$30,406	$31,425	$29,874
	Standard Deviation	$595	$619	$598	$924	$996	$920	$680	$349	$338
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$24,876	$25,189	$24,567	$24,329	$24,743	$24,107	$25,534	$25,921	$25,189
	Minimum	$23,631	$24,124	$23,449	$22,242	$22,717	$21,882	$24,774	$25,269	$24,441
	Average	$24,285	$24,710	$23,924	$23,274	$23,840	$22,900	$25,122	$25,562	$24,773
	Standard Deviation	$377	$336	$387	$657	$634	$672	$216	$178	$214
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$20,220	$20,469	$20,175	$19,999	$20,175	$19,827	$20,511	$20,587	$20,425
	Minimum	$19,772	$19,979	$19,557	$18,811	$18,976	$18,579	$20,249	$20,456	$20,092
	Average	$20,019	$20,232	$19,858	$19,517	$19,740	$19,282	$20,433	$20,562	$20,308
	Standard Deviation	$148	$144	$191	$345	$326	$341	$72	$37	$88
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

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PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Preferred Development Plan
NPV @ 6.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$57,536	$60,272	$55,649	$55,164	$57,601	$53,339	$60,135	$63,894	$59,089
	Minimum	$51,715	$53,975	$49,929	$47,050	$49,389	$45,396	$55,503	$59,927	$55,227
	Average	$54,196	$56,807	$52,377	$51,167	$53,343	$49,305	$58,508	$61,578	$56,828
	Standard Deviation	$1,549	$1,866	$1,491	$2,371	$2,343	$2,165	$1,105	$1,094	$950
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$45,851	$47,672	$44,735	$44,488	$45,710	$43,420	$47,919	$50,041	$47,637
	Minimum	$42,711	$44,064	$41,911	$40,190	$41,653	$38,763	$45,819	$47,801	$44,800
	Average	$44,230	$45,652	$43,088	$41,991	$43,454	$40,927	$47,037	$48,682	$45,737
	Standard Deviation	$1,018	$1,086	$917	$1,383	$1,281	$1,412	$658	$591	$754
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$36,086	$36,576	$35,595	$35,120	$35,580	$34,904	$37,179	$37,648	$36,576
	Minimum	$34,487	$35,150	$33,993	$32,442	$33,280	$32,442	$36,214	$36,729	$35,511
	Average	$35,210	$35,883	$34,677	$33,854	$34,459	$33,388	$36,691	$37,270	$36,093
	Standard Deviation	$494	$470	$580	$724	$710	$790	$248	$213	$321
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

PV of Domestic Revenue
Maximum, Minimum, Average, Standard Deviation and MH Assigned Probability
All Economic, Energy and Capital Scenarios
Preferred Development Plan
NPV @ 10.00%
($ in millions)

		Energy and Capital								
		RR	RH	RL	HR	HH	HL	LR	LH	LL
High Economics	Maximum	$30,286	$31,418	$29,675	$29,573	$30,319	$28,656	$31,418	$32,391	$30,717
	Minimum	$28,274	$29,317	$27,636	$26,641	$27,183	$25,628	$28,505	$31,091	$29,594
	Average	$29,123	$30,124	$28,477	$27,790	$28,674	$26,983	$30,626	$31,721	$30,099
	Standard Deviation	$596	$638	$575	$957	$941	$969	$585	$383	$324
	MH assigned probability	9.6%	5.8%	3.9%	2.6%	1.6%	1.1%	5.3%	3.2%	2.1%
Reference Economics	Maximum	$24,657	$25,215	$24,292	$24,290	$24,599	$23,923	$25,304	$25,832	$25,205
	Minimum	$23,657	$24,118	$23,229	$22,022	$22,625	$21,673	$24,661	$25,239	$24,364
	Average	$24,148	$24,605	$23,754	$23,268	$23,771	$22,873	$25,037	$25,490	$24,654
	Standard Deviation	$333	$335	$328	$611	$564	$640	$186	$156	$222
	MH assigned probability	13.8%	8.3%	5.5%	3.8%	2.3%	1.5%	7.5%	4.5%	3.0%
Low Economics	Maximum	$20,197	$20,324	$20,048	$19,913	$20,043	$19,849	$20,488	$20,603	$20,332
	Minimum	$19,740	$19,944	$19,438	$18,599	$18,867	$18,599	$20,230	$20,375	$20,049
	Average	$19,937	$20,135	$19,754	$19,434	$19,638	$19,269	$20,367	$20,511	$20,207
	Standard Deviation	$154	$137	$198	$331	$320	$349	$64	$53	$85
	MH assigned probability	4.1%	2.5%	1.7%	1.1%	0.7%	0.5%	2.3%	1.4%	0.9%

1

Tab 101

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NEEDS FOR AND ALTERNATIVES TO (NFAT) REVIEW OF MANITOBA HYDRO'S PROPOSAL FOR THE KEEYASK AND CONAWAPA GENERATING STATIONS

Technical Appendix 9A

Economic Analysis Part I

PUBLIC VERSION

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PREPARED FOR

The Manitoba Public Utilities Board

January 24, 2014

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Acronyms

Technical Appendix 9A

CCGT	Combined Cycle Gas Turbines
CPV	Cumulative Present Value
DSM	Demand Side Management
ESOW	Expanded Scope of Work
GS	Generating Station
IEC	Independent Expert Consultant
IRR	Internal Rate of Return
ISD	In-Service Date
LCA	La Capra Associates
MH	Manitoba Hydro
MISO	Midcontinent Independent System Operator
MW	Megawatt
NFAT	Needs For and Alternatives To
NPV	Net Present Value
O&M	Operations and Maintenance
PAQ	Probabilistic Analysis Quilt
PDP	Preferred Development Plan
SCGT	Simple Cycle Gas Turbine
SOW	Scope of Work
SPLASH	Simulation for Long-Term Analysis of System Hydraulics
US	United States
WPS	Wisconsin Public Service Corporation

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I. Introduction

A. Scope of Report

La Capra Associates (LCA) has prepared this Technical Appendix to address elements of our Needs for and Alternatives To (NFAT) Scope of Work (LCA SOW) that pertain to the economic analysis issues and support other elements of the LCA SOW that rely on the materials in this report. The specific focus of this Technical Appendix is to assess the reasonableness of Manitoba Hydro's (MH) economic modeling of the alternative development cases and to address the additional issues related to that analysis included in the LCA SOW.

The specific LCA SOW elements addressed by the material presented in this Appendix include:

Power Resource Planning and Economic Evaluation

11. *For all scenarios addressed, define the lower quartile, median and upper quartile impacts of natural gas supply pricing, coal pricing and wind pricing.*

Business Case and Risk Assessment

2. *Assess whether the high-level summaries filed by MH of net present value and internal rates of return reflect sound assumptions and calculations.*
4. *Address estimate uncertainties involving large complex hydro projects.*
5. *Examine and evaluate the treatment of risk in MH's development of Power Resource Plans and resource scenario models. Include expert opinions on flood and drought risks and optimal strategy.*
13. *Test each scenario look for potential risks, including:*
    a) *Lower export market prices;*
    b) *Higher interest rates;*
    c) *Lower or higher domestic load growth;*
    d) *Droughts;*
    e) *Competing technologies;*
    f) *Fuel price changes;*
    g) *Carbon pricing;*
    h) *Government and regulatory policy change;*

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i) Construction cost escalator;
j) Economic conditions;
k) Infrastructure failure; and
l) Any other major risks identified.

This Technical Appendix is being prepared in two parts. This initial part Technical Appendix 9A covers the Business Case and Risk Assessment Elements 2, 4 and 5 described above. Part II of this filing, Technical Appendix 9B, will cover the other items in the SOW listed above.

This Technical Appendix also relies on information contained in LCA Technical Appendices:

- 1: Resource Planning,
- 2: Generation Alternatives,
- 3: Alternative Resource Plans,
- 5: Hydrological Risk (to be filed at a later date),
- 6: Export Markets,
- 7: Export Contracts, and
- 8: Transmission.

In addition, some inputs and information rely on work of other Independent Expert Consultants (IECs) retained by the PUB.

Moreover, PUB staff and advisors issued Information Requests to MH requesting data or analysis on specific issues related to the economic analysis. LCA agreed to address several of these issues, which are listed below and described as Expanded Scope of Work (ESOW) items. All but ESOW 1 will be addressed in Part II of the filing.

ESOW 1 – Economic Analysis sensitivity to alternative Discount Rates

ESOW 2 – Economic Analysis sensitivity to changes in Export Revenue

ESOW 3 – Economic Analysis sensitivity to CO_2 Regulation

ESOW 4 – Economic Analysis sensitivity to Alternative Drought Scenarios

ESOW 5 – Economic Analysis sensitivity to changes in Export Pricing

ESOW 6 – Economic Analysis of Combined Cycle Resource Plans

B. La Capra Associates Approach to Reviewing the NFAT Economic Analysis

LCA reviewed MH's economic analysis to answer the following questions:

1. Did MH use reasonable assumptions for the cost and characteristics of the resource options?
2. Did MH evaluate the benefits and costs of alternative development plans under reasonable external market and economic conditions?
3. Did MH evaluate the uncertainties and risks associated with the future resource technology improvements?
4. Are the models, programs, spreadsheets, and other analytical tools used in alternative development plan evaluations for the MH system appropriate?
5. Did MH execute the models, programs, spreadsheets, and other analytical tools with proper inputs?
6. Did MH utilize the results of its modeling and analysis accurately in the NFAT Submission in its presentation of information, observations and conclusions?
7. Did MH accurately calculate its chosen metrics, and were these metrics appropriate for the conclusions and decisions MH presented in the NFAT Submission?
8. Are there additional analyses, metrics, resource options, or resource development plans that MH should have included in its NFAT economic analysis?

In the course of its evaluation, LCA staff reviewed the NFAT Submission along with material from associated prior regulatory proceedings, including outside consulting reports. LCA filed several Information Requests and met in person with MH analytical and modeling team members in September and again in December to obtain a better understanding of MH's modeling and Analytical tools (namely SPLASH,[1] Economic

[1] The Simulation Program for Long-Term Analysis of System Hydraulics or "SPLASH" model is MH's internal and proprietary software program used to simulate the dispatch of MH's generation to serve domestic load and optimize energy available for export. This program determines generation costs, including water rental fees, fuel costs, variable O&M costs, purchase power costs and volumes, import costs and volumes, and energy export costs and volumes for 99 different historical hydraulic flow years.

Model, Financial Model, Load Forecasting, Demand-Side Management (DSM) Analysis, Capital Cost estimation processes, Risk Analysis). Moreover, LCA initiated several conference calls / webinars with MH staff to review analysis and data. In addition, LCA had numerous discussions with other IECs to assimilate their findings and thinking into our review.

MH did not produce working copies of the SPLASH or Economic Models for our use in this review. In lieu of direct access to the models, LCA used the following approach:

1. SPLASH - LCA performed a detailed review of SPLASH model outputs to test the reasonableness of the generation system operation, especially with respect to exports, imports, hydropower optimization, and thermal unit operation. Much of the information necessary for this review was not available to our team until late December. LCA was not able to conduct audit-level inspection of the SPLASH modeling to determine the detailed algorithms used or to verify that the intended algorithms were functioning correctly.

2. Economic Model - MH provided detailed PDFs and spreadsheets with Economic Model output in lieu of working versions of the Economic Model. The LCA team created its own working economic model output spreadsheet, which enabled it to analyze additional metrics and perform additional comparisons entirely utilizing MH data, and in most instances MH's actual modeling results. In addition, as will be discussed later in this report, some sensitivity analyses were performed in order to test the robustness of MH's observations regarding the relative benefits of alternative development plans. A working version of this model is provided in the workpapers accompanying this report.[2]

[2] A list of workpapers is provided at the end of this Technical Appendix.

C. Structure of the Report

LCA's review of MH's economic analysis as presented in this Technical Appendix is organized into four parts.

First, in Section II, we review MH's economic analysis methodology. In that section, we consider only the reference scenario set of assumptions. Four of the fifteen alternative development plans—plans that are more prominent in the NFAT Submission—were selected to illustrate our assessment of the methodology and provide examples.

In Section III, we review MH's economic uncertainty analysis. In that section, we consider the 27 alternative sets of assumptions that MH used to evaluate the uncertainty in export energy prices, discount rates, and capital costs.

In Section IV, we provide a sensitivity analysis on several key parameters. In this section, we test the sensitivity of MH economic analysis results to assumptions regarding energy prices, discount rates, capital costs, and the alternative assumptions of the probabilities assigned to these variables.

In Section V, we review the MH economic analysis from the perspective of the Province of Manitoba, in contrast with the prior two sections, which focus on the perspective of Manitoba ratepayers.

In Section VI, we provide a summary of our finding and conclusions from this review.

This report will be supplemented at a later date with additional economic analysis of alternative development plans using LCA assumptions as well as assumptions provided by other IECs. In addition, modeling results of additional development plans prepared by MH in response to Information Requests in this proceeding have only recently been made available. LCA requires additional time to complete its assessment of these results. All of this analysis will be provided in Technical Appendix 9B as soon as the information can be evaluated.

II. Economic Analysis – Reference Scenario

A. Introduction

In this section of our report, we review MH's economic analysis comparing the net costs of 15 development plans under reference scenario assumptions.[3] MH also conducted economic uncertainty analysis, which we address in a later section of this report.

The following is a list of definitions of a few key terms used throughout this Technical Appendix, consistent with MH's use of these terms in its NFAT Submission:

> **Resource Option** – A particular generation plant type, transmission facility or load reduction program or set of programs (DSM) that MH could use to serve native load or to facilitate imports or exports.
>
> **Resource Plan or Development Plan** – A sequence of assumed energy resource additions, enhancements, or retirements to the MH system to meet system requirements over the planning period.
>
> **Scenario** – A combination of planning assumptions for parameters not associated with a specific resource plan or which represent sensitivity to resource option costs. For example, a change in natural gas prices would constitute a new scenario as would a change in resource capital costs.
>
> **Case** – A resource plan evaluated under assumptions of a specific scenario.

MH evaluated 15 development plans using SPLASH and spreadsheet economic models under reference scenario inputs and assumptions. MH compared the results of 14 of the plans with a plan it called the All Gas Plan, which only utilizes natural gas-fueled

[3] NFAT Submission, **Chapter 9: Economic Evaluations- Reference Scenario of the NFAT Application,** MH performed a detailed economic analysis of the 15 development plans discussed in **Chapter 8: Determination and Description of Development Plans,** which is summarized in Table 9.3 of the filing.

generation as potential new resource options. MH's economic analysis is, therefore, a comparative assessment of the development plans evaluated.

MH developed the reference scenario to model its view of the "most likely" future outcome for Manitoba. MH drew from *"2012 resource planning assumptions with the exception of adjustments, primarily downwards, to the electricity export prices."*[4]

MH conducted its analysis from the perspective of costs to domestic load. Payments to the province are treated as expenses, and costs and revenues of export energy sales are included. MH must recover the resulting net cost from its domestic customers.

This Section reviews MH's economic analysis methodology and metrics and provides LCA's suggestions and analysis of additional metrics that are commonly used in comparing utility resource plans.

B. Manitoba Hydro Economic Analysis Methodology and Metrics

MH describes its method of economic evaluation in Section 9.1 of the NFAT Submission and emphasizes that this piece of the filing is *"integral to resource decisions."*[5] MH calculated the incremental net costs of each development plan relative to another development plan in real or constant dollars. The analysis is essentially an unleveraged cash flow analysis in that it uses only the direct capital investments as cash requirements in each year such costs are incurred, thereby not incorporating any interest costs or depreciation per the typical accounting treatment of capitalized expenditures. MH compares the cash flows of each plan on a present value basis using a discount rate that MH estimates to be its weighted average cost of capital.

MH performed its economic analysis excluding sunk costs because *"these represent money already spent or commitments that cannot be changed relative to the decision point when choosing among plans."*[6] MH defines sunk costs to include costs *"prior to June*

[4] NFAT Submission, Chapter 9, p. 1.

[5] *Id.*, p. 2.

[6] *Id.*

2014...having been made to protect in-service dates for Keeyask and Conawapa generating stations as well as the option of a new US interconnection and new export sale agreements."[7]

MH's economic evaluations also disregard "*accounting for any aboriginal income-sharing,*" as MH considers it "*a relatively small portion of the benefits Manitoba Hydro provides directly to Manitobans.*" This is the one departure from the perspective of the costs to domestic ratepayers. To the extent there are aboriginal income-sharing payments in an alternative development plan, those payments are effectively an added cost to domestic ratepayers that is not accounted for in the MH economic analysis. MH does incorporate aboriginal income-sharing in the financial analysis.

MH used the All Gas Plan (Plan 1) under reference scenario assumptions as the reference case to which all other alternative development plans are compared. MH chose this plan to be the reference case because it was the least capital-intensive plan considered. MH did not use a "do nothing" alternative because the results of MH's resource needs assessment determined that new resources would be required to serve future load growth, and that a "do nothing" option was not a viable resource plan.[8]

Table 9.3 of the NFAT Submission summarizes MH's 15 development plans and is reproduced in Figure 9-1 below. The plans are listed in a numerical order designation ranging from Plan 1, All Gas, which is the least capital-intensive to Plan 15 which is the most capital-intensive.

[7] *Id.*

[8] *Id.*, p. 27.

Plan Number	Development Plan Short Name	Description of Development Plan
1	All Gas	Natural Gas-Fired Generation starting in 2022/23
2	K22/Gas	Keeyask 2022/23, Natural Gas-Fired Generation starting in 2029/30
3	Wind/Gas	Wind Generation starting in 2022/23 supported by Natural Gas-Fired Generation starting in 2025/26
4	K19/Gas24/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, 250 MW Export/50 MW Import US Interconnection 2020/21, 250 MW MP Sale
5	K19/Gas25/750MW (WPS Sale & Inv)	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2025/26, 750 MW Import/Export US Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale
6	K19/Gas31/750MW	Keeyask 2019/20, Imports, Natural Gas-Fired Generation starting in 2031/32, 750 MW Import/Export US Interconnection 2020/21, 250 MW MP Sale
7	SCGT/C26	Simple Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation Starting in 2038/39
8	CCGT/C26	Combined Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation Starting in 2039/40
9	Wind/C26	Wind in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2036/37
10	K22/C29	Keeyask 2022/23, Conawapa 2029/30, Natural Gas-Fired Generation starting in 2040/41
11	K19/C31/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, Conawapa 2031/32, 250 MW Export/50 MW Import US Interconnection 2020/21, 250 MW MP Sale
12	K19/C31/750MW	Keeyask 2019/20, Imports, Conawapa 2031/32, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export US Interconnection 2020/21, 250 MW MP Sale
13	K19/C25/250MW	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2040/41, 250 MW Export/50 MW Import US Interconnection 2020/21, 250 MW MP Sale
14	K19/C25/750MW (WPS Sale & Inv) Preferred Development Plan	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export US Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale
15	K19/C25/750MW	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export US Interconnection 2020/21, 250 MW MP Sale

Figure 9-1: Manitoba Hydro's List of 15 Development Plans[9]

The longer description of each development plan to the right clarifies the nomenclature used. In the short names "K" refers to Keeyask Generating Station (GS) and "C" refers to Conawapa GS. The two digits that accompany the K or C designation refer to their

[9] *Id.*, Table 9.3, p. 12.

planned in-service date (ISD); "C25," for example, refers to Conawapa in service in 2025. Similarly, the two digits that follow "Gas" indicate when the first gas unit is in service. "Gas" refers to natural gas-fueled generating capacity that can either be a simple cycle gas turbine "SCGT" or a combined cycle gas turbine "CCGT." "WPS Sale & Inv" refers to a 300 MW export contract between MH and Wisconsin Public Service (WPS), and the "Inv" designation means that WPS is investing in the US portion of the 750 MW interconnection facilities.[10]

The cumulative present value (CPV) of the capital investment in each of the 15 plans is summarized in a table in Figure 9-2. The table shows that the incremental investment for each of the development plans as compared to the All Gas Plan is higher at the end of 35 years than at the end of 78 years. This is due to the shorter lives of the natural gas and wind generating capacity. A study of this length must make assumptions regarding the replacement of some of the natural gas and wind generating capacity added in the first 35 years. MH assumed the natural gas and wind generation would be replaced with the same technology with the same cost and performance after year 35 as is available now. This result shows how large the investment is for the Keeyask and Conawapa facilities and that in three development plans MH is proposing to make those investments through the next 12 years and in three development plans through 17 years.

[10] *Id.*, p. 12.

Plans	Present Value of Total Capital over 35 years	Present Value of Total Capital over 78 years
1-All Gas	$1,363	$1,706
2-K22/Gas	$3,630	$3,878
3-Wind/Gas	$3,274	$4,214
4-K19/Gas24/250MW	$4,054	$4,338
5-K19/Gas25/750MW (WPS)	$4,164	$4,439
6-K19/Gas31/750MW	$4,250	$4,491
7-SCGT/C26	$4,407	$4,527
8-CCGT/C26	$4,604	$4,786
9-Wind/C26	$5,211	$5,444
10-K22/C29	$6,501	$6,610
11-K19/C31/250MW	$6,711	$6,877
12-K19/C31/750MW	$6,974	$7,121
13-K19/C25/250MW	$7,496	$7,611
14-K19/C25/750 (WPS)	$7,748	$7,885
15-K19/C25/750MW	$7,889	$8,026

Figure 9-2: Present Value of Total Capital Expenditures through 35 and 78 Years – Millions of 2014 Present Value Dollars

Evaluation Process

MH evaluates the development plans using the following process:

1. Develop plan specific inputs, such that the sequence of resources is defined to meet energy and capacity requirements of the MH system over the planning study period.
2. Develop scenario specific inputs (e.g., energy prices, discount rates)
3. Perform system simulation using SPLASH to determine production costs net of export revenue for the MH system, including existing resources and the plan specific resource changes.
4. Put the net costs/revenues and other outputs of the SPLASH simulation along with other plan-specific inputs, such as direct capital expenditures and fixed operation and maintenance (O&M) costs of the plan-specific resources, into the Economic Model to determine the present value of the costs associated with the

specific development plan. The Economic Model is a spreadsheet analysis performed on an unleveraged cash flow basis. Sources of plan-specific inputs are summarized in Figure 9-3 below.

Plan-Specific Inputs	Sources of Input for all Development Plans
Revenue:	
Contract revenue from proposed electricity export sales	Export sale contracts
Electricity export revenue from surplus power	Manitoba Hydro's consensus electricity export price forecast as used in the generation system model (SPLASH)
Cost:	
Capital investment	Manitoba Hydro capital cost estimates for each resource option including associated transmission for each development plan and transmission interconnection as applicable
Fuel	• Water rental rate from The Water Power Act • Consensus natural gas price forecasts from Manitoba Hydro's Energy Price Outlook as used in the generation system model (SPLASH)
Operating & Maintenance (O&M) including capital maintenance	Manitoba Hydro's O&M estimates for each facility in each development plan including capital maintenance items required over the life of the asset.
Imports	Manitoba Hydro's consensus electricity export price forecast as used in the generation system model (SPLASH)
Taxes	• Capital taxes based on The Corporation Capital Tax Act • Carbon tax on coal from the Climate Change and Emissions Reductions Act • Forecast of future carbon adder for Manitoba-based generation (federal/provincial)

Figure 9-3: Economic Evaluation- Summary of Revenue and Cost Inputs[11]

MH derives a majority of the inputs for its Economic Model from its generation system production-costing model, SPLASH. Inputs to the SPLASH model include *"Manitoba domestic load, demand side management, electricity export prices, natural gas prices, current*

[11] *Id.*, Table 9.1, p. 6.

and future carbon adders, and proposed export power sales."[12] Outputs include *"flow-related electricity export revenues and production costs such as fuel and variable O&M."*[13] The SPLASH model is explained in further detail the NFAT Submission in ***Appendix 9.2- Description of the SPLASH Model***.

Reference scenario inputs, as explained in the introduction to Section II of this Appendix, were based on *"2012 resource planning assumptions with the exception of adjustments, primarily downwards, to the electricity export price forecast described in* ***Appendix 9.3 – Economic Evaluation Documentation."***[14] The reference scenario is meant to model the *"most likely"* set of outcomes; key assumptions for the reference scenario can be seen in **Table 9.2** of the NFAT Submission.

Once the cash flows for each plan are determined, a discount rate is applied to calculate the NPV. MH states that because the discount rate *"is used to guide investment decisions based on uncertainty, a risk premium may be identified to arrive at a discount rate which makes the investor indifferent between cash amounts received at different points in time. In the case of Manitoba Hydro, the discount rate consists of the cost of financing, which includes a guarantee fee to the Province, and a return on equity as described in* ***Appendix 9.3 - Economic Evaluation Documentation."*** [15] As mentioned earlier the Economic Model uses real or constant dollars in its evaluation. Thus, MH utilizes a real discount rate, the interest rate for which the inflation escalation rate has been subtracted.

Study Period - 78 Years

The most notable characteristic of MH's economic analysis methodology is the 78 year study period of fiscal year beginning 2013 to 2090, inclusive. The 78 year study period is meant to reflect the fact that hydro assets typically have extremely long lives. MH concluded that the 78 year study period was needed to analyze the full economic life of both the Keeyask GS and Conawapa GS investments, given that the proposed

[12] *Id.*, p. 7.

[13] *Id.*, p. 8.

[14] *Id.*, p. 1.

[15] *Id.*, p. 9.

Conawapa ISD is 2025 or alternatively 2031. The 78 year study period encompasses the economic life of both proposed hydroelectric generating stations.

The MH economic modeling for the 78 year study period includes a 35-year detailed evaluation period. The SPLASH model simulates all 35 years of this period.

After 35 years, "*replacement capital costs are assumed for assets that reach the end of their economic lives before the end of the long-study period. In addition, a net production cost approximation is used beyond the 35-year study period extending fixed operating and maintenance costs throughout the economic life of all assets…and extending the average net revenues of the last three years in a development plan to capture the expected ongoing incremental revenues between development plans to the end of the study period.*"[16] For some plans, since Conawapa GS has a 2031 ISD, this means that the detailed modeling period captures only the first 16 years of operation of the Conawapa GS.

In determining the system net costs/revenues, SPLASH modeled the MH system for 99 different water flow years, representing the full history of water inflow data available at the time. The Economic Model incorporates SPLASH output that is the average of the output of the 99 years, and not the individual modeling of the water flow years.

As discussed in Technical Appendix 1: Resource Planning, MH adds enough resources to each development plan to meet dependable energy and capacity requirements through the first 35 years of the study period, 2013 through 2037. Over that period, MH has included forecasted growth in energy and peak load requirements, as well as allowed for expected generation retirement and the expiration of export contracts.

In Figure 9-1 above shows the initial resource options added to the system under each plan. Development plans that include the new hydroelectric facilities also include the addition of enough natural gas-fueled CCGTs and SCGTs to meet the dependable energy and capacity requirements of the MH system after the new hydroelectric facilities are in service.

[16] *Id.*, p. 9.

Within the detailed 35 year study period, the net production costs or revenues are determined through the use of the SPLASH model. The SPLASH model accounts for forecasted Manitoba domestic energy and peak loads, existing and potential future firm export contracts, forecasted export prices available from the Midcontinent Independent System Operator (MISO) market, MH facility fuel and emissions costs, MH purchase power costs from wind generation facilities, and water inflow assumptions from 99 possible water flow years.

After the initial 35 years, MH uses the following methodology to estimate the potential ongoing costs of each of the plans for use in comparisons to other plans.

1. No additional growth in energy or peak load requirements is estimated; therefore, there is no need to add additional resources beyond 2037.
2. O&M costs are extrapolated at the escalation rates assumed for generating and transmission plant placed in service as part of a specific development plan.
3. Replacement capital costs are added for any plant added prior to 2037 that has an estimated plant life such that the plant would 'retire' prior to the end of the 78 year study period.
4. Net production costs or revenues are held constant at their year 35 value on a real dollar basis.

MH uses these simplifying assumptions to capture costs and benefits of each of the alternative development plans over the last 43 years of the 78 year study period.

The 78 year Metric – Net Present Value

MH utilizes net present value (NPV) calculations as the primary economic metric for comparison of the alternative development plans. Present value analysis is a common approach for economic analysis of an investment in which annual costs and revenues are discounted to a common point in time for an equivalent comparative analysis.

The incremental costs of one plan versus another can be calculated on a year-by-year basis by subtracting the cash flows of one plan from another. One plan is usually chosen as the base case plan. MH selected the All Gas Plan (Plan 1) as the base case plan, since it requires the least capital investment.

MH's economic model derives the NPV (2014 is the present value year in the analysis) of the difference in costs over the 78 years between two plans.

This 78 year NPV is the metric which MH uses to determine which plan is lowest cost or most economic. As MH explains, the NPV is "*the amount of money, if invested today at a stated discount rate that would grow to an amount sufficient to finance and to provide a return on the investment over the life of the project. When comparing alternative development plans, the incremental NPV represents the incremental net benefits (or costs) associated with the increment of investment made of a higher cost investment option, e.g. the additional investment for the higher-cost option becomes the investment in the NPV calculation, the additional benefits (revenue) from a higher-cost option becomes the revenue in the NPV calculation.*"[17] Figure 9-2 shown earlier provided the present value of the capital costs in each of the development plans.

MH's economic analysis is an unleveraged cash flow analysis based on real dollars (constant dollars). The discount rate used with this analysis to produce the NPV is a real discount rate, excluding inflationary effects. The unleveraged cash flow method has several key characteristics:

1) There are no financing-related costs;
2) All annual costs during the development and construction of any capital project (in this case generation and transmission), are treated the same as if they were expensed cash requirements;
3) There is no corresponding capitalization to include elements such as interest during construction;
4) This approach does not translate capital expenditures into the series of annual revenue requirement dollars (depreciation, interest and return on equity as well as income tax effects which are not applicable for MH) that would be included in annual costs of service totals for ratemaking purposes.

The unleveraged cash flow approach is primarily a MH perspective, rather than a MH customers perspective. The unleveraged cash flow approach is commonly used, at least

[17] *Id.*, p. 2.

in preliminary economic analyses, when the analysis is focused on single investments (projects) that have short installation or construction periods. Generally anything more involved, such as development plan comparisons, would be better-served with financial analysis or at least, where a utility is involved, a revenue requirements analysis.

Over the life of an asset, the sum of present value of direct capital expenditure in each year of a project should be approximately equal to the CPV of the annual revenue requirements associated directly with the capital costs of the asset. This is provided that the correct discount rate, i.e. the weighted average cost of capital, is used to make the present value calculations. This means that at the end of the 78 year study period, the calculation of an NPV comparison between plans will be similar to the CPV revenue requirement comparison between plans. Nevertheless, it is only an approximation of a revenue requirements analysis comparison.

Reference Scenario Results

MH provides numerous tables in its filing comparing the incremental 78 year NPVs of each development plan.[18] One such comparison showing the NPV benefit for each plan relative to the All Gas development plan is included in Figure 9-4 below. The sequence of plans shown begins with the plan with the highest capital investment on top followed by development plans in order of decreasing level of capital investment.

[18] *Id.*, Tables 9.4, 9.5, 9.6, 9.7, 9.8, and 9.9.

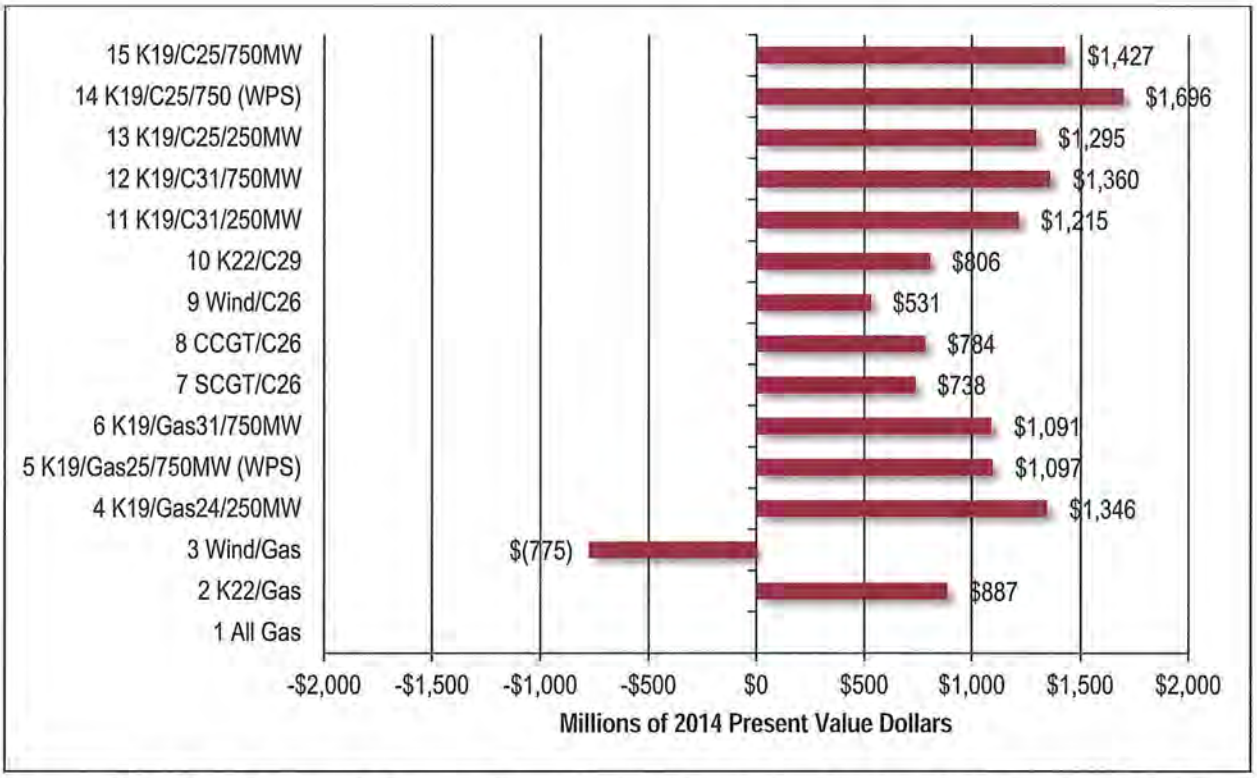

Figure 9-4: Development Plans – Benefits to Manitoba Hydro (Relative to All Gas) – Millions of 2014 Present Value Dollars.

MH observes that Plan 14, the Preferred Development Plan (PDP) with K19/C25/750 MW (WPS & Inv), is lower in cost than the Plan 1 All Gas base case by $1.696 billion of 2014 present value dollars at the end of the 78 year period. According to MH's results, the PDP is the lowest-cost of all the plans presented in the NFAT Submission.[19]

Next, MH compared the incremental NPV of four sets of selected plans in tabular form in order to estimate the benefits of a potential new interconnection. The four sets of plans include: (a) development plans with no new interconnection, (b) development plans with a 250 MW interconnection, (c) development plans with a 750 MW interconnection, and (d) development plans with either a 250 MW or 750 MW interconnection. LCA summarizes MH's observations and conclusions for each of the four comparisons in the following subsections.

[19] NFAT Submission, Chapter 14, p. 28:26-27.

(a) Development Plans with no new Interconnection,

First, MH compared the seven plans with no new transmission interconnection (Section 9.3.2.1 of the NFAT Submission). MH concluded that two plans, Plan 2 - K22/Gas and Plan 10 - K22/C29, provided significant benefits compared to the All Gas Plan, but that not much difference exists between these two plans. However, because Plan 10 K22/C29 requires a significantly greater capital investment, MH excluded it from further analysis.

MH used the Wind/Gas plan to provide a "*wind-based development plan which incorporates wind generation to meet energy requirements, combined with the most cost-effective natural gas-fired generation to provide capacity and to support the intermittent nature of the wind resource.*"[20] MH's analysis yielded a "*significantly negative*" NPV for the Wind/Gas plan in comparison to both the All Gas and the K22/Gas plans.[21] MH found all six of other development plans without a transmission interconnection preferable to the Wind/Gas plan.

The remaining three development plans (Plan 7 - SCGT/C26, Plan 8 - CCGT/C26 and Plan 9 - Wind/C26) were used to determine which of the "*non-hydro resources, when combined with the Conawapa [GS], will be selected for further revaluation*"[22] as each plan uses a different generating resource option to satisfy MH's resource needs prior to an in-service Conawapa. MH concluded that Plan 8 - CCGT/C26 could be ignored because the incremental 78 year NPV between Plan 7 - SCGT/C26 and Plan 8 - CCGT/C26 was very small; it was therefore not worthwhile to consider both plans. MH excluded Plan 8 - CCGT/C26 from further review.

Similarly, Plan 9 - Wind/C26 is the plan with the second-highest capital investment requirement among the plans analyzed in this group. Plan 7 - SGCT/C26 significantly outperforms Plan 9 - Wind/C26 leading MH to remove Plan 9 from further analysis under alternative scenarios.

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[20] NFAT Submission, Chapter 9, p. 16.

[21] *Id.*, p. 17.

[22] *Id.*, p. 18.

Therefore, of these seven development plans without a new transmission interconnection, MH carried only three beyond the reference assumption economic analysis: Base Case Plan 1 - All Gas, Plan 2 - K22/Gas and Plan 7 - SGCT/C26. However, MH decided to use the Wind/Gas development plan in order to test a wind resource scenario.

(b) Development Plans with a 250 MW Interconnection

Second, MH considered plans with a new 250 MW interconnection (Section 9.3.2.2 of the NFAT Submission). Each of the three plans considered in this group yield an incremental NPV relative to the All Gas plan greater than $1.2 billion. MH's comparison of the three plans using the 78 year NPV metric shows they have very similar results. The net benefit of Plan 4-K19/Gas24/250MW in comparison to Plan 13-K19/C25/250MW is negligible and Plan 12-K19/C31/250MW is only marginally preferable to the two other plans. However, the substantial incremental investment associated with the addition of Conawapa distinguishes these three plans from the plans in the first set.

(c) Development Plans with a 750 MW Interconnection

Third, MH considered the five remaining plans (Section 9.3.2.3 of the NFAT Submission), which each include a new 750 MW interconnection. For the purposes of this report, LCA will focus on this set of plans in its review in ***Section II-C***. Based on MH's analysis and the 78 year NPV metric, the Preferred Development Plan, Plan 14 - K19/C25/750MW (WPS Sale & Inv) yielded the highest benefits despite its second-highest incremental capital investment. Plan 5 and Plan 14 (Preferred Development Plan) are very similar plans; Plan 5 uses natural gas-fired generation instead of Conawapa. The contrast between these two plans provides decision makers with two alternatives after Keeyask: the natural gas-fired generation and Conawapa. The other three plans propose scenarios where the 300MW WPS sale is not successful. Plan 15-K19/C25/750MW mimics Plan 14- K19/C25/750MW (WPS Sale & Inv) in this way.

(d) All Development Plans with either a 250 MW or 750 MW Interconnection

The final set of comparisons (Section 9.3.2.4 of the NFAT Submission) includes the development plans in sets two and three. This grouping shows that the Preferred Development Plan yields the highest net benefits of all the development plans. In the event that a 250 MW interconnection is built due to contracts or other external factors, MH concluded that the net benefits associated with a smaller line are larger than those plans with a 750 MW interconnection with natural-gas generation instead of Conawapa. In other words, MH found all plans with a 250 MW interconnection preferable to plans with a 750 MW interconnection with natural-gas fired generation instead of Conawapa. MH concluded that the 750 MW transmission interconnection was economically beneficial in the plans that include Keeyask and Conawapa.

C. La Capra Associates' Review and Concerns

LCA has a number of comments and concerns with MH's reference scenario analysis. Many of these concerns derive from the use of a 78 year study period. Specifically, the key issues we identified with the MH economic analysis approach are as follows:

1. The economic differentials at the end of 78 years between the alternative development plans is relatively small compared to the scale of the investments proposed in the Preferred Development Plan. The relative economic value of the plans considered can be materially affected by relatively small changes in assumptions.
2. A 78 year planning horizon analysis is particularly susceptible to forecast uncertainty.
3. MH's singular focus on the 78-year NPV metric as the basis for comparing alternative development plans is too limited in scope for a decision of this magnitude. MH does not offer any comparative metrics that capture important differences in the plans through the study period that bear on the timing of costs and benefits and the associated risks.
4. MH's use of an unleveraged cash flow analysis for its economic evaluation is a relatively simple approach for economic analysis of alternative plans with investments of the scale that are under consideration in this NFAT proceeding.

5. MH does not feature the annual differences in cash flow between the plans in its application, which is important foundational information for assessing relative ratepayer cost and risk implications between the alternative plans. LCA has prepared those comparisons.
6. MH does not provide a break even evaluation of the alternative plans. This analysis provides important information on the time required for proposed investments to provide benefits and on assessing implications of forecast risk. LCA has prepared comparisons of the plans using a cumulative NPV analysis.
7. MH does not provide conventional metrics comparing alternative plans over time. LCA has prepared comparisons of the alternative plans for 20 year, 35 year and 50 year NPV analysis and internal rate of return (IRR) analysis.
8. MH's economic analysis excludes sunk costs. In Part B of this Technical Appendix to be filed at a later date, LCA will provide a comparison of the total cost of the Preferred Development Plan to the All Gas Plan that considers the total cost of the resources to illustrate the impact that the sunk costs have on the comparative economics and ratepayers.

Each of these concerns is discussed further in this section below. The concerns discussed here are confined to the economic analysis methodology and the metrics used to evaluate the relative economic performance of the development plans. The 78 year planning horizon raises other concerns in resource planning that are addressed in LCA Technical Appendices on Resource Planning, Generation Alternatives, and Alternative Development Plans (Technical Appendices 1-3). For example, this Technical Appendix does not address concerns regarding the technology risk that exists over such an extended planning horizon.

The 78 year Economic Differentials Are Small

Figure 9-5 below puts in perspective MH's 78 year NPV values for each development plan. LCA has calculated the present value of the incremental capital costs for all the resource additions in each development plan relative to the All Gas Plan, which are shown in Figure 9-5 as the red bars. In comparison, the blue bars show the total incremental 78 year NPV values according to MH's results. The figure shows that the 78 year NPV of benefits are relatively small compared to the incremental investment

necessary to achieve them for the Preferred Development Plan and several of the more capital-intensive plans.

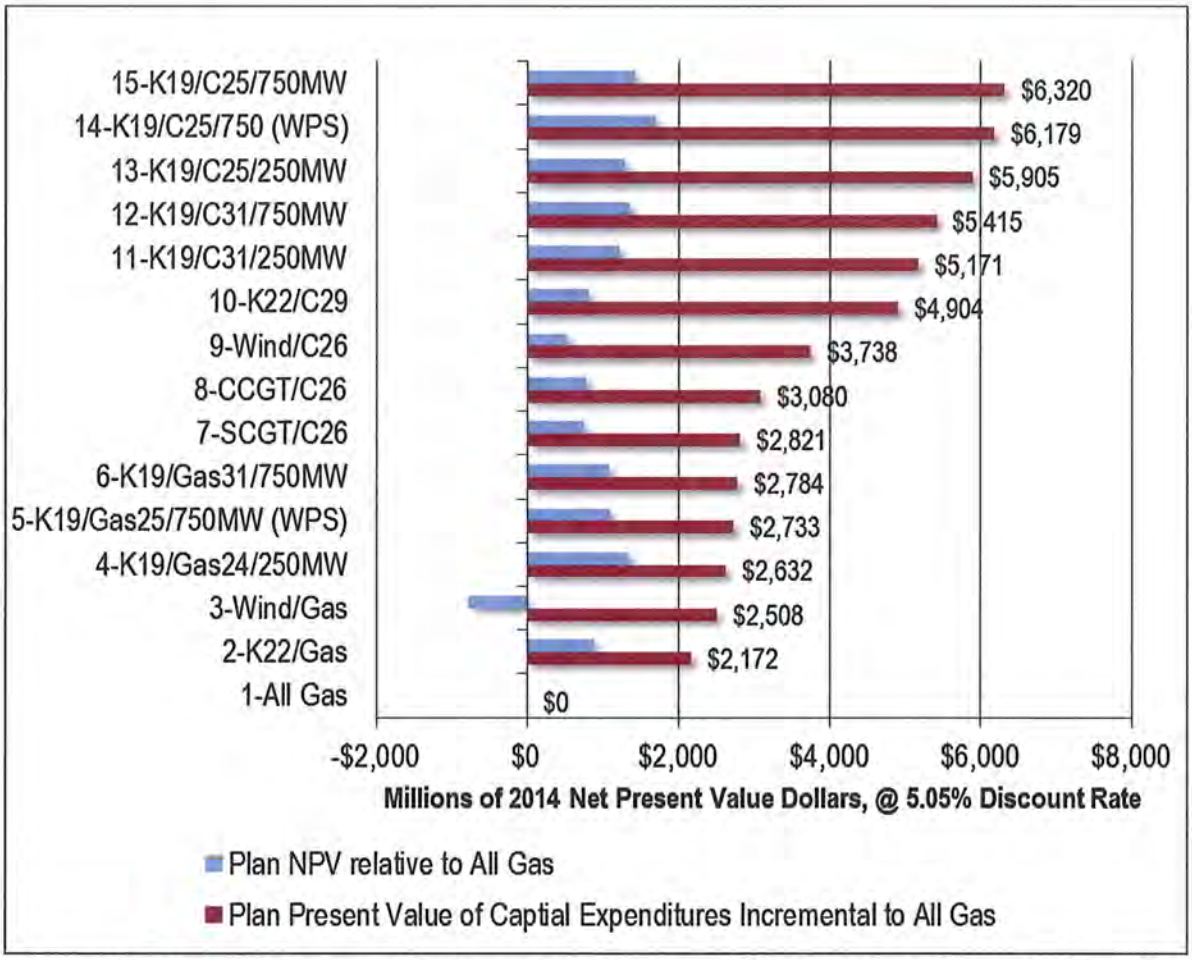

Figure 9-5: Present Value of Invested Capital and NPV of Costs for each Plan through 78 Years Relative to All Gas - Millions of 2014 Present Value Dollars

A 78 Year Planning Horizon Analysis Is Susceptible To Forecast Uncertainty

A 78 year study period is unusual in evaluating utility investments. While utility plant is used to serve customers reliably and economically over long lives, it is unusual for utilities to use economic analysis study periods that include the full plant life. All utility economic evaluations rely on forecasts of the economy, customer energy use, fuel prices, inflation, interest rates, operating costs, and more. There are risks inherent in forecasting over such a long period of time, and the estimates of benefits over that period of time are subject to much uncertainty.

- Forecast risk is inherently more uncertain when forecasts extend beyond 10 to 20 years. It is typical in the industry to conduct planning over 20 to 30 years, and even within these timeframes considerable uncertainty and scenario analysis is used to assess the inherent forecast risk. An analysis based upon forecasts of 78 years is even more susceptible to forecast error.
- It is common for decision makers to place much less weight on long-term forecasts of long-term benefits in conjunction with plans with high front-end costs. This means it is valuable to consider intertemporal issues, payback, IRR and other metrics that better articulate the temporal relationship between investments and the associated benefits expected from those investments.

Singular Focus On The 78-year Net Present Value Metric

The visuals depicting the reference scenario economic results in MH's filing and discussed in ***Section II-B*** only illustrate the economics of a single point in time (the 78-year NPV). The choice of such a long study period raises concerns over the uncertainty of outcome as risk increases over time.

It is a common practice in evaluating utility investments to look at the year-by-year effects of alternative resource options or resource plans. LCA proceeded to investigate the year-by-year impacts and estimated NPVs for different time periods using MH's reference scenario assumptions to understand certain questions like:

- How long it will take before a plan is more beneficial than the All Gas Plan?
- How much cost will accumulate due to high initial capital investment prior to a plan's ability to generate more revenues on an annual basis? and

- What sort of economic burden is MH taking on in the years leading up to its 78 year potential payoff.

MH's focus and reliance on the 78 year NPV metric for decision support fails to depict what occurs between year 0 and year 78, namely investment amounts and durations that affect risk. In this report, LCA provides annual differences between the unleveraged cash flows, break even years, CPV charts over time, and shorter time period incremental NPVs all for individual development plans relative to a base case. These additional metrics provide a more complete description of the temporal characteristics of the relative economics of the plans considered.

In addition, the NPV metric does not convey any information on the return on investment. Selecting the plan with the greatest benefits on an NPV basis does not necessarily provide the plan with the greatest return on investment. As can be seen in Figure 9-5, the plans with the largest NPV of benefits do not have the largest proportion of benefits to investment. IRR or other similar metrics would provide additional perspective on the results in considering the choice among alternative development plans.

Unleveraged Cash Flow Analysis

MH's 78 year NPV metric is just one way to look at comparative economics of alternative development plans. Considering the magnitude of the investments and the variability in the scenario and plan assumptions, there will always be additional perspectives regarding the likelihood of a particular scenario or regarding different scenario assumptions (characteristics). LCA believes it is more appropriate to look at how each plan's incremental costs translate into ratepayer impact in a revenue requirements analysis. However, much can be learned with the development of additional metrics, including looking at time periods much shorter than 78 years, using the unleveraged cash flow approach of the NFAT economic analyses.

In the following sections, we discuss the economic analysis results within the NPV methodology proposed by MH. In fact, most of the following discussion utilizes modeling results developed by MH. While we do not endorse MH's use of unleveraged cash flow analysis for an investment proposal of this magnitude, LCA believes that

reviewing the MH methodology without changing the modeling output results calculated by MH is a useful first step to demonstrate the additional viewpoints and metrics directly taken from MH analysis. In the latter part of this document we will focus on alternative assumptions and additional analyses that LCA suggests are important for the PUB Panel to see and understand in helping them formulate their opinion on the merits of the request by MH to endorse the Preferred Development Plan which would develop the Keeyask and Conawapa Generating Stations, and an additional transmission interconnection with the US.

Comparison of Annual Cash Flow Requirements of Plans

In this section, LCA provides examples of the comparison of the alternative development plans on a year by year incremental cash flow in real 2012 dollars[23] of each plan over the study period using all MH's reference scenario assumptions and model results. The year by year values shown here are MH's results, using the annual costs which were provided by MH from their economic analysis of the plans and used by MH to determine their 78 year NPV results. LCA's analysis here simply displays the annual detail from the MH analysis. The following figures provide additional, useful information for the decision maker, who can visualize and quantify the net costs and benefits of each plan over time.

For the purposes of illustrating year by year effects, we chose the All Gas Plan as the Base Case (as did MH) and four development plans: the Preferred Development Plan (Plan 14) and Plans 4, 5, and 6 which include Keeyask, add natural gas-fired generation capacity instead of Conawapa, and have variations in the amount of transmission included in their plans. As in MH's comparative analysis, LCA uses the All Gas plan as the base case for comparative analysis of these plans. It is important to keep in mind

[23] It is important to clarify that the MH economic analysis and modeling was indeed calculated utilizing annual cash flow implications that are expressed in 2012 real or constant dollars. Real or Constant dollar usage has removed inflation escalation. In the same analysis, MH utilizes present value techniques to capture the time value of money. These present value dollars have a reference year. MH has chosen 2014 as the present values year. Thus you will see in this report the use of the term 2014 Present Value Dollar basis.

that the PDP and Plan 5 add natural gas-fired generating capacity after the plan's hydroelectric development of either Keeyask and Conawapa or just Keeyask, is completed.

In this section we will start with the annual net costs of the five plans. The incremental costs involved were described earlier in the Plan Specific Inputs table. The annual costs developed by MH in their analysis of the All Gas Plan are presented in Figure 9-6 below. The costs depicted are the incremental investment and O&M costs required by the All Gas Plan and the production costs (net of export revenue) of the total generation system of MH which were developed utilizing the SPLASH model. The figure shows in years where the All Gas Plan where the value of net production costs is positive, which are years prior to capital investments when the system is showing a net revenue (i.e., export revenues exceed MH production costs and incremental capital investment). By 2027, the All Gas Plan has a net annual incremental cost (shown as negative) as the costs to add new resources, operate all new thermal resources and pay for all imports are greater than export revenues. The annual All Gas Plan incremental costs are negative (i.e., increase costs) for the remainder of the study period growing to over 600 million, 2012 dollars.

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.

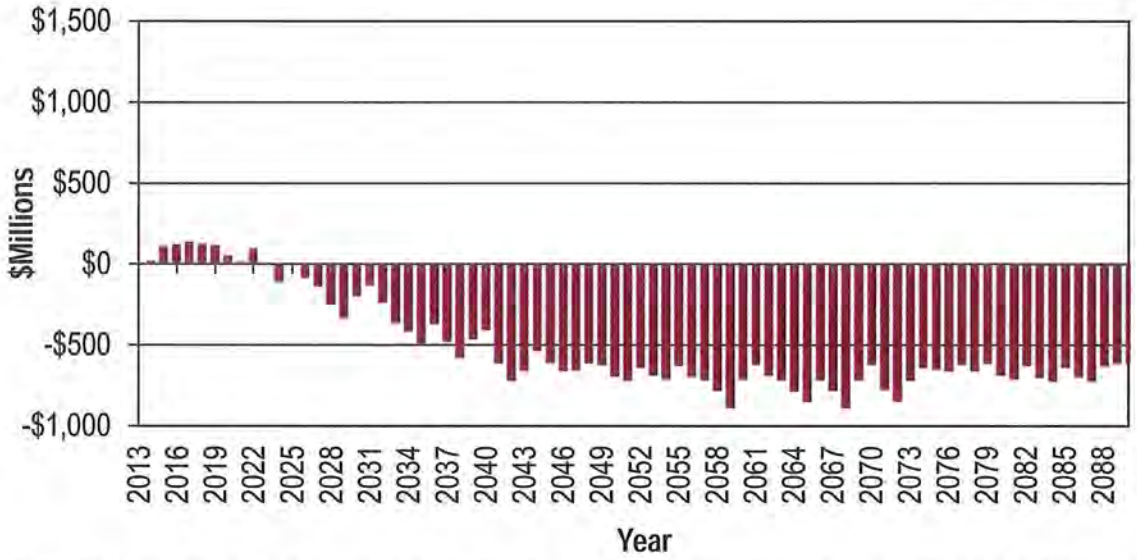

Figure 9-6: Plan 1- All Gas Annual Cash Flow Reference Scenario in Millions of Real 2012 Dollars

Figures 9-7 to 9-10 show the annual costs for the other four plans chosen for comparison, Plan 14 (Preferred Development Plan K19 C25 750MW WPS & Inv), Plan 4 (K19/Gas 24/250MW), Plan 5 (K19 Gas 24 750MW (WPS & Inv) and Plan 6 (K19/Gas31/750MW). Since each of these plans include the construction of the Keeyask GS, we can see in the first five or so years the cash flow is negative since there are substantial cash needs for the construction of Keeyask GS. The second period of years shows positive cash flow just after the Keeyask GS is placed into service.

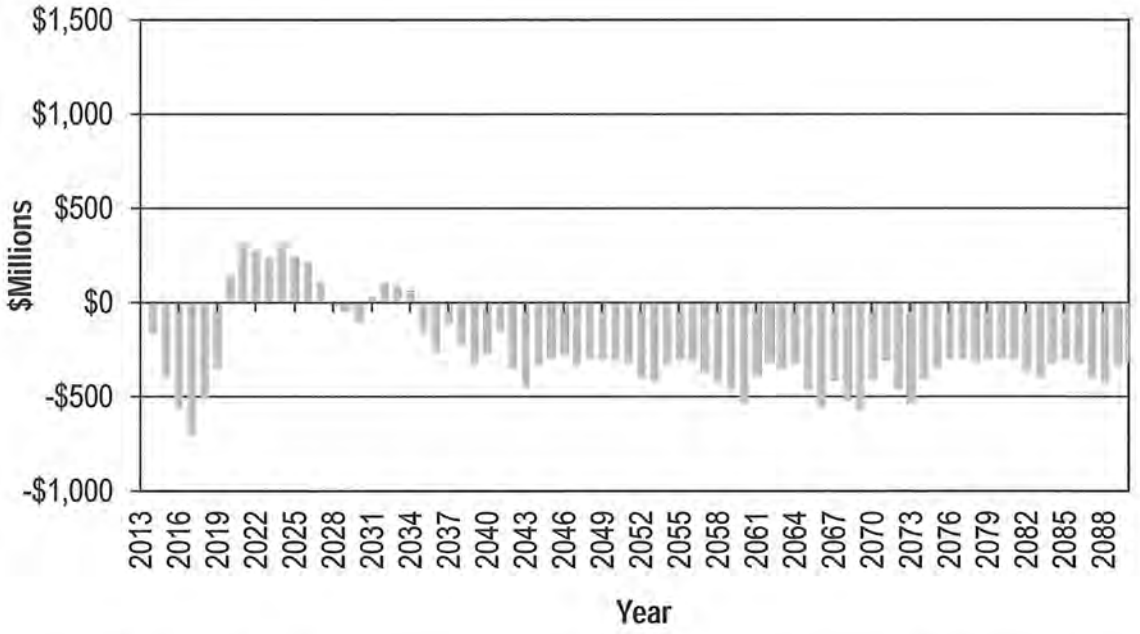

Figure 9-7: Plan 4 - K19/Gas24/250MW Annual Cash Flow Reference Scenario – Millions of 2012 Dollars

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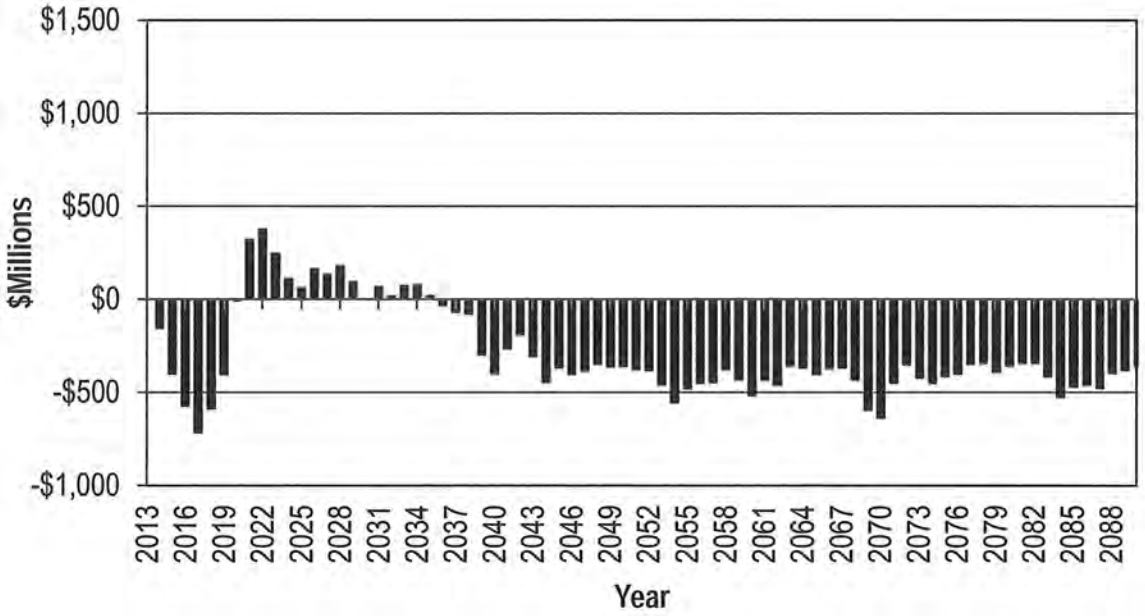

Figure 9-8: Plan 5 – K19, Gas 24, 750 MW (WPS & INV) Annual Cash Flow Reference Scenario in – Millions of Real 2012 Dollars

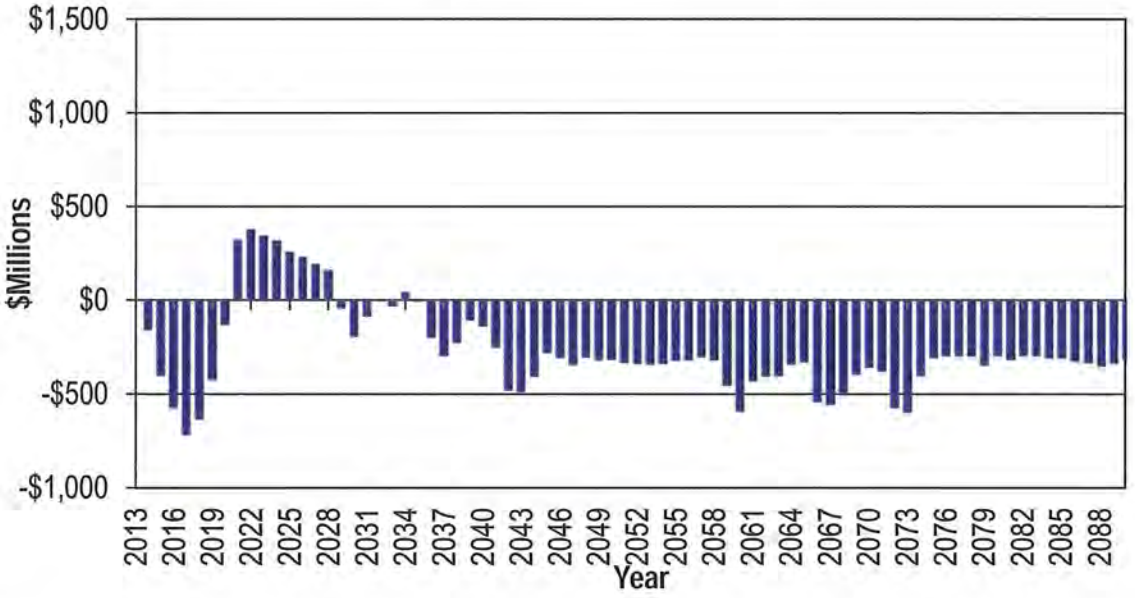

Figure 9-9: Plan 6- K19/Gas31/750MW Annual Cash Flow Reference Scenario – Millions of 2012 Dollars

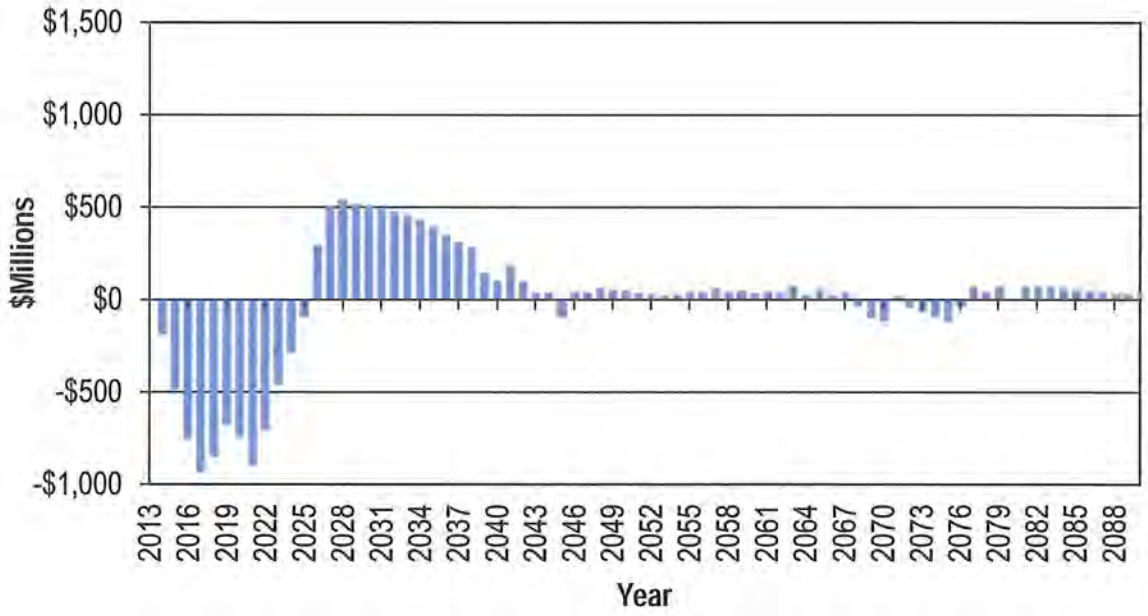

Figure 9-10: Plan 14 - Preferred Development Plan Annual Cash Flow (Real 2012 Dollars)

Figures 9-11–Figure 9-14 below, show the incremental cash flow or cash flow differences of Plan 5 and Plan 14 respectively compared to the Base Case All Gas Plan. A negative number indicates that the Plan being compared to the All Gas Plan has greater cash requirements than the All Gas Plan. Plan 14 has annual cash requirements greater than the All Gas Plan in the initial years. Plan 14 – the Preferred Development Plan in 2026 begins having substantially less cash requirements than the All Gas Plan, and throughout the study period MH analysis shows that Plan 14 is lower-cost than Plan 1 All Gas on a cash flow basis varying between $500 million and $900 million annually. Similarly Plan 5 in 2021 begins having substantially less cash requirements than the All Gas Plan, and throughout the study period MH analysis shows that Plan 14 is lower-cost than Plan 1 All Gas on a cash flow basis up to $500 million annually.

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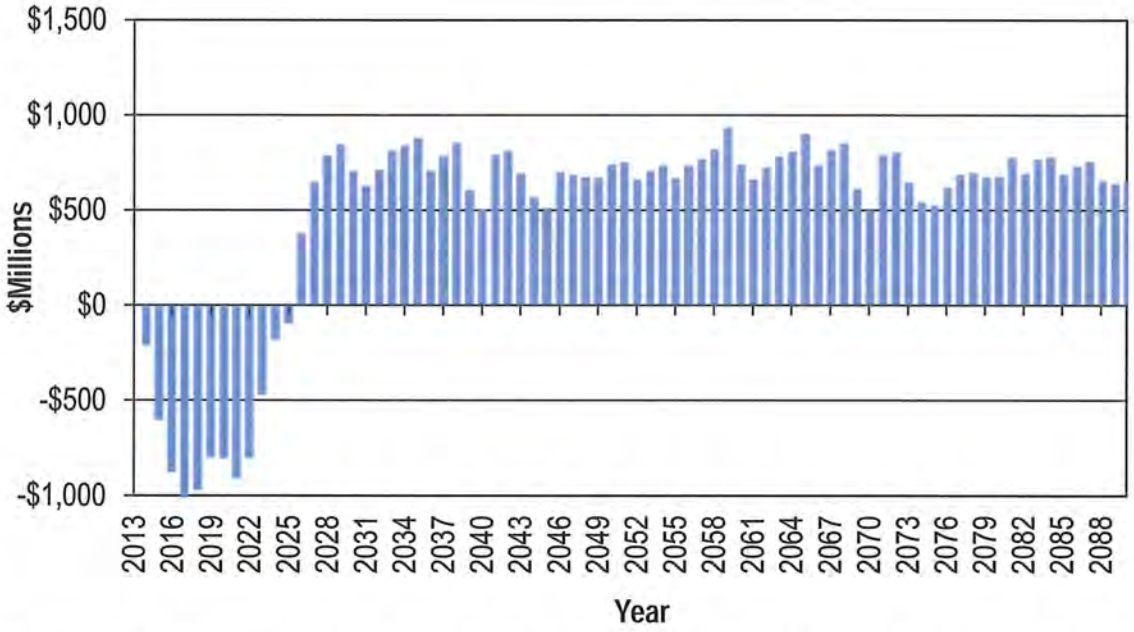

Figure 9-11: Incremental Annual Cash Flow for the Plan 14 Preferred Development Plan Compared to the All Gas Plan Reference Scenario – Millions of 2012 Real Dollars

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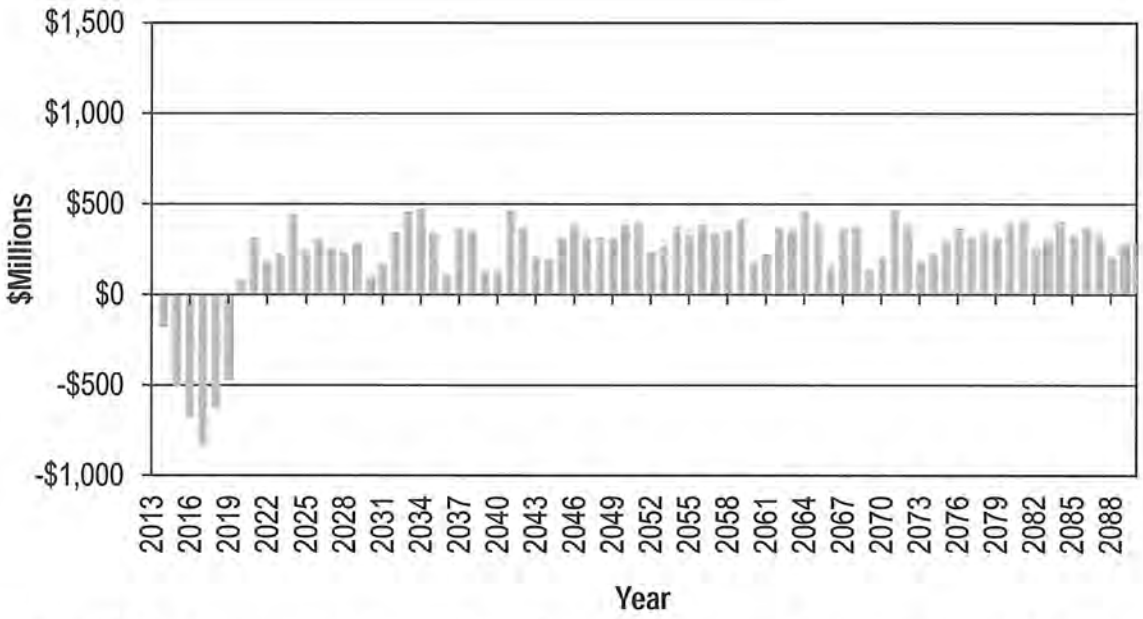

Figure 9-12: Incremental Annual Cash Flow for Plan 4- K19/Gas24/250MW Compared to the All Gas Plan – Millions of 2012 Real Dollars)

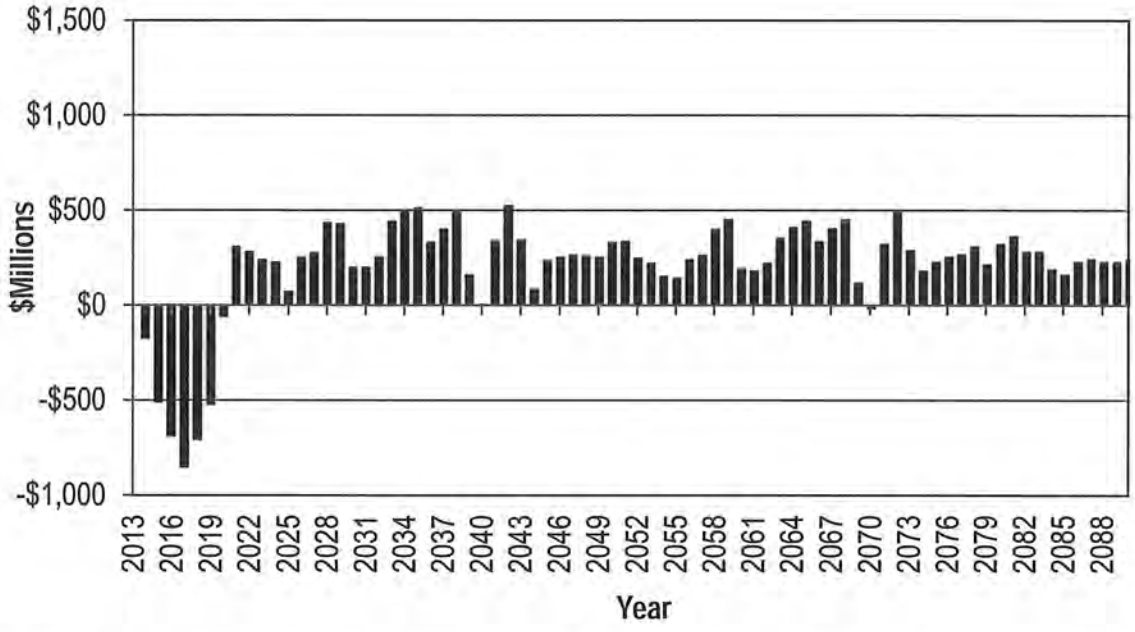

Figure 9-13: Incremental Cash Flow for the Plan 5 Cash Flow Compared to the All Gas Plan - Millions of 2012 Real Dollars

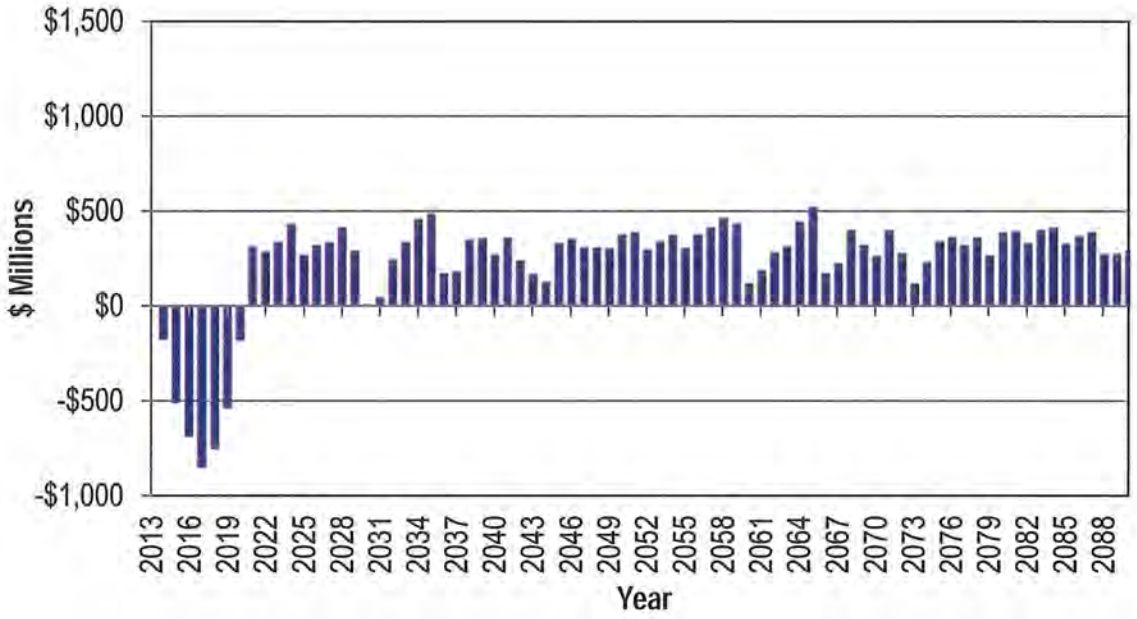

Figure 9-14: Plan 6- K19/Gas31/750MW Incremental Cash Flow Compared to the All Gas Plan (Real 2012 Dollars)

By inspection, we can see how much more upfront capital investment is required for Plan 14 in both amount and duration of payments. However, more costs are associated with the later years in Plans 4, 5 and 6. After 2026, when Conawapa is in service, Plan 14 accrues more revenues and thus has more positive cash flow.

While these annual 'plan' costs are useful in understanding the costs associated with a particular plan, the NPV is used to indicate the economics of an investment. As explained earlier, the "do nothing" plan is not an option in order to preserve the threshold of reliability utility customers require. Thus comparisons of plan economics are usually shown as the costs of the plan after subtracting the Costs of the Base Case, in this analysis the All Gas Plan.

Break Even Evaluation Of The Alternative Plans

Another potentially helpful graphic for decision makers is an incremental CPV chart of each plan over time relative to the All Gas Plan. The CPV is calculated by taking the

annual costs of each plan, as shown above, calculating the annual difference between the plan and the base case and discounting each to get an annual present value. The CPV we show below is the sum of the present value for each year's incremental cash flow from the beginning of the study period through that point in time.

CPV charts demonstrate how beneficial a plan is as compared to a base case from the start of the study to a given point in time; the CPV is essentially the NPV at a point in time. Thus the final year's CPV matches the 78 year NPV metric used by MH. These visuals lead more directly to an understanding of the path towards the final 78 year NPV value used in MH's filing and the year the development plan breaks even on a present value basis when compared to the base case (All Gas). They show how quickly the upfront investment pays off as it is discounted over time.

Plans 4, 5, 6 and Plan 14 as examples

Again, we used Plans 4, 5, 6 and 14 in Figure 9-15 to illustrate the value of these additional metrics. The CPV charts similarly use MH's assumptions associated with the reference scenario.

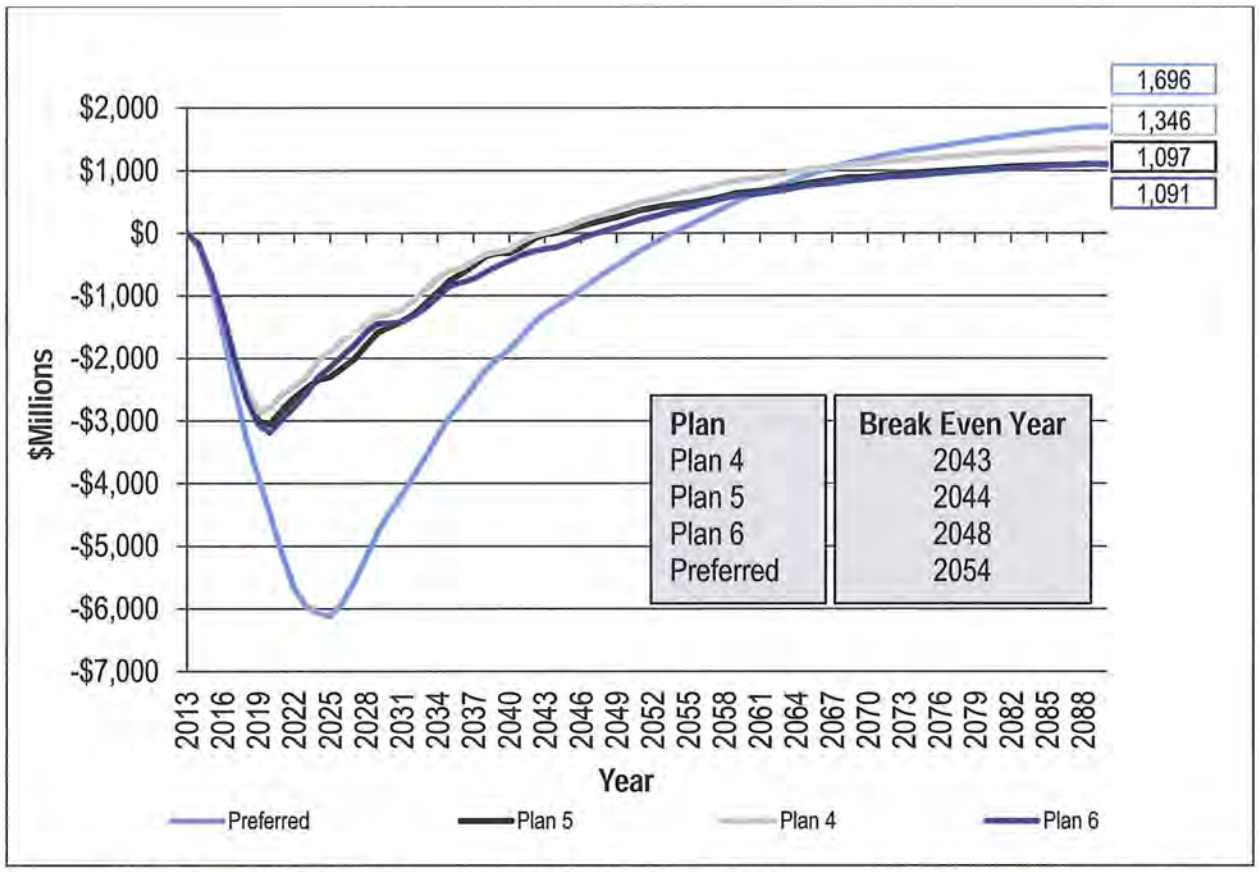

Figure 9-15: Cumulative Incremental Cash Flow Difference for Plans 4, 5, 6, and 14 as Compared to the All Gas Case – Millions of 2014 Present Value Dollars

As discussed above, the point at which each curve ends represents the 78 year incremental NPV value difference versus the All Gas Plan. However, there are many more aspects to this chart that could be beneficial to the decision maker beyond the point associated with year 2090.

The lowest point of the curve indicates when the annual net incremental costs of the specified plan begin to be lower than the Base Case (All Gas Plan). It is also significant to note how low the curve reaches; the lower the lowest point, the more cash outflow that has occurred for that plan on a present value basis as compared to the Base Case All Gas Plan. The Preferred Development Plan has a lowest point CPV of costs relative to the All Gas Plan of over $6 billion, double that of Plan 5. This is directly related to the significant capital investments required for Keeyask and Conawapa.

The point where the curve reaches zero (crosses the x-axis) is the point in time when the plan is at break even with the All Gas Plan. Prior to that point, the respective plan has a NPV cost more than the Base Case All Gas Plan. Plan 5 reaches the break-even point with the All Gas Plan in 2044. The Preferred Development Plan reaches a break-even CPV with the All Gas Plan later (2054) and experiences a much greater cash outflow as compared to the All Gas Plan in a single point in time. By the end of the 78 year study period, the Preferred Plan achieves a better 78 year NPV than Plan 5. It is also not surprising that there are only small differences among Plans 4, 5 and 6 in terms of the shape of these curves and Break Even year. Each of these plans has the primary characteristics of including Keeyask GS in 2019 and all generation thereafter is natural gas-fired.

While these figures have been selected as examples, they do show a specific comparison. The difference between the two plans is that Plan 14 (the Preferred Development Plan) includes Conawapa while Plan 5 uses natural gas generation instead of Conawapa. These charts also reveal the break even years for both plans as compared to the All Gas Plan (the point at which the curve crosses the x-axis). Plan 5 breaks even on a present value basis compared to All Gas at year 2044; the Preferred Development Plan doesn't break even on its costs relative to the All Gas Plan until 2054. In addition it is not until around year 50 of the study period, 2061, that Plan 14 becomes lower cost than Plan 5 on a CPV of cash flow basis. This is using MH-generated modeling results, unaltered by LCA.

Similar figures can be developed for any resource plan comparison for the plans studied by MH, based upon MH modeling results. LCA has prepared a working spreadsheet model that can select any comparison. This model is included in our filed workpapers. It does not contain any Commercially Sensitive Information.

LCA created figures similar to Figure 9-15 for each of the resource plans studied in the NFAT application. Below is a table (Figure 9-16) summarizing the break-even years for each development plan relative to the All Gas plan. In reference to the graphs displayed earlier in this section, it is the point at which each of these graphs would cross the x-axis in their incremental CPV chart relative to the All Gas case.

Plan	Break Even Year (All Gas) Base Case
2 - K22/Gas	2051
3 - Wind/Gas	N/A*
4 - K19/Gas24/250MW	2043
5 - K19/Gas25/750MW (WPS)	2044
6 - K19/Gas31/750MW	2048
7 - SCGT/C26	2059
8 - CCGT/C26	2059
9 - Wind/C26	2064
10 - K22/C29	2064
11 - K19/C31/250MW	2059
12 - K19/C31/750MW	2058
13 - K19/C25/250MW	2058
14 - K19/C25/750 (WPS)	2054
15 - K19/C25/750MW	2057

**note that N/A signifies that a Plan has higher CPV of costs than the All Gas Plan through 2090*

Figure 9-16: Break-Even Years for Development Plans Relative to All Gas on a CPV Basis

The break-even table shows that no single development plan breaks even for the first 30 years. Most cases don't break even until the 40 year mark. The table also shows that Plans 4, 5, and 6, which all have Keeyask GS and some additional new transmission interconnection before adding natural gas generation, have the shortest periods until they break-even and then become lower cost than the All Gas Plan. These plans break-even earlier than the Preferred Development Plan (Plan 14) by 6 and 11 years.

Alternative Economic Metrics Comparing Alternative Plans

While we recognize some value in viewing the potential impact of these development plans over a long time horizon given the long life of hydro assets, we believe that viewing the results through other, shorter time periods can provide additional and perhaps even more valuable information to decision makers. For the purpose of this analysis, we chose to calculate the CPVs for three additional time periods as follows:

a. 20 years - In our experience, this is frequently the longest period reviewed for rate making and other regulated purposes. Wholesale changes in the political, physical, and financial landscape can be expected over 20 years, making the modeling of even just those 20 years subject to considerable uncertainty. While these reasons may or may not apply equally in a proceeding such as the NFAT, we believe this is still a helpful lens through which to view the results. We recognize that this 20 year look is important to decision making for issues such as capital rationing, inter-generational equity, and the confidence in the assumptions made in an economic analysis. It is for this reason that few decisions are made based on benefits that take significantly longer than 20 years to accrue. However, we concede that this period would cover less than ten years of in-service time for the proposed Conawapa GS. Longer periods of time are also appropriate to analyze long-lived investments.

b. 35 years - This is the period over which actual production cost modeling output exists. As part of the LCA review, we investigated the basis for all economic analysis over the entire 78 year study period. MH was very forthcoming in discussing that its analysis is based upon detailed modeling for the first 35 years of the study period. The detailed modeling with SPLASH began with a forecast of MH customer energy usage and dependable energy requirements, peak system demand, impacts of current DSM programs, and commitments for firm export sales. The existing MH generation system and generation additions for each plan were then modeled to serve domestic customer needs and meet export sales commitments while optimizing market opportunities through the SPLASH model in order to determine net revenue/production costs for the first 35 years of the analysis beginning in 2014 for the various plans and uncertainty scenarios. This net revenues/production costs model was based on numerous assumptions including forecasts for market energy prices from outside experts. The annual net revenue/production costs were combined with export firm contract revenues, new generation construction annual cash flows, new generation annual O&M costs, water rental costs and capital tax charges to complete the economic analysis. Beyond 35 years the analysis was based solely upon the continuation of the annual costs of year 35 in real dollars except for replacement of generating assets assumed to have useful lives less than the study period. The analysis after year 35 is merely an extrapolation of the conditions at the end of this modeling period. Even though this extrapolation may be a valid consideration in any long-

term modeling, the economic implications of the results in this period are generally viewed as more suspect, given the uncertainty of any assumptions and in this case the simplistic estimation of annual effects after year 35. LCA maintains that understanding the relative results without any end effects would provide valuable insight.

c. 50 years – This is the period over which the financial model was run. This period extends through year 2062. This would capture at least 30 years of operation of the proposed Conawapa GS and over 40 years of the operation of the proposed Keeyask GS. This analysis period would even include 15 years beyond the end of the detailed modeling analysis.

By reviewing the results of these various time periods, decision makers can understand where the relative benefits and costs of various development plans occur. This can be especially useful in reviewing risk, since the risk profile of different development plans can vary greatly over time. Figure 9-17 below delineates the various study periods in the CPV analysis.

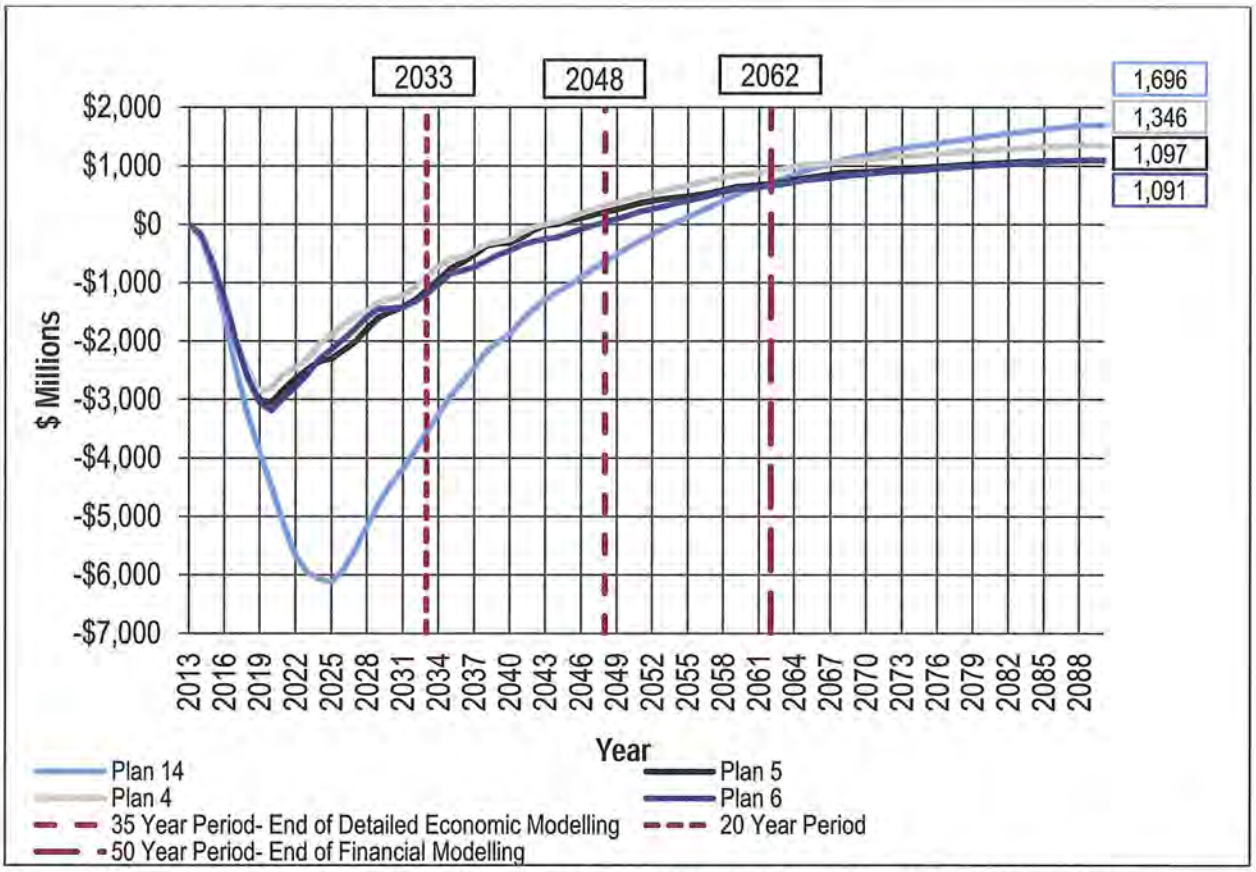

Figure 9-17: Incremental CPV Plan 4, 5, 6 and Plan 14 Relative to All Gas Case

The bar chart below (Figure 9-18) elaborates on the observations from the break-even table. Namely, every case is significantly worse than the All Gas plan in a 20 year period. As one might expect, since the more capital-intensive plans accumulate savings versus All Gas over time, all of the plans with higher investment in generating resources have higher cash flow requirements for a first 20 years of the study period. For example, in plans where Keeyask is added in 2019, the earliest that a generation station is added, Keeyask would only be in operation for 14 years at the end of year 2032. However this does show the magnitude of extra costs that are incurred during the first 20 years relative to the All Gas Plan. We see plans including both hydro facilities have costs approximately $4 billion higher than Plan 1 - All Gas. Plans with just Conawapa added in 2026 have over $2.5 billion higher costs than the All Gas Plan. Other plans have less than $1.4 billion higher costs than the All Gas Plan.

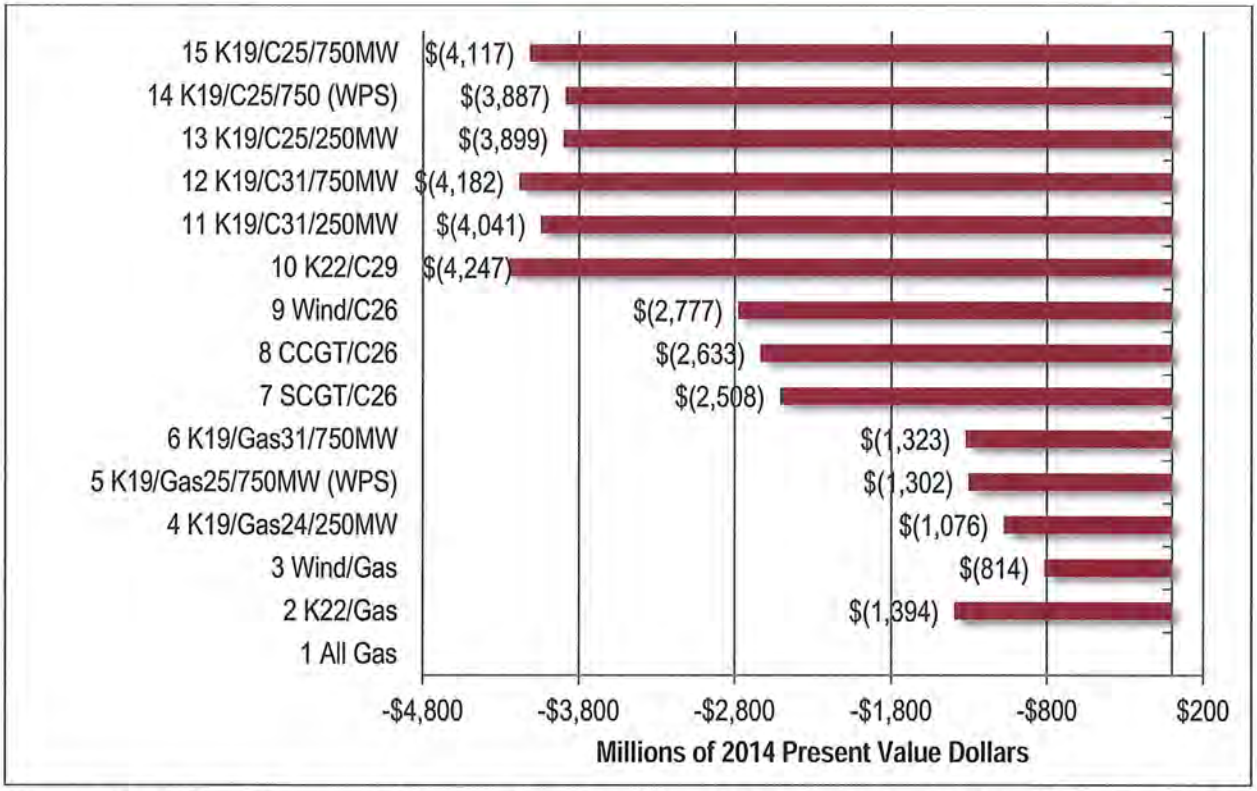

Figure 9-18: Development Plans – Benefits (Costs) to Manitoba Hydro (Relative to All Gas) after 20 years – Millions of 2014 Present Value Dollars.

The break-even Figure 9-16 in the prior section above showed that only two plans have reached the point where they are providing lower costs on a present value basis prior to 2047, the 35th year of the study period. Plans 4 and 5 are similar in that they are characterized by Keeyask in-service in 2019, do not include Conawapa, include new natural gas-fired generation first added in 2024 or 2025, and both have a new transmission interconnection. Utilizing MH assumptions and modeling results of year by year costs that are the basis for the analysis in the NFAT Submission, Plan 5 and Plan 4 would have lower costs than the base case at the end of 35 years of the study period on a CPV basis of $161 million and $254 million respectively. Conversely, even though MH observes that the Preferred Development Plan (Plan 14) has the lowest cost on an NPV basis at the end of year 78, it has a more negative CPV than the Base Case All Gas Plan by $766 million through the first 35 years. One would also observe that there are

only 6 out of the 14 other plans that have higher costs than the Preferred Development Plan through 2047, the first 35 years as seen in Figure 9-19 below.

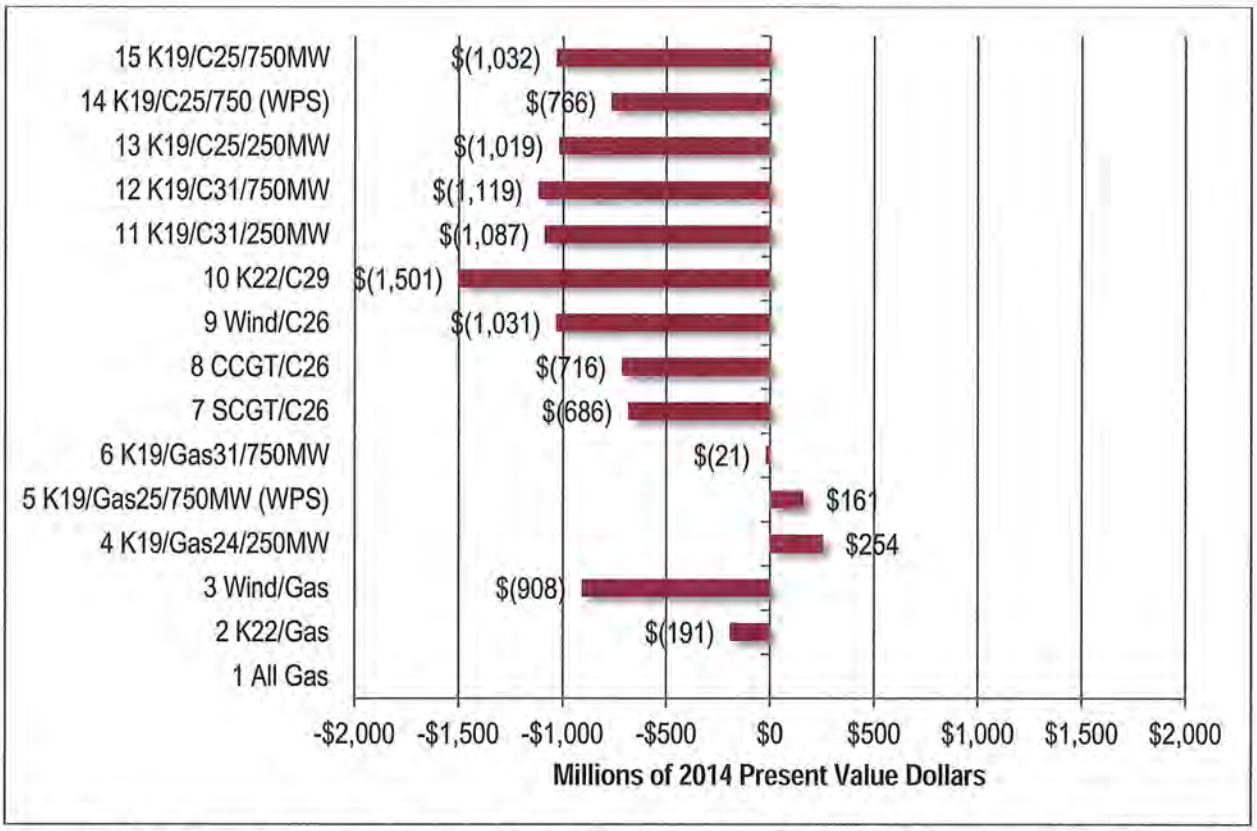

Figure 9-19: Development Plans – Benefits (Costs) to Manitoba Hydro (Relative to All Gas) after 35 years – Millions of 2014 Present Value Dollars.

As we look at how the plans compare by the end of 2062 in Figure 9-20, the 50 year study, we see that utilizing the exact year by year results MH used in its filing, only three plans, Conawapa plans (Plan 7 & 8) and Plan 3 Wind Gas, have higher costs than the All Gas Plan on a CPV basis. This is consistent with their break even years on our earlier table showing years after 2062. The bar graph below (Figure 9-20) demonstrates that even by 2062 years, Conawapa plans (11-15) have still higher costs than their natural-gas fired alternatives (Plans 4-6). The Preferred Development Plan has a 50 year CPV similar to Plans 4 and 5. The best plan on a 50 year CPV basis shows to be Plan 4 K19 Gas24 250MW. Only the 78 year incremental NPV chart relative to the All Gas case

shown as in Figure 9-4 earlier and in MH's filing presents the Preferred Development Plan as the lowest cost.

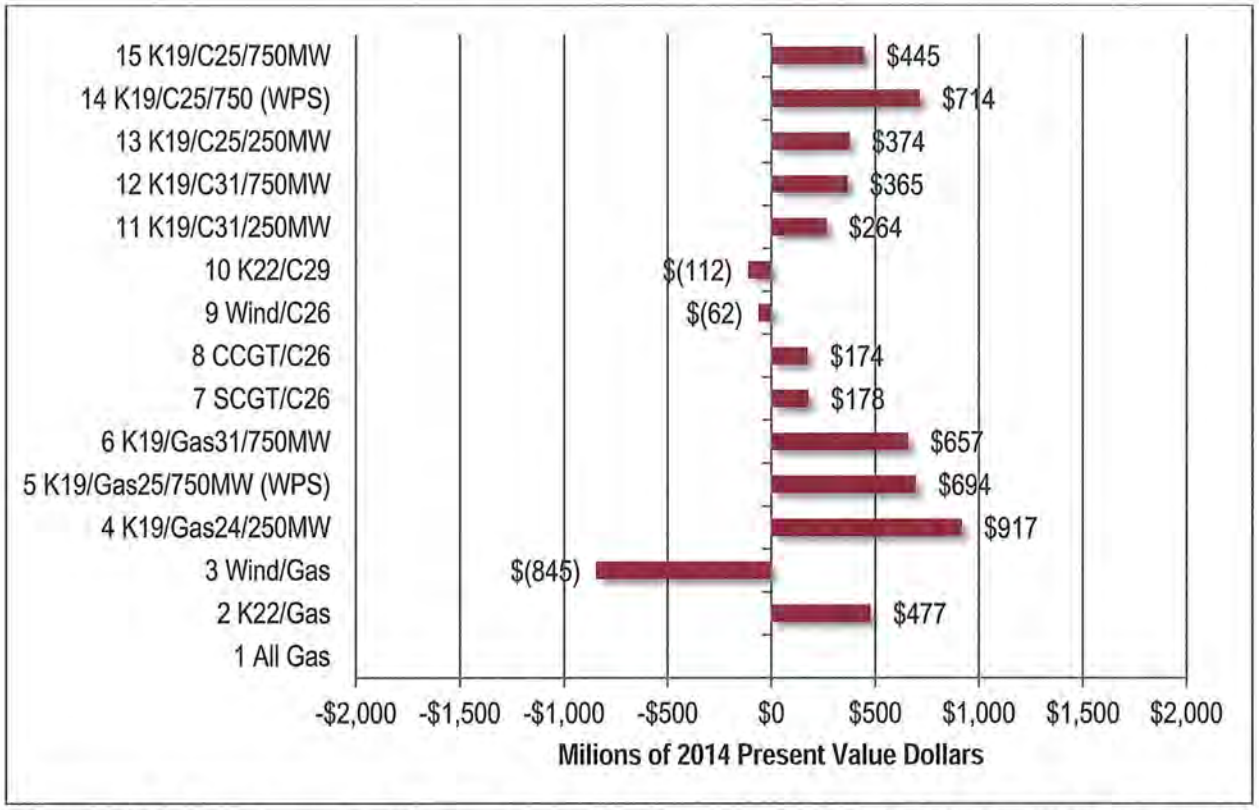

Figure 9-20: Development Plans – Benefits (Costs) to Manitoba Hydro (Relative to All Gas) after 50 years – Millions of 2014 Present Value Dollars.

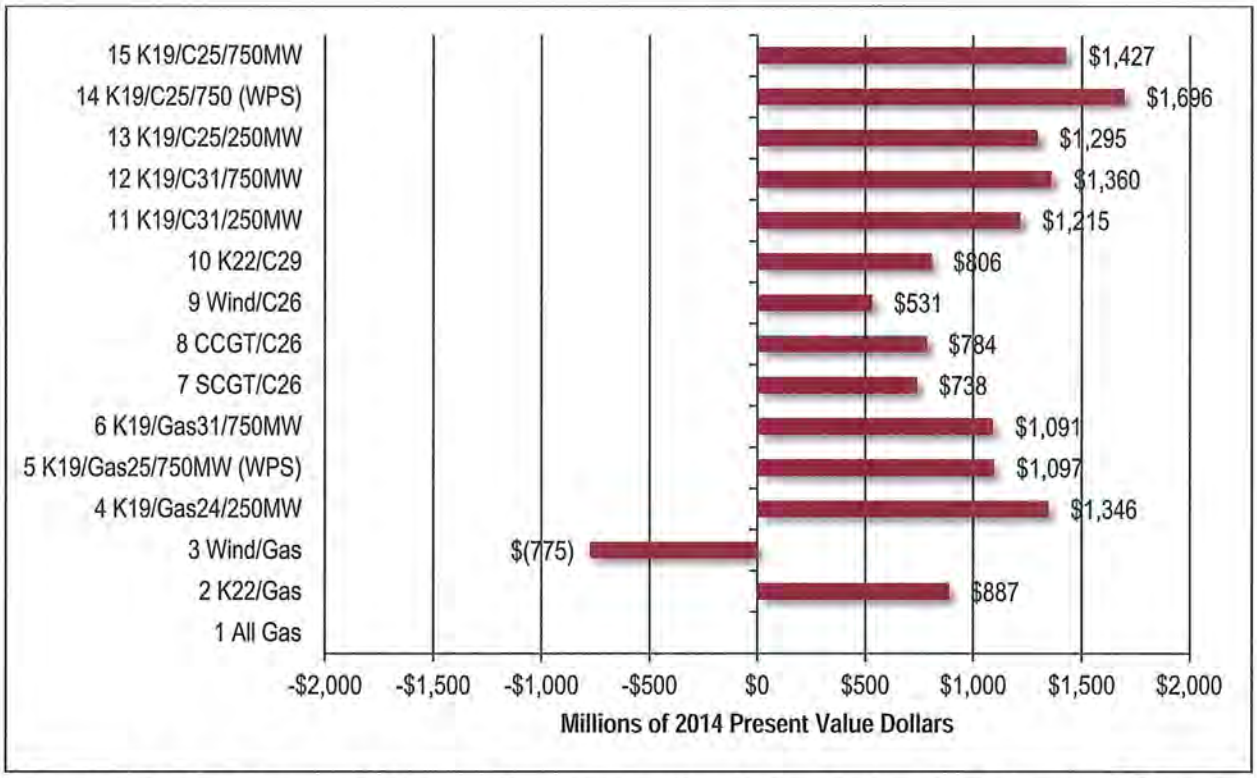

Figure 9-4: Development Plans – Benefits to Manitoba Hydro (Relative to All Gas) – Millions of 2014 Present Value Dollars.

The Internal Rate of Return Metric for Comparing Resource Plans

In addition to present value metrics that we have been discussing, some decision makers find it helpful to understand the benefits of making higher investments in generation and transmission resources in terms of a percent return. In the past, MH had generated IRR metrics for proposed hydroelectric generation projects. MH did not file IRRs in the NFAT application. LCA developed the IRRs for the 14 resource plans by using the annual cash flows incremental to the All Gas Plan. The annual cash flows are the annual values that resulted from MH modeling results. The IRRs were developed by determining what rate of return, if used as a discount rate, would make each individual plan have a 78 year NPV difference versus All Gas equal to zero. If a plan has a positive incremental NPV compared to All Gas than the IRR will be greater than the 5.05% real discount rate used by MH in the economic analysis.

Resource Plan Comparative Results using the Additional Metrics

Below, we have rendered a summary table (Figure 9-21) that synthesizes highlights from the CPV figures and the IRR analysis. This table repeats the values provided earlier in the break-even table. The column of 78 Year NPV represents the results published by MH in the NFAT Submission and discussed earlier. The 20, 35, and 50 year CPV columns are the values shown on the bar charts discussed earlier in this section.

We see that the while over 78 years the IRR values are indeed greater than the discount rate of 5.05%, the highest IRR realized after 78 years utilizing all of MH results is 7.1% attributed to Plan 4 K19/Gas/250 MW. Plan 14, the Preferred Development Plan K19/C25/750 MW, has an IRR of 6.15%. We can also observe from the table that since all 20 year CPV metrics are negative, that the lowest-cost plan through the next 20 years is the All Gas Plan. As observed earlier from the bar charts, only two plans are lower cost than the All Gas Plan on a cash flow basis over the next 35 years, Plan 4 and Plan 5. Each of these plans has the Keeyask GS followed by natural gas generation and a transmission interconnection expansion. Over the next 50 Years, most alternative plans are lower cost than the All Gas Plan, with the lowest cost plan over the next 50 years being Plan 4.

Plan	78 Year PV of Total Capital	Incremental to All Gas					
		78 NPV	50 CPV	35 CPV	20 CPV	78 Year IRR	Break Even Year
2-K22/Gas	$2,172	$887	$477	($191)	($1,394)	6.63%	2051
3-Wind/Gas	$2,508	($775)	($845)	($908)	($814)	N/A	N/A
4-K19/Gas24/250MW	$2,632	$1,346	$917	$254	($1,076)	7.10%	2043
5-K19/Gas25/750MW (WPS)	$2,733	$1,097	$694	$161	($1,302)	6.69%	2044
6-K19/Gas31/750MW	$2,784	$1,091	$657	($21)	($1,323)	6.62%	2048
7-SCGT/C26	$2,821	$738	$178	($686)	($2,508)	5.99%	2059
8-CCGT/C26	$3,080	$784	$174	($716)	($2,633)	5.99%	2059
9-Wind/C26	$3,738	$531	($62)	($1,031)	($2,777)	5.67%	2064
10-K22/C29	$4,904	$806	($112)	($1,501)	($4,247)	5.71%	2064
1-1-K19/C31/250MW	$5,171	$1,215	$264	($1,087)	($4,041)	6.04%	2059
12-K19/C31/750MW	$5,415	$1,360	$365	($1,119)	($4,182)	6.62%	2058
13-K19/C25/250MW	$5,905	$1,295	$374	($1,019)	($3,899)	5.94%	2058
14-K19/C25/750 (WPS)	$6,179	$1,696	$714	($766)	($3,887)	6.15%	2054
15-K19/C25/750MW	$6,320	$1,427	$445	($1,032)	($4,117)	5.96%	2057

Figure 9-21: Summary- CPVs as Compared to All Gas Plan at the End of Various Periods, Break-Even Year, and 78 Year IRR - Millions of 2014 Present Value Dollars

The NPVs listed above can be seen in Figures 9-18, 9-19, 9-20, and 9-4 earlier. They are calculated relative to the All Gas Plan base case using the modeling results provided by MH for MH's reference scenario.

When a 78 year study period is chosen, the magnitude of the NPV can appear very large. This NPV at the end of 78 years as shown in Figure 9-21 presents Plan 14, the Preferred Development Plan as having $1.696 billion lower costs than the All Gas Plan, the base case. This NPV is only $350 million dollars lower cost than Plan 4, which is shown to have the lowest cost at the end of 35 years and 50 years. Thus, this means that the benefits of the Preferred Development Plan as compared to Plan 4 have all accumulated after year 2062, or after 50 years. It is also important to understand these differences relative to the differences in capital investment made in these development plans.

Also, Figure 9-21 above shows that the net gain on NPV after 78 years is a small percentage of the incremental investment costs of the plans. For example, according to

MH results, Plan 14, the Preferred Development Plan has the largest NPV after 78 years of $1.696 billion. In order to implement Plan 14 the incremental investment on a present value basis is over $6 billion. A simple average of the NPV over the 78 years would be approximately $30 million annually net after paying for the investment. This is not a large number considering the amount of required investment.

LCA is filing electronic worksheets which have incorporated the MH modeling results and can be used to calculate NPV, Break-even Year and IRR metrics.

Consideration of Sunk Costs

MH's economic analysis focuses on the "*incremental costs and benefits associated with one plan relative to another*," which neglects costs and benefits common to all plans and all sunk costs, costs prior to June 2014.[24] In Part B of this Technical Appendix LCA will be providing information to help understand the effects of the sunk costs to date in the Keeyask and Conawapa projects and the implications of continued expenditures that may turn into future sunk costs of otherwise uneconomic projects.

D. Synopsis

There are several important aspects that should be summarized for convenience resulting from LCA's review of the MH Economic Analysis contained in this section of the report.

1. The MH Economic Analysis relies solely on the results at the end of a 78 year study period, 2013-2090.
2. The cash flow analysis used by MH for the 78 year study period has detailed modeling, including SPLASH, of generation operations and economics through the first 35 years only. The remaining 43 years of the economic analysis use extrapolation of costs and benefits at inflation, held constant on a real dollar basis, in order to estimate longer-term resource plan economics. The extrapolation process maintains the amount of export hydro power from Keeyask and Conawapa in 2045-2047 for the next 43 years.

[24] NFAT Submission, Chapter 9, p. 2.

3. Even in the first 35 years of detailed modeling, the cost and revenue results of the variations in water flow years is lost in the averaging, not allowing for the value of risk management to enter the economic analysis of the alternative development plans.
4. It takes at least 30 years, until 2043, before any development plan studied is lower-cost than the All Gas Plan, with the Preferred Development Plan requiring 41 years to break even versus the All Gas Plan
5. When interim period economic analysis results are used to develop metrics for 20, 35, and 50 year study periods, the Preferred Development Plan does not appear to be the lowest-cost resource plan alternative.
6. The IRR of the development plans compared to All Gas Plan are only slightly higher than the discount rate. The Plan with the highest 78 year IRR is Plan 4 and not the Preferred Development Plan
7. A closer look at the relative magnitude of the NPV after 78 years reveals that the differentials are small relative to the incremental investments required.

III. Economic Uncertainty Analysis

A. Introduction

As discussed in ***Section II-B***, MH performed a detailed Economic Analysis, which it presented in Chapter 9 of its filing and was reviewed by LCA. The key metric to this analysis was the NPV for each development plan using assumptions associated with the reference scenario. As a supplement to that analysis, MH produced a study of certain key uncertainties by performing both a probabilistic analysis and some sensitivity analyses. As MH stated in Section 10.0 of the NFAT Submission, *"(f)or decision making, including resource planning decisions, potential outcomes can directly and indirectly affect the impact of the alternatives considered and the choices made."*[25] This section discusses MH's probabilistic analysis and some alternative analytic methodologies that build off of it. The focus of this section is decision support: providing the best analytic metrics in order to *"recognize uncertainty and identify the way forward that has the best balance of value and risk given that uncertainty."*[26]

LCA agrees with MH that the primary objective of uncertainty analysis should be decision support. MH has done a reasonable job of identifying a basic methodology and set of uncertainty parameters to study. However, there are changes required that enhance this analysis's value to decision makers. One is a correction to the way MH provides comparisons with the uncertainty results, while the other provides additions to MH's base methodology that are useful for decision makers. Certain assumption ranges should be modified and certain additional development plans should be considered when identifying potential strategies for mitigating risk. This section covers the MH methodology, our evaluation of that methodology, and some recommended modifications and additions to that methodology for the purpose of more fully supporting a decision regarding integrated resource planning for MH.

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[25] NFAT Submission, Chapter 10, p. 1.

[26] *Id.*

B. Manitoba Hydro Methodology

The probabilistic analysis uses all the same modeling and analytical processes described in Section II. The probability analysis models the development plans under differing scenario assumptions. MH's probabilistic analysis of each plan under each scenario utilizes the Economic Model and the SPLASH model in exactly the same manner described throughout Section II of this report. MH's probabilistic analysis also relies solely on the NPV metric after the 78 year study period. The probabilistic analysis methodology that MH chose is described in more detail within Section 10.1 of the NFAT Submission. MH's goal of this analysis was to consider "*the range of uncertainty defined by reference, high and low values on key factors.*"

The first step in the process was to determine the key variables for treatment using uncertainty analysis. As MH states, "*probabilistic analysis will grow exponentially with each added factor*".[27] In order to limit analytical complexity while still providing meaningful risk analysis, MH chose to focus on three variables, each of which was viewed as a "*proxy*" for multiple underlying variables. These variables "*represent 1) the electricity market 2) investment costs and 3) the economy and, when combined, result in 27 individual scenarios for each development plan analyzed.*"[28]

With the three categories of uncertainty identified, MH next determined which variables would present the highest risk and therefore be most important to model. MH looked at ten individual variables. The impact of each variable was measured by comparing the two development plans with the most significant difference in characteristics – the All Gas development plan and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)).[29] A tornado diagram was then created to visually indicate the ranking of all variables from the largest impact (widest range on the diagram) to the smallest.[30] From this the variables were grouped into three sets: Energy Prices, Capital Costs, and Economic Indicators.[31] Each of these sets then received a high, reference, and low value as well as an assigned probability to create 27

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[27] *Id.*, p. 2.

[28] *Id.*

[29] *Id.*, pp. 2-3.

[30] *Id.*, Figure 10.1, p. 4.

[31] *Id.*, p. 4.

discrete scenarios with individual probabilities for use in the actual risk analysis. This analysis was then applied to evaluate the 12 development plans identified in Table 10.1.[32]

MH analytically derived several uncertainty variables that could be linked together to all the uncertainty analysis work with a more manageable amount of scenarios. Essentially MH created three uncertainty groupings.

MH's first uncertainty group, Energy Prices, actually includes Export Market prices, Natural Gas prices, and Carbon Emissions prices. MH moves these variables in the same direction within one set of reference, low and high probabilities.

The second uncertainty grouping, Discount Rate, includes Nominal Interest Rates, Inflation and Exchange Rate. Since the Economic Modeling is conducted in real (constant) dollars, the Nominal Interest rates and Inflation produce the real discount rate used in the economic modeling for present value purposes.

The third uncertainty grouping, Capital Cost, includes several parameters that may or may not be correlated. "*There are six variables included in the category Capital Costs:*

- *Hydro- Electric Generation Current Dollar Capital Costs*
- *Natural Gas-Fired Generation Current Dollar Capital Costs*
- *Wind Generation Current Dollar Capital Costs*
- *Transmission Line and Station Current Dollar Capital Costs*
- *Hydro- Electric Generation Capital Cost Escalation*
- *Natural Gas-Fired Generation Capital Cost Escalation*"[33]

Several other areas of the uncertainty analysis need to be introduced for a full understanding of the analytical framework used by MH. The first of these is the actual values used to represent the high, reference and low conditions for the three key variable sets discussed above. The other key input is the probabilities themselves. The probabilities are reported in Figure 10.6, reproduced below in Figure 9-22:

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[32] *Id.*, Table 10.1, p. 10.

[33] NFAT Submission, Appendix 9.3, p. 57.



Figure 9-22: Probabilities for MH's Highest Impact Uncertainty Groups

MH obtains the probabilities used in this analysis from a process that captures the perceptions of those probabilities by MH personnel and experts that provide some of the inputs to this process (e.g., the experts retained to provide MISO market price projections). It is important to understand when working with these probability distributions that the input into the mathematical process are the probabilities estimated by experts and MH personnel, not data derived from forecasts or statistical analysis.

When the three uncertainty groupings, each with three stated sets of assumptions, or branches, are combined these produce 27 scenarios that were then modeled for each of the 12 Plans for which MH elected to perform uncertainty analysis.

MH next conducted an economic analysis of each case (i.e. each plan/scenario combination). This process, described in Section 10.1.3, involved multiple SPLASH runs (to reflect those variables that could impact dispatch) as well as economic modeling, both of which were also extrapolated beyond years with SPLASH data as described in Section II. Each case was analyzed to derive the relative NPV[34] of that combination. This led to 324 separate cases with NPV calculations, which were presented in a "quilt" in Table 10.4, replicated here in Figure 9-23:

[34] As will be discussed further below, MH used one methodology for calculating Relative NPV, but there are other methods that can be considered and which may provide a more useful decision support function.

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.

Development Plan			1	3	7	2	4	13	11	6	15	12	5	14
			All Gas	Wind/Gas	SOGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
			Millions of 2014 NPV dollars										WPS Sale & Investment	
Energy Prices	Discount Rates	Capital Costs												
Low	Low	H	-4043	-7769	-3309	-3792	-3190	-3459	-3506	-3418	-3643	-3554	-3855	-3841
		Ref	-3049	-5403	-2401	-2532	-1877	-2124	-2166	-2130	-2177	-2138	-1616	-1410
		L	-2247	-3666	-1655	-1590	-890	-1069	-1099	-1175	-1030	-1022	-703	-292
	Ref	H	-463	-3056	-1297	-1212	-911	-2510	-2161	-1191	-2816	-2323	-730	-2155
		Ref	208	-1478	-582	-278	95	-1368	-1050	-185	-1559	-1153	257	-929
		L	750	-323	6	408	837	-473	-176	548	-585	-243	974	20
	High	H	1204	-796	-284	25	117	-2029	-1413	-182	-2383	-1622	203	-1810
		Ref	1708	384	323	785	963	-994	-434	679	-1243	-592	1060	-698
		L	2114	1245	822	1336	1580	-189	327	1297	-364	201	1674	157
Ref	Low	H	-5014	-7167	-1760	-2511	-1796	206	-334	-2041	498	0	-2103	853
		Ref	-4030	-4802	-852	-1251	-482	1541	1006	-753	1963	1415	-865	2284
		L	-3217	-3064	-107	-309	504	2597	2073	202	3110	2531	49	3402
	Ref	H	-671	-2354	23	-46	341	152	104	85	170	190	109	470
		Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696
		L	542	380	1326	1573	2089	2189	2089	1824	2401	2270	1813	2645
	High	H	1308	-82	879	1091	1258	109	391	998	2	366	1041	268
		Ref	1812	1098	1487	1851	2104	1144	1370	1859	1143	1396	1898	1380
		L	2218	1959	1986	2402	2721	1949	2132	2478	2022	2189	2512	2235
High	Low	H	-6415	-6719	-355	-1499	-692	3819	2796	-1006	4455	3410	-1694	4372
		Ref	-5441	-4353	552	-239	621	5154	4135	282	5921	4826	-456	5803
		L	-4638	-2616	1298	703	1607	6210	5203	1237	7068	5941	458	6922
	Ref	H	-1158	-1767	1241	941	1398	2746	2308	1127	2993	2571	713	2940
		Ref	-487	-189	1956	1874	2403	3888	3430	2134	4250	3741	1701	4166
		L	55	966	2543	2560	3146	4783	4293	2867	5225	4652	2417	5115
	High	H	1210	533	1956	2017	2246	2170	2127	1993	2236	2228	1691	2203
		Ref	1713	1712	2563	2777	3092	3206	3106	2854	3377	3259	2549	3315
		L	2120	2573	3063	3328	3709	4010	3867	3473	4256	4051	3163	4170

Colour Legend: <-3000 … 0 … >3000

Figure 9-23: MH Probabilistic Analysis Quilt[35]

[35] NFAT Submission, Chapter 10, Table 10.4, p. 14.

The Probabilistic Analysis Quilt (PAQ) provides a lot of information, much of it clearly designed to provide strong decision support. In the development of the PAQ shown in Table 10.4, MH individually calculated the NPV of the net costs of each plan under each of the 27 scenarios of the uncertainty branches. As with most analyses of resource planning, a base case is chosen. MH, consistent with the economic analysis under the reference scenario discussed in Section II of this report, chose to use Plan 1, All Gas, as the base case. In the quilt above, the Reference-Reference-Reference All Gas case cell is 0, indicating that all values in the quilt are relative to that value. **LCA does not believe this is the appropriate comparison to make in utilizing the array of results of these 12 plans across 27 scenarios for future conditions. We will discuss this further later in this Section.**

As discussed by MH, one of the chief benefits of the quilt is that decision makers can scan the various development plans, identifying which have more relative downside risk (have more red color) and which have more relative upside opportunity (more green color).

Additionally, each development plan is plotted individually as an S-Curve, which illustrates the uncertainty of that specific plan as measured against the chosen base case. An example of this was presented as Figure 10.9 in the filing and is reproduced below as Figure 9-24:

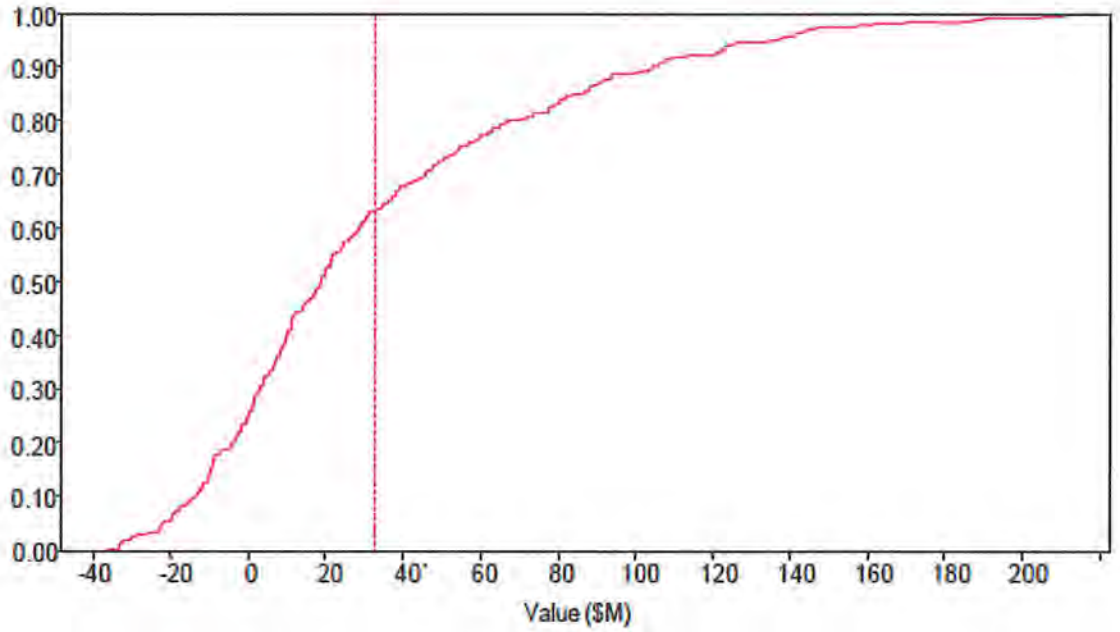

Figure 9-24: Sample S-Curve from MH Filing

An S Curve as MH has used it in their methodology shows, in a snap shot, a significant volume of information related to the risk profile of a given solution. The curve represents a comparison of a series of outcomes (the 27 scenario outcomes for a given plan) against a point from a selected base case. This means that the further to the right on the x-axis, the more beneficial a development plan's value is relative to the base case (All Gas with Reference Scenario inputs for all variables). The zero-point on the x-axis represents the point at which both the studied development plan and the base case have an equal NPV value. The further to the right along the x-axis, the more the development plan NPV exceeded the base case.

In the example above, as MH states, "*The risk profile clearly shows the range of possible outcomes, from a loss of more than $30 million to a gain of more than $200 million. It also shows that there is roughly a 25% chance that the value is less than 0; that is, that the base case is lower cost. There is roughly a 90% chance that the value is less than $100 million, meaning that there is a 10% chance that the value is more than $100 million; indicating that the investment has a 10% probability of being highly successful. Consequently, it can be determined that there is a*

65% (90% less 25%) chance that the value lies between $0 million and $100 million, a modest success."[36]

In addition to the quilt and S Curve tools used, MH also presents some scatter plots and "box and whisker" graphs. While these tools also illustrate finer points regarding the risk profiles of the various plans, the key tools are the quilt and S Curve graphs as they provide the majority of the decision support utility needed to identify the key risk characteristics.

One example of how MH utilized the S Curves is Figure 10.14 (Figure 9-25) from the filing, which compared the two plans that both included the 750 MW tie expansion between MH and the US and the 300 MW WPS sale.

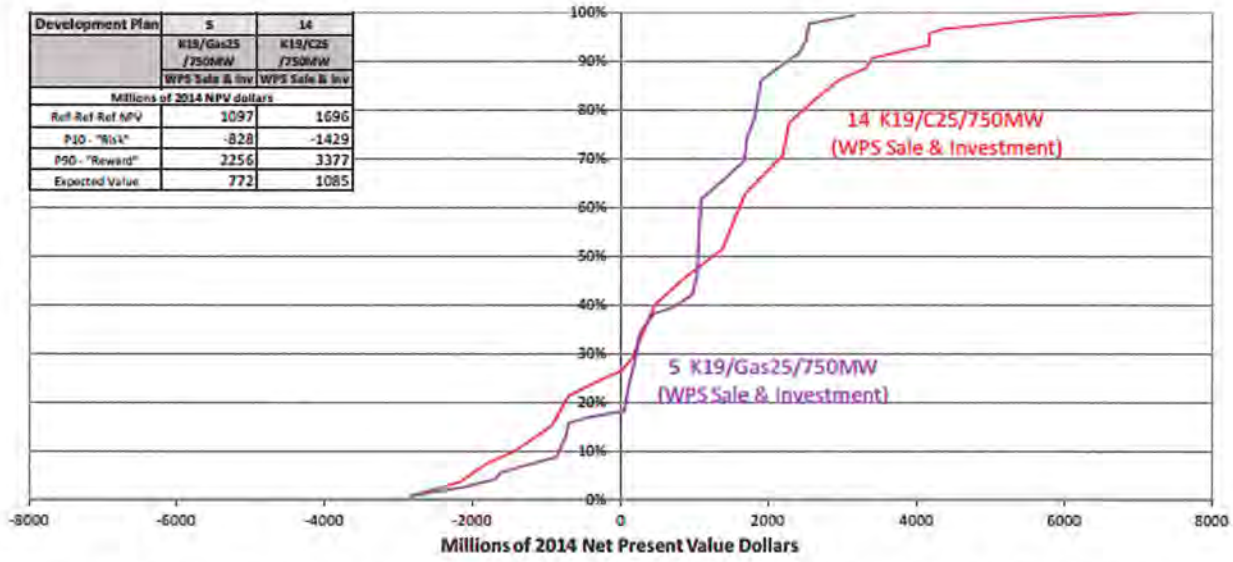

Figure 9-25: MH Sample Comparison S-Curve Figure 10.4 from NFAT Submission

MH, in reviewing this result, focused on two aspects: the similarity of the curves below the 50 percentile and the higher NPV results of the Preferred Plan above 50%. *"Below the 50th percentile, the risk profile is similar for the two plans but is driven by different factors. The downside risk of Plan 5 is due to a greater proportion of operating costs being related to*

[36] *Id.*, pp. 20-21.

thermal generation, particularly under low discount rate scenarios. As the Preferred Development Plan, which has Conawapa in 2025/26, has a large volume of surplus power, it is more sensitive to lower energy prices particularly when combined with higher discount rates and higher capital costs. Above the 50th percentile, the Preferred Development Plan lies to the right of Plan 5, reflecting significantly greater value primarily due to the availability of surplus power from the Conawapa GS at reference or higher energy prices."[37]

There are two aspects of the MH methodology and variable choices and the implications of those choices that are also important to note about the MH methodology.

1. MH's Base Comparison Case

The first step in reviewing MH's methodology is to review their choice of base case for comparison of NPVs. As discussed above, the quilt and S Curves use "Relative NPV" to compare the development plans. The calculation of relative NPV is simply [NPV of Plan (27 points)] – [NPV of Base Case (Ref/Ref/Ref point)]. This calculation is then used for all development plans (including the All Gas Plan which also serves as the Base Plan). Because this calculation is used for all cells in the quilt (all points along all S Curves) it is possible to compare the S Curves (or parts of the quilt) and derive information useful for decision makers. However, as will be discussed later, the choice of a single future as the reference point for all comparisons introduces a dynamic that may make it less useful than it could be.

MH's choice of Plan 1, All Gas, as the base case is appropriate given that among the plans investigated by MH in the analysis filed in the application, it represents the least capital-intensive strategy. This allows the decision makers to see the benefits of making additional investments.

2. MH's 78 Year Study Life – NPV Metric

As was discussed in Section II, the entire MH reference scenario economic analysis was done on the basis of a single metric, the 78 year NPV. This is true of all NPVs used in the uncertainty analysis, as well. The choice of 78 years was meant to reflect the fact that hydro assets typically have extremely long lives. However, decision makers

[37] *Id.*, p. 26.

frequently have to consider impacts that span shorter time frames than full resource life in order to completely understand the ramifications of potential options. Additionally, the various modeling tools used by MH do not all have the same time horizon, leading to a lengthy extrapolation period used to estimate economics over the last 43 years of the 78 year study period. ***Section II-C*** discusses several additional NPV calculations based on differing time horizons, including the various time horizons suggested by MH modeling tools that may be useful to decision makers.

C. La Capra Associates Critique of the MH Methodology

LCA has a number of comments and concerns specifically with MH's use of the probabilistic economic analysis. In ***Section II-C*** we discussed LCA's concerns regarding the MH reference scenario economic analysis and modeling. Since MH's probabilistic uncertainty analysis relies upon MH's economic analysis methodology and modeling, all those concerns directly apply to the uncertainty analysis. The following concerns and comments are in addition to those described in ***Section II-C***.

- The comparison of all cases (plan & scenario) to a single case (Plan 1 All Gas reference scenario assumptions)
- The sole focus on a study period of 78 years even within an 'uncertainty' analysis
- The probability assessments rely on judgments that may be dated

Each of these concerns is discussed in more detail below.

1. Development Plan Comparisons to a Single Base Case

LCA finds that the methodology by which MH develops the incremental NPV of a development plan's 27 scenarios is easily misinterpreted. MH subtracts the NPV of each case from the All Gas Plan NPV in order to determine the comparative risk of each plan. This manner of taking differences needs to be expressed in words to understand the potential for confusion.

In the MH PAQ, in the last column the 9th row down is the scenario of Low Energy Prices, Low Discount Rates and Lows Capital Costs. The value of the cell is -$2,155 or

approximately $2.2 billion of an NPV penalty. This -$2,155 value in words is that the Preferred Development Plan under the future scenario of Low/Low/Low outcomes is $2.155 billion higher in costs than the All Gas Plan under the Reference/Reference/Reference scenario. This does not tell us whether MH would be better off under Low/Low/Low scenario conditions with the All Gas Plan or the Preferred Development Plan.

LCA, when utilizing similar analysis techniques of probabilities and S-curve representations, compares case results of each plan to the base case (All Gas) under the same scenario. The NPV differences that result can be interpreted in this manner, a negative number means the All Gas Plan under that scenario has lower costs than the specific plan being examined under the same set of assumptions of the uncertain variables. When the comparative NPV metric is positive, the alternative plan is lower-cost on this NPV basis at the end of 78 years.

By comparing a given plan's result to a base case, the quilt and S Curves are providing a view of "the risk of regret." In other words, would the decision maker look back and regret the choice made if events prove to be different than the reference case assumptions and the investment does not provide the value expected? However, when doing this type of analysis, it is important to ensure that the comparisons being made are, in fact, useful to the decision maker in question. We believe that MH's methodology of comparing all 27 scenarios of a development plan's potential outcomes to a single (reference) point in the base case does not indicate the most important element, which plan is economic for a given scenario.

2. Utilization of Metrics determined at the end of the Study Period of 78 Years

The second area of critique of the MH methodology is that the uncertainty analysis does not consider shorter time periods than 78 years. If there is one thing to learn from considerations of uncertainty it is that forecast uncertainty increases over time, given the increasing number of variables that may make forecasts inaccurate. To perform an elaborate, time-consuming, and informative 78 year uncertainty analysis and not show NPVs using different time periods misses the opportunity to inform decision makers as to how development plans differ under uncertainty over time. As discussed in the reference scenario analysis in Section II, LCA's experience is that most decision makers do not look at economic analysis for study periods that are this long. The concern about

the validity of assumptions, the uncertainties in technology development and the inter-generational equity concerns are just a few reasons why shorter study period metrics are significant factors affecting utility resource plan selections.

3. Probability Assignments may be dated

The assessment of probabilities that MH used to develop its probabilities for the uncertainty scenarios begins with opinions of experts at a given point in time as the key inputs. This makes the probabilities as a very important input that can be changed to reflect updated information or differences of opinions. LCA is concerned that the perspective of the experts captured in the probabilistic analysis has likely changed in the two years since the analysis was conducted. One can adjust the probabilities to reflect the current wisdom of the range of potential assumptions, whether they be from the original experts providing inputs or some other party.

We should also note that these probabilities are the opinions of those experts at that time. Decision makers or other experts may have a different perspective on those probability assignments. For example, Potomac Economics has reviewed the probability assignments provided by MH market price consultants and offers its own view of those probabilities.

D. La Capra Associates Changes to MH Methodology

LCA made changes to the MH S Curve and Quilt analysis to make the comparison of development plans using an NPV difference that indicates which development plan has lower cost for a given scenario. LCA then compares S Curve probability distributions to learn the probability one development plan is better than the All Gas Plan. This allows expected value metrics to be calculated, which have meaningful indications of comparative economics of development plans. In this analysis, all of MH assumptions, NPV results, and probability assignments are used. The only change is the method of comparing alternative development plans with the same scenario inputs. In Section IV we will discuss analysis where LCA in sensitivity analyses does alter assumptions and probabilities.

Comparison of Resource Plan Economics over Multiple Scenarios

If, after making a decision to implement one of the development plans, the future yields a non-reference draw (such as High Energy Prices, Reference Discount Rate, Reference Capital Costs) then MH and the other decision makers will only be able to review their decision to implement that development plan under that actual future draw (High/Ref/Ref). What this means for decision support is that each point on the quilt of any development plan is more informative when compared to the same scenario outcome on the quilt of the base development plan. In terms of how the calculation should work, instead of:

[NPV of Plan (each of the 27 points)] – [NPV of Base Case (Ref/Ref/Ref point)]

as MH calculated, the formula should be:

[NPV of Plan (27 each of the points)] – [NPV of Base Case (each of the 27 points)]

We will be referring to the latter calculation as the LCA Methodology for convenience in the rest of this document. In our experience, this LCA Methodology is the common way comparisons are conducted this S-Curve Uncertainty Analysis.

While this means that the S Curve analysis cannot provide any meaningful view of the risk of the base case (in this case the All Gas development plan) there are other tools that can be used for such analysis.

The key concept is that all 27 future scenarios of the results must be utilized because MH has no control over the future with respect to these outcomes.

The 78 Year PAQ using LCA Methodology is shown in Figure 9-26.

Energy Prices	Discount Rates	Capital Costs	K19/C25/750M W (NPS Sale &Inv)	K19/C25/750M W	K19/Gas25/75 O&M (NPS Sale & INV)	K19/C31/750M W	K19/Gas31/75 O&M	K19/C25/250M W	K19/Gas24/25 O&M	K19/C31/250M W	All Gas	Wind/Gas	K22/Gas	K22/C29	SCG2/C26	CCG2/C16	Wind/C26
Low (30%)	Low (15%)	High (30%)	1202	401	1188	489	625	584	853	537	0	-3726	251	-22	734	514	-500
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	1955	1217	1544	1224	1072	1178	1356	1148	0	-1419	657	474	592	620	206
	Ref (50%)	High (30%)	-1692	-2353	-267	-1861	-729	-2047	-448	-1699	0	-2593	-749	-2076	-834	-1068	-1780
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-730	-1335	224	-993	-202	-1223	87	-926	0	-1072	-342	-1428	-744	-779	-1085
	High (35%)	High (30%)	-3014	-3587	-1001	-3826	-1386	-3233	-1087	-2617	0	-2000	-1179	-2863	-1488	-1721	-2274
		Ref (50%)	-2406	-2950	-648	-3239	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1958	-2478	-440	-1914	-817	-2303	-534	-1787	0	-869	-778	-2165	-1292	-1352	-1598
Ref (55%)	Low (15%)	High (30%)	5866	5511	2910	5013	2973	5220	3218	4680	0	-2154	2502	4174	3253	3310	2653
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	6620	6327	3266	5749	3420	5814	3721	5291	0	153	2908	4669	3111	3417	3359
	Ref (50%)	High (30%)	1141	841	780	861	756	823	1012	775	0	-1683	625	434	694	628	140
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2103	1860	1272	1729	1282	1648	1547	1547	0	-162	1031	1083	784	917	834
	High (35%)	High (30%)	-1040	-1306	-268	-942	-310	-1139	-50	-917	0	-1390	-218	-1140	-429	-544	-938
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	16	-196	294	-30	259	-269	503	-87	0	-260	184	-441	-233	-175	-262
High (15%)	Low (15%)	High (30%)	10807	10890	4740	9844	5428	10254	5742	9230	0	-284	4936	8790	6079	6412	6167
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	11560	11706	5096	10580	5875	10849	6246	9841	0	2023	5342	9285	5937	6518	6873
	Ref (50%)	High (30%)	4098	4151	1871	3729	2285	3904	2556	3466	0	-609	2099	3172	2398	2494	2261
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5060	5170	2362	4597	2812	4728	3091	4238	0	912	2505	3820	2489	2783	2956
	High (35%)	High (30%)	994	1027	482	1019	783	961	1036	917	0	-677	807	725	747	742	529
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2050	2136	1043	1931	1353	1891	1589	1747	0	453	1208	1424	943	1111	1205

Figure 9-26: Probabilistic Analysis Quilt 78 Year with LCA Methodology for Determining Comparisons to All Gas Plan

LCA believes that a useful metric that results from a probabilistic analysis is the expected value. In Section II we developed considerable discussion of the results of economic comparisons between development plans at reference scenario assumptions, as had MH in the NFAT Submission in Chapter 9. Figure 9-27 compares the Expected Value 78 year NPV which shows whether a development plan has lower costs (+) than the All Gas Plan.

There is a significant difference in the expected value results which probabilistically weight all the scenario outcomes in the Quilt and the reference scenario results. The reference scenario benefit that each of the alternative developments has when compared to the All Gas Plan is much lower based on the expected value. This indicates that the MH reference scenario assumptions are not a reasonable proxy for the value obtained with all of its scenarios considered.

The effect of the shift to the expected value metric is not uniform or proportional among the development plans. For example:

1. Plan 14 remains the plan with the highest benefit; however its advantage over the second highest plan is reduced.
2. The Plans including both Keeyask and Conawapa see the largest reduction in benefits
3. Plan 4 (K19/Gas24/250) becomes the second highest NPV plan (formerly Plan 15)
4. The difference between Plan 14 and Plan 4 was $350 million under reference case assumptions and is $144 million based on expected value.

Summary Table - NPV after 78 years as compared to All Gas			
Plan	Description	Reference Scenario	Expected Value
Plan 1	All Gas	-	-
Plan 2	K22/Gas	$887	$634
Plan 3	Wind/Gas	($775)	($1,014)
Plan 4	K19/Gas24/250MW	$1,346	$1,041
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842
Plan 6	K19/Gas31/750MW	$1,091	$776
Plan 7	SCGT/C26	$738	$525
Plan 8	CCGT/C26	$784	$529
Plan 9	Wind/C26	$531	$217
Plan 10	K22/C29	$806	$418
Plan 11	K19/C31/250MW	$1,215	$806
Plan 12	K19/C31/750MW	$1,360	$891
Plan 13	K19/C25/250MW	$1,295	$782
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155
Plan 15	K19/C25/750MW	$1,427	$830

Figure 9-27: Summary Table of Expected Economic Value – Millions of 2014 Present Value Dollars

Figure 9-28 compares the S Curve of the Preferred Development Plan as calculated by MH with the same S Curve calculated by LCA. Note in the LCA Methodology the implied profile of the All Gas Plan is vertically zero for all scenario outcomes. The MH methodology would produce a risk profile for the All Gas Plan itself. The S-Curves are derived by plotting the entire range from the worst outcomes to the best outcomes.

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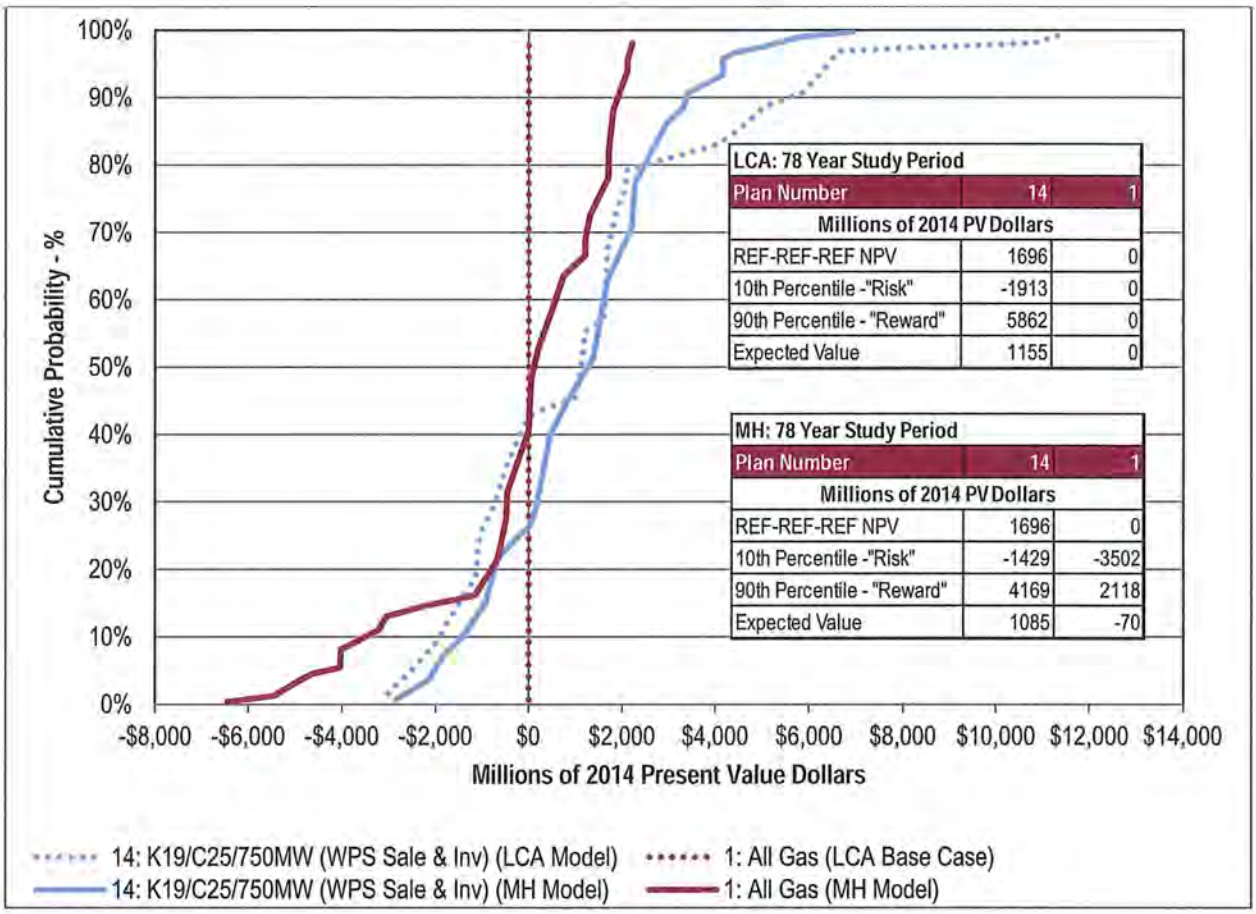


Figure 9-28: Plan 14 Preferred Development Plan S Curves, comparing MH & LCA Methodologies, NPV after 78 year

For the MH curve, the results show that there is a roughly 25% chance that the results of the Preferred Development Plan will be worse than the reference results of the Base Plan. For comparison, the LCA Methodology-derived S-Curve shows that there is a roughly 42% chance that in the future the Preferred Development Plan will end up with higher costs than the Base Plan.

The tail end of the upside of the curve is larger for the LCA curve which demonstrates that in this particular comparison, there is at least one future where the Preferred Development Plan provides a greater 78 year NPV cost savings as compared with the All Gas Plan than one could see in the MH Methodology S-Curves. While this

represents an extreme case and is unlikely to strongly determine any decision making, it is still a more accurate depiction of the range of uncertainty between these two plans.

Additional Economic Analysis Study Periods – CPV Metrics

While we recognize the value in viewing the potential impact of these development plans over a long time horizon given the long life of hydro assets, we believe that viewing the results through other, shorter life spans can provide additional and valuable information to decision makers. For the purpose of this analysis, we chose to calculate the NPVs for three additional time periods as follows. The detailed explanation as to why LCA proposes utilization of three additional time periods: 20 Years, 35 Years, 50 Years, is provided in ***Section II-C*** in the subsection titled Alternative Economic Metrics Comparing Alternative Plans.

By reviewing the results of these various time periods, decision makers can understand where the relative benefits and costs of various development plans reside. This can be especially useful in reviewing risk, since the risk profile of different development plans can vary greatly over time.

Figure 9-29 presents four S Curves for the Preferred Development Plan as compared to the All Gas Plan using the four time periods discussed above. All CPV/NPV calculations were made using the LCA Methodology, so this graph represents a "look back" based on four different vantage points.

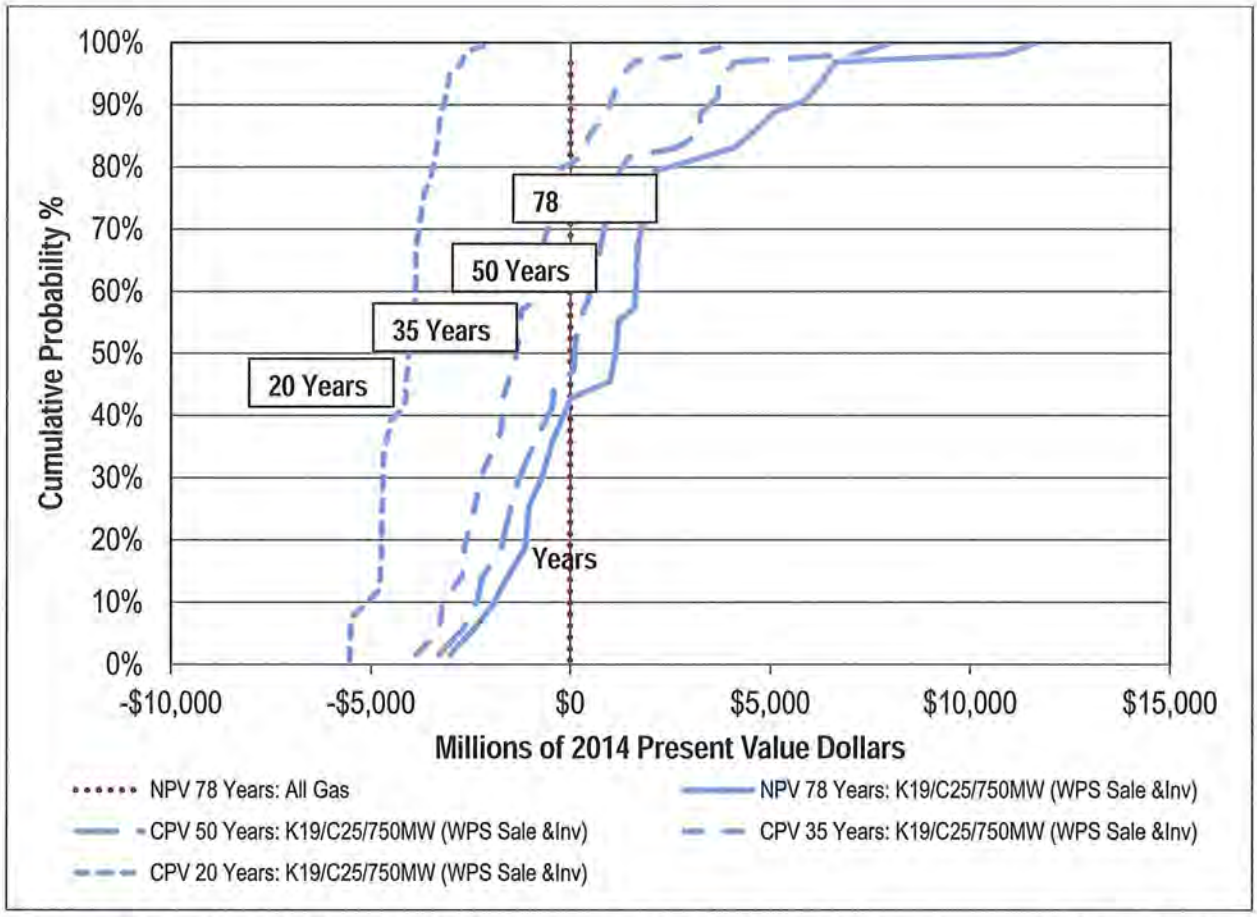


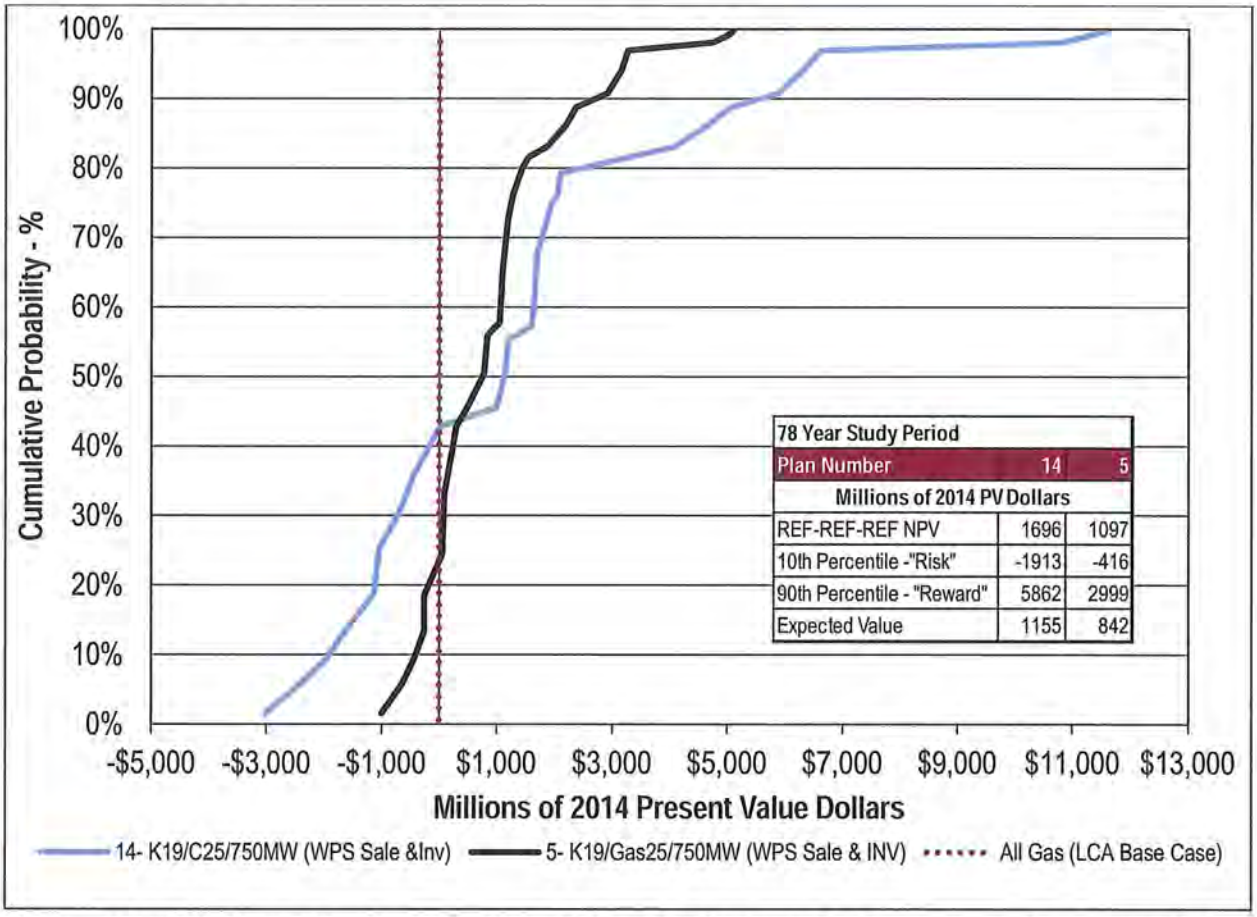
Figure 9-29: Probability Distributions of the Preferred Development Plan having Higher Costs than the All Gas Plan – Millions of 2014 Present Value Dollars

These graphs provide additional information. Over a 20 year horizon, within the scenarios used in the NFAT study, the Preferred Development Plan does not produce a higher economic value (CPV) than the All Gas Plan. While this may not be surprising given the investment needed up front to support the development of large hydro, it is instructive to see as a starting point. A more interesting comparison might be that at the 35 year mark, which is the end of the actual detailed economic modeling, the Preferred Development Plan is still only producing a CPV which is positive (thus lower costs than the All Gas Plan) roughly 20% of the time. The majority of the benefits that MH attributes to the Preferred Development Plan come from years 36 and on. These are also the years with the greatest uncertainty and the greatest risk that MH has not

captured the full range of potential outcomes in its risk analysis. Essentially, longer study periods carry an additional risk, which can be viewed as the chance that the uncertainty analysis may not capture a sufficiently wide range of potential outcomes. That risk exists in all modeling efforts, but becomes more material the further into the future the model extends.

Another way to use different time horizons in uncertainty analysis is to compare development plans over different time horizons. For the purposes of this illustration we chose two similar plans: The Preferred Development Plan and Plan 5, which is identical to the Preferred Development Plan except that it adds natural gas fired plants instead of Conawapa. This is the comparison that we illustrated with the inclusion of Figure 10.14 from the MH report in ***Section III-B*** above.

The first comparison is that when leaving the time horizon at 78 years but comparing all points along the S Curve as discussed above (the LCA Methodology) the shape of the curves change from the MH curves. This is illustrated in the figure below.



78 Year Study Period		
Plan Number	14	5
Millions of 2014 PV Dollars		
REF-REF-REF NPV	1696	1097
10th Percentile -"Risk"	-1913	-416
90th Percentile - "Reward"	5862	2999
Expected Value	1155	842

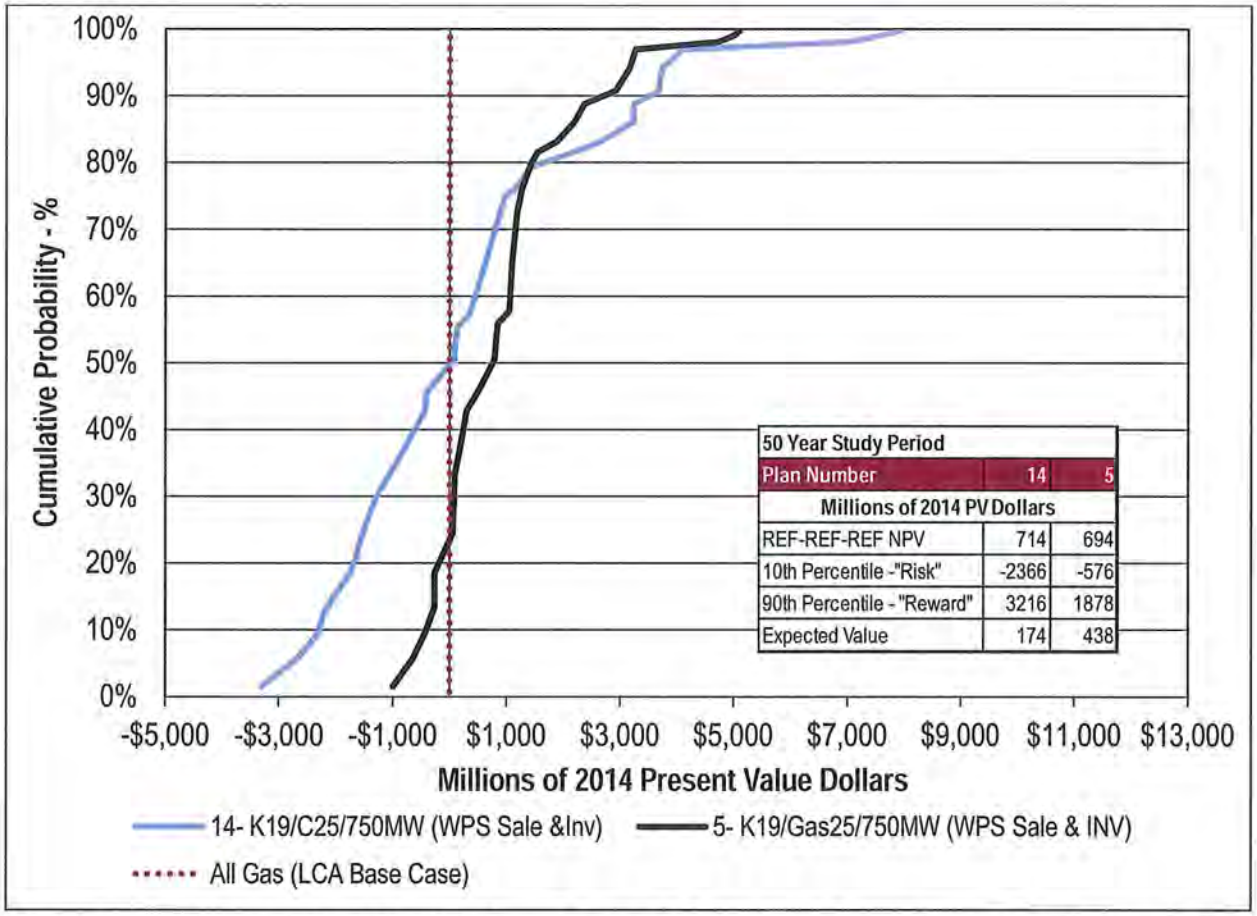
Figure 9-30: Probability Distribution of Plan 14 Preferred Development Plan and Plan 5 K19/Gas25/750MW/ WPS & Inv having higher costs than the All Gas Plan after 78 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

While the potential for additional value in the top half of the curve remains as MH described it, the downside risk of all hydro is better illustrated in this graph. However, this is only one lens through which to view this comparison. As discussed above, these projects can be looked at for other time horizons in order to understand the magnitude of shorter term risks.

This figure also contains a table providing NPV comparison metrics on four different bases; NPV that results from the Reference Scenario evaluations, the expected value of the NPV that results from combining the results of all 27 scenarios, the 10% Percentile

value showing the lower NPV value that has a 10% chance of being that number or less, and similarly the 90% value of the NPV.

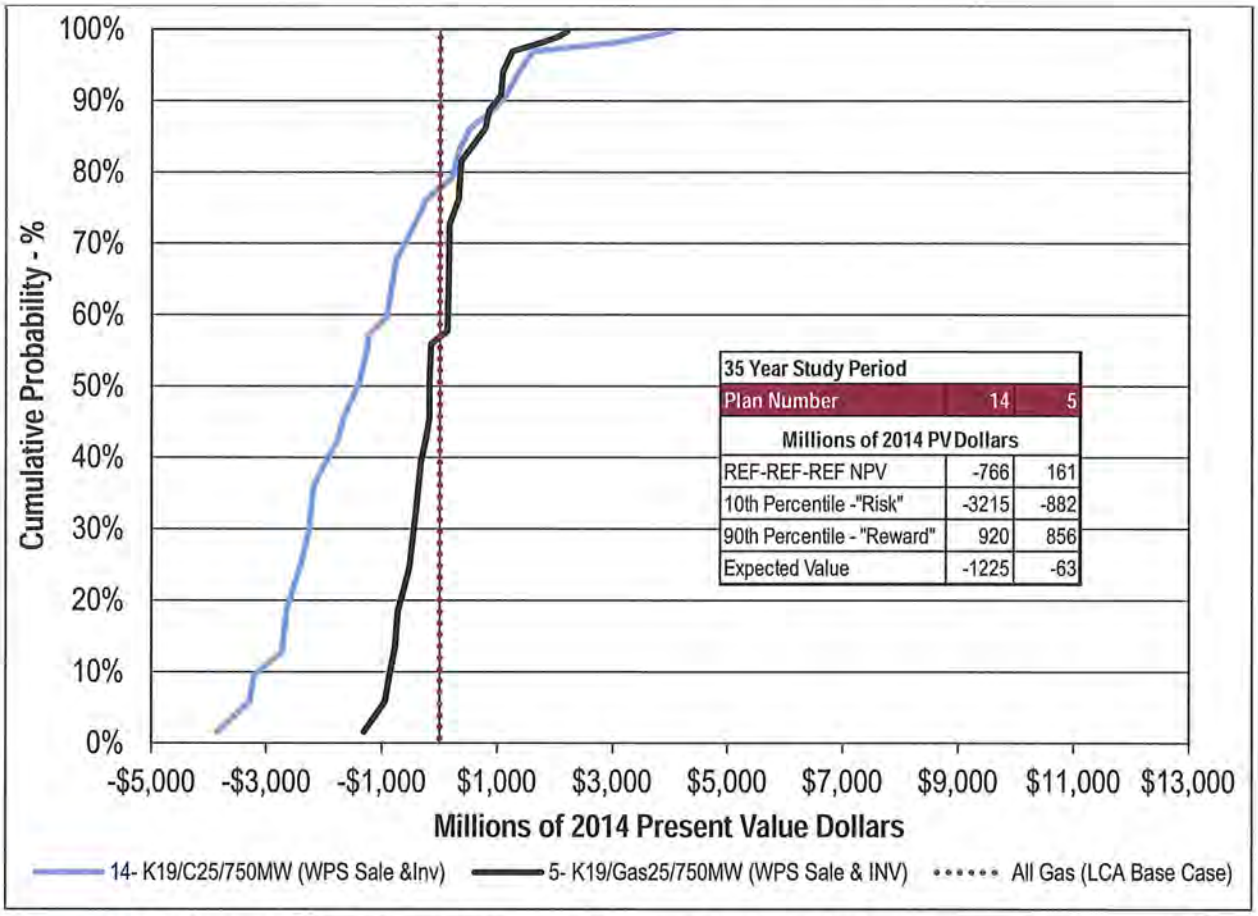
Figure 9-31 below provides the same comparison over the 50 year time horizon that MH used for its financial analysis. The most obvious difference is that the upside value that MH identified in its filing has, for the most part, yet to materialize. Most of the potential value that comes from the Conawapa investment in certain futures is not realized until more than 50 years from now, even if the futures and the results of those futures are exactly as MH predicts.



50 Year Study Period		
Plan Number	14	5
Millions of 2014 PV Dollars		
REF-REF-REF NPV	714	694
10th Percentile -"Risk"	-2366	-576
90th Percentile - "Reward"	3216	1878
Expected Value	174	438

Figure 9-31: Probability Distribution of Plan 14 Preferred Development Plan and Plan 5 K19/Gas25/750MW/ WPS & Inv having higher costs than the All Gas Plan after 50 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

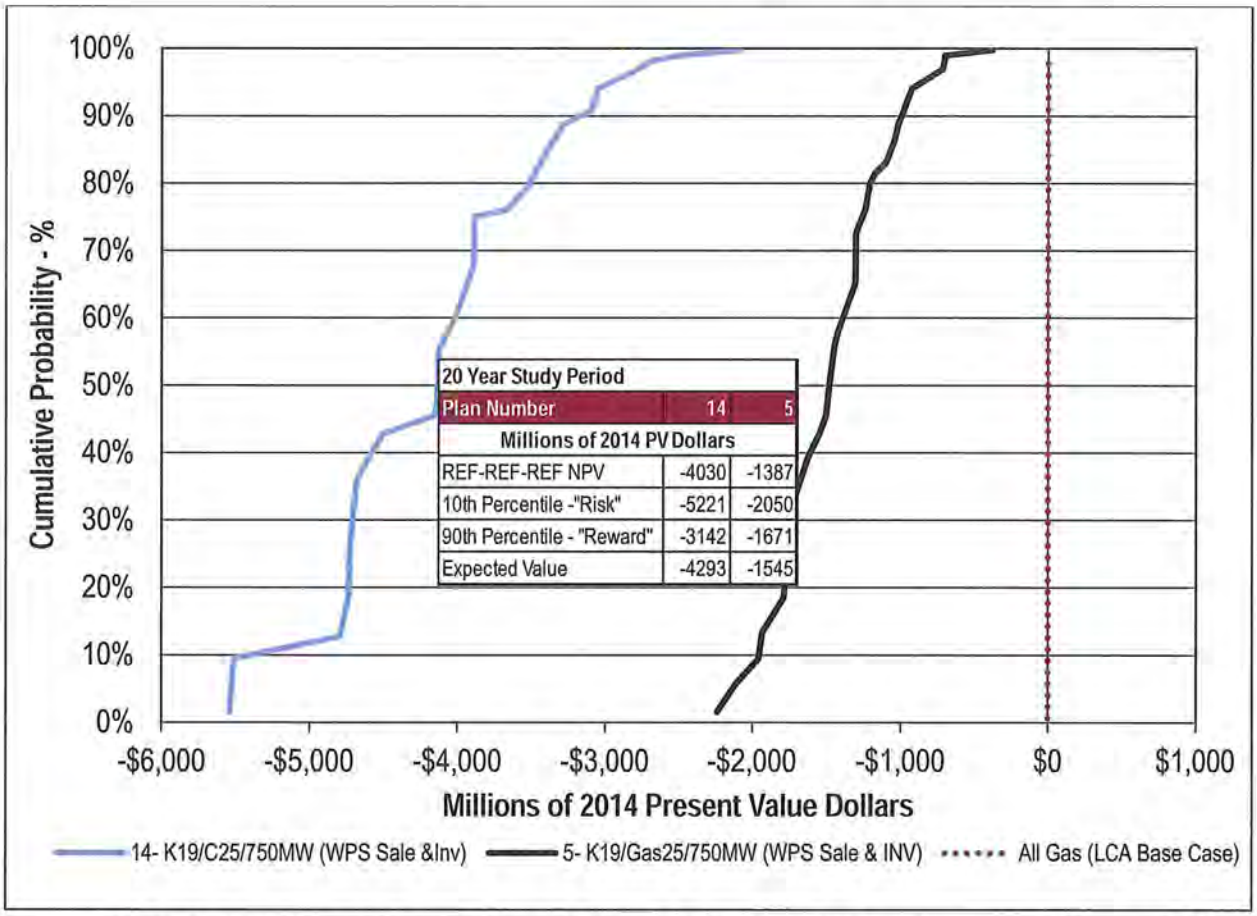
Another time horizon discussed above is the 35 years of detailed economic modeling. This is the time horizon over which actual economic analysis modeling occurred, and once again the comparison between these plans shifts when viewed in this light. Figure 9-32 below illustrates this. Over this time horizon, Plan 5 is almost always producing a higher relative NPV compared to Plan 14. So the modeled years tell a different story than the end effect years. While this doesn't mean that only a 35 year viewpoint is appropriate, it suggests that viewing these two plans solely through the lens of a 78 year NPV may not provide as much useful information for decision makers as viewing the plans from multiple perspectives. Solely relying upon the 78 year metrics will not provide insights into when there are higher costs between plans, and when there are lower costs between plans. This 35 year S-Curve shows that at the end of 35 years there is a 75% probability that the Preferred Development Plan is measurably more costly than the Base Case All Gas Plan on a CPV basis. In contrast at the end of the 35 year study period Plan 5 has only a 40% probability of measurably higher costs than All Gas and a 20% probability of measurably lower costs than All Gas. We can also observe that the magnitude of the regret in the Preferred Development Plan at the end of 35 years of the study is often four times the amount of Plan 5.



35 Year Study Period		
Plan Number	14	5
Millions of 2014 PV Dollars		
REF-REF-REF NPV	-766	161
10th Percentile -"Risk"	-3215	-882
90th Percentile - "Reward"	920	856
Expected Value	-1225	-63

Figure 9-32: Probability Distribution of Plan 14 Preferred Development Plan and Plan 5 K19/Gas25/750MW/ WPS & Inv having higher costs than the All Gas Plan after 35 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

Finally, LCA modeled the S Curves for two plans from the perspective of a 20 year time horizon. Figure 9-33 below shows that over the first 20 years Plan 5 always has a higher NPV than Plan 14.



20 Year Study Period		
Plan Number	14	5
Millions of 2014 PV Dollars		
REF-REF-REF NPV	-4030	-1387
10th Percentile -"Risk"	-5221	-2050
90th Percentile - "Reward"	-3142	-1671
Expected Value	-4293	-1545

Figure 9-33: Probability Distribution of Plan 14 Preferred Development Plan and Plan 5 K19/Gas25/750MW/ WPS & Inv having higher costs than the All Gas Plan after 20 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

Each of these metrics provides some insight into the temporal aspect of the comparative value of these plans. In long-term resource planning it is important to understand the useful life of various projects and to model appropriate time horizons to reflect that life. But it is also important to understand the relative impacts over other, shorter time horizons, especially when the proposed resources' useful lives can extend out over most of this century. Using the tool this way for all plans provides significantly more understanding of some of the potential tradeoffs and risks of all development plans.

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Comparison of Multiple Resource Plan Economics across All Scenarios

Figures 9-34, Figure 9-35, and Figure 9-36 each show a comparison of four plans using the 78 year, 50 year, and 35 year NPV metrics, respectively. Plan 14, the Preferred Development Plan includes the Keeyask GS and the Conawapa GS, and Plans 4, 5, and 6 include the Keeyask GS and uses natural gas generation instead of the Conawapa GS. Plans 4, 5 and 6 vary in the transmission interconnect size added as part of the plan.

Observations that can be made regarding the comparisons of these plans in these figures include:

- The reference case results are not a good proxy for the expected value results. The expected value result for each of the plans in each metric is lower than the corresponding value of the plans based on the reference scenario assumptions (see the first and fourth rows in the table insets in each figure). For example, in the 78 year analysis, the Preferred Development Plan shows a probability of benefits at or above the reference scenario results of about 30%. Use of the reference case results as a metric overstates the value of each these plans relative to the All Gas plan based on MH's analysis and probability assignments.
- Using the 78 year NPV metric, the Preferred Development Plan can be seen to offer slightly higher expected value, but also significantly more exposure to extreme outcomes at both tails of the distribution.
- Using the 50 and 35 year metrics, the Preferred Development Plan has lower expected value results than Plans 4, 5, and 6.
- Using the 35 year metric, the expected value of the All Gas Plan is higher than all of the other plans.
- Using the 78 and 50 year NPV metrics, the Preferred Development Plan has approximately a 45% probability of being the worst of the plans.

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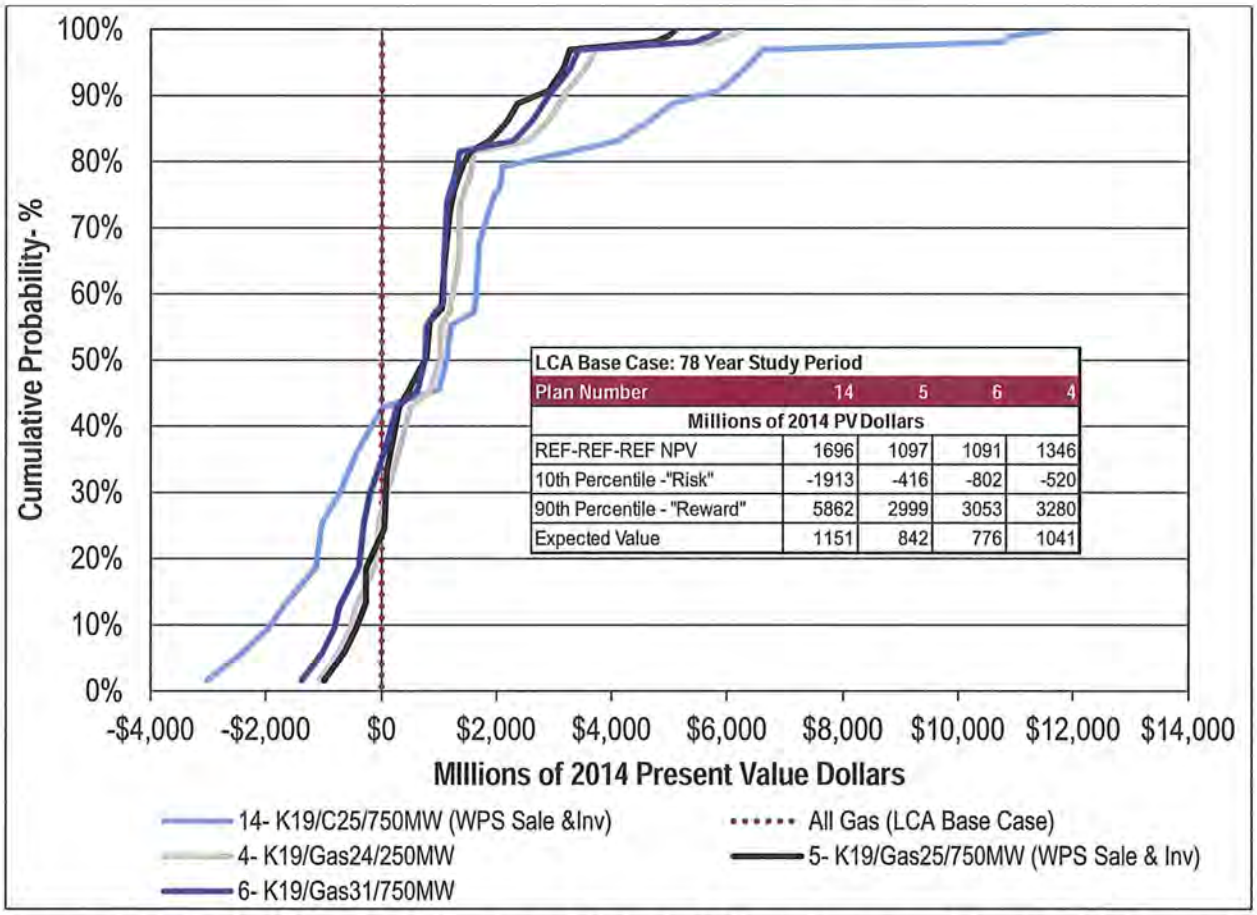

LCA Base Case: 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	1696	1097	1091	1346
10th Percentile -"Risk"	-1913	-416	-802	-520
90th Percentile - "Reward"	5862	2999	3053	3280
Expected Value	1151	842	776	1041

Figure 9-34: Probability Distribution of Selected Plans Compared having higher costs than the All Gas Plan after 78 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

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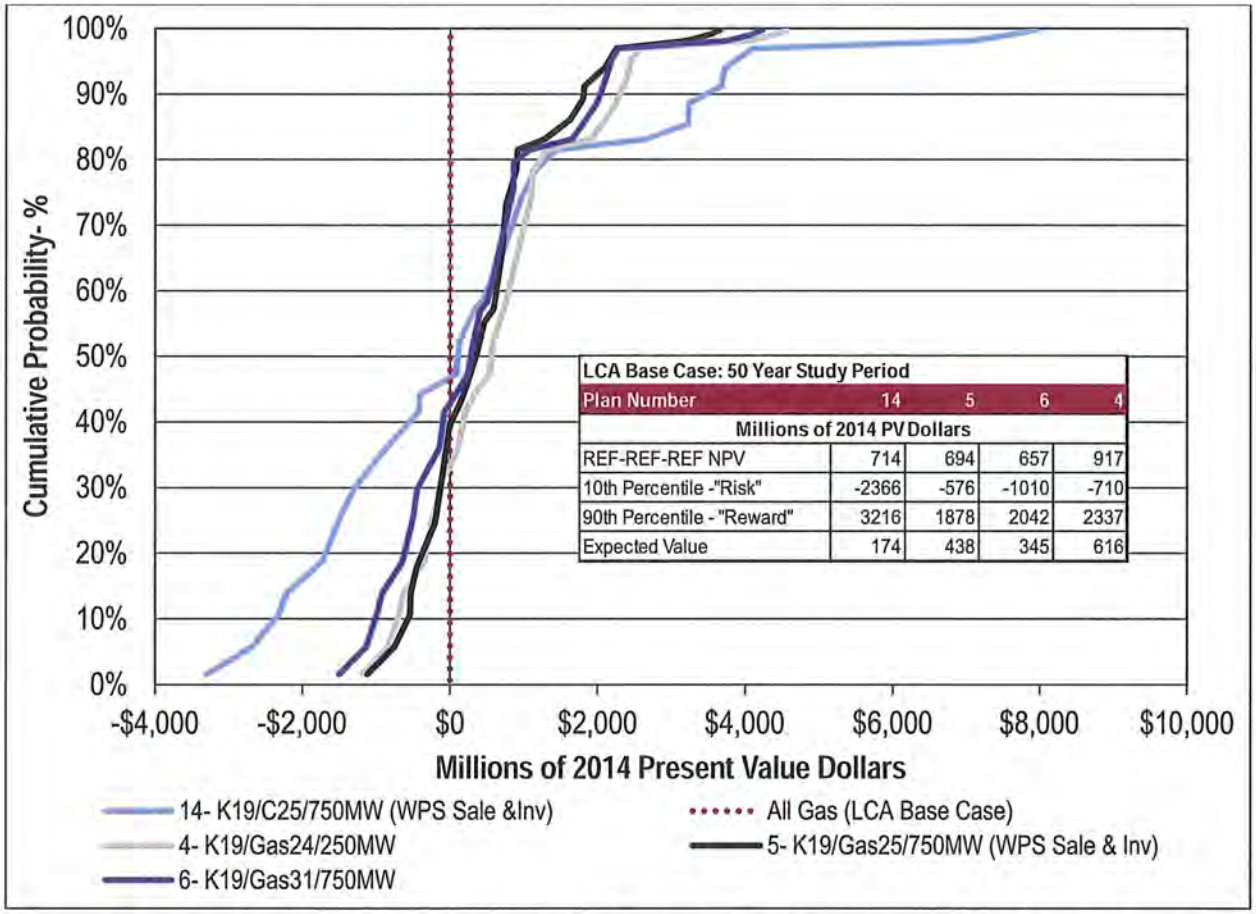

LCA Base Case: 50 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	714	694	657	917
10th Percentile -"Risk"	-2366	-576	-1010	-710
90th Percentile - "Reward"	3216	1878	2042	2337
Expected Value	174	438	345	616

Figure 9-35: Probability Distribution of Selected Plans Compared having higher costs than the All Gas Plan after 50 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

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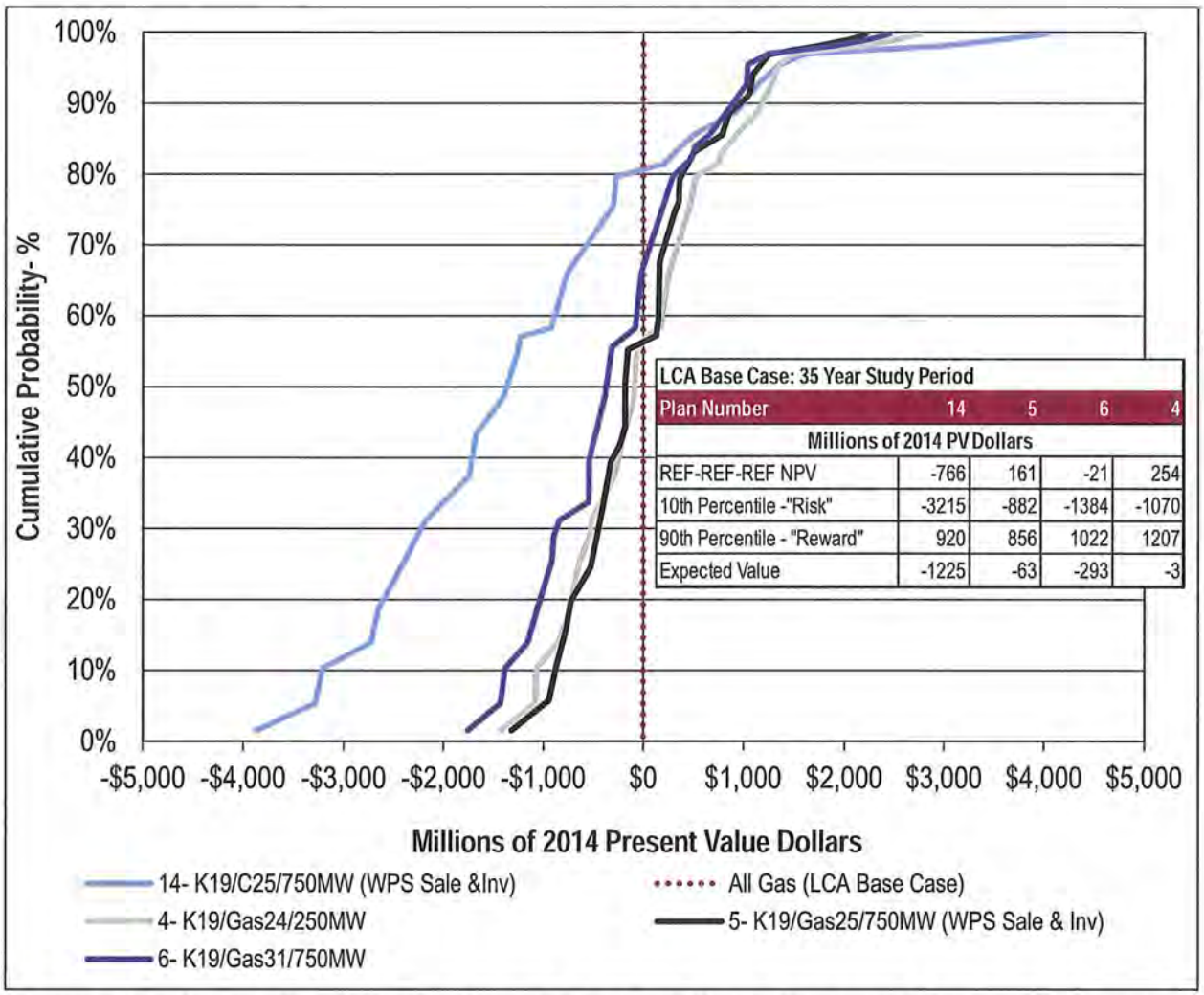

LCA Base Case: 35 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	-766	161	-21	254
10th Percentile -"Risk"	-3215	-882	-1384	-1070
90th Percentile - "Reward"	920	856	1022	1207
Expected Value	-1225	-63	-293	-3

Figure 9-36: Probability Distribution of Selected Plans Compared having higher costs than the All Gas Plan after 35 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

E. Synopsis

There are several important aspects of this uncertainty analysis resulting from LCA's review of the MH Probabilistic Uncertainty Economic Analysis:

1. The expected benefits from the PDP, relative to the alternative plans, are largely derived from upside opportunities after the first 50 years of the study period. Based on MH's economic analysis and probability assessments, the PDP recommendation requires a long-term view of benefits.
2. The LCA Methodology provides a comparative analysis across plans using consistent assumptions of uncertain parameters. Using this method with MH's economic analysis results and probability assessments, the comparative assessments of the plans are quite different than depicted in the MH S-Curve analysis.
3. When interim period economic analysis results are used to develop metrics for 20, 35, and 50 year study periods, the Preferred Development Plan does not appear to be the lowest-cost resource plan alternative even when a probabilistic scenario analysis covering 27 scenarios is included.
4. Plans with Keeyask GS but without Conawapa GS have more favorable economic uncertainty profiles than the Preferred Development Plan.

IV. Economic Analysis – Sensitivity Example

A. Introduction

This section of the report measures the impact of altering variables used as inputs to the economic analysis. Whereas LCA previously in this report utilized all modeling results generated by MH, we now investigate future scenarios not included in MH's filing by making small changes to the modeling results to calculate plan metrics.

These future scenarios include different values for high, low and reference discount rates, alternative probabilities for high, low and reference scenarios for energy prices and capital costs, and changes to capital costs used in high, low and reference scenarios for hydro, thermal, and wind generating stations. In each case, we used the LCA methodology discussed in Section III D.

The objective of these sensitivities is to provide an understanding as to how the metric values vary when changes to certain development plan or scenario assumptions are made. In economic analysis studies where the comparative metrics do not vary significantly with changing assumptions, decision makers can draw comfort that the choice they are making is robust in terms of the choice being beneficial. In economic studies where the results are very sensitive to assumptions, then the plans may be harder to distinguish in terms of economics.

B. Sensitivity to Discount Rate Assumptions

In the prior sections of this economic analysis we discussed that the metrics used for comparing the economics of the resource plans are often determined through a present value analysis. In any present value analysis an important input assumption is the discount rate that we apply to take the present value of future cash flows. In analysis of very capital intensive investments where the benefits take a long period of time to accrue, the value of the discount rate can have a large effect on the relative economics of alternatives. Higher discount rates would improve the economics of plans with lower costs in the early part of the study period. Conversely, lower discount rates would

enhance the value of the plans where the latter years of the study have lower costs than other plans.

In this sensitivity section we have two different ways of modeling the concern that the discount rates used in the MH's economic uncertainty analysis are lower than others might expect. One method of analyzing higher discount rates is to change the discount rates and recalculate the NPV metrics. The other way would be to shift some portion of the probability assigned to the low discount rate scenarios to reference and/or high scenarios. We have analyzed the results of the NPV metrics utilizing each of these methods independently in this section

Figure 9-37 below shows the reference case and expected value results using MH's discount rates as compared to the other two higher discount rate sensitivity analyses. Descriptions of the exact modeling of these discount rate sensitivities and more results in the form of S Curves are shown in Sections 1 and 2 below.

The economic results of these changes to discount rates are very dramatic. While all development plans lose some or all of their economic value (NPV) as compared to the All Gas Plan, the plans with Conawapa lose the greatest amount of their economic value. This is not that surprising when we realize that the time period metrics we looked at in Section III showed us that the benefits of Conawapa occur after year 50 of the study. Higher discount rates would affect these plans the most as a result.

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Discount Rates Sensitivity Case Summary Table - NPV after 78 years as compared to ALL Gas							
		Reference assumptions		Higher Discount Rates		Probability of Low Discount Rates = "0"	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-	-	-
Plan 2	K22/Gas	$887	$634	$568	$166	$887	$251
Plan 3	Wind/Gas	($775)	($1,014)	($738)	($909)	($775)	($970)
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$958	$464	$1,346	$582
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$728	$286	$1,097	$400
Plan 6	K19/Gas31/750MW	$1,091	$776	$706	$202	$1,091	$318
Plan 7	SCGT/C26	$738	$525	$335	($77)	$806	$26
Plan 8	CCGT/C26	$784	$529	$358	($102)	$784	$2
Plan 9	Wind/C26	$531	$217	$121	($379)	$531	($289)
Plan 10	K22/C29	$806	$418	$220	($444)	$806	($315)
Plan 11	K19/C31/250MW	$1,215	$806	$594	($115)	$1,215	$32
Plan 12	K19/C31/750MW	$1,360	$891	$694	($92)	$1,360	$65
Plan 13	K19/C25/250MW	$1,295	$782	$565	($302)	$1,295	($104)
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	$906	($21)	$1,696	$196
Plan 15	K19/C25/750MW	$1,427	$830	$649	($320)	$1,427	($112)

Figure 9-37: Discount Rates Sensitivity Table – Millions of 2014 Present Value Dollars

1. Sensitivity - Utilizing Estimates of Higher Discount Rates

This analysis utilizes low, reference and high real discount rates of 4.5%, 5.5% and 7.5% respectively. These rates are consistent with the opinion being offered by Morrison Park Associates in their review of the NFAT application. The real discount rates used in the NFAT analysis by MH are 3.35%, 5.05% and 6.50% respectively. As it turns out the reference case discount rate of 5.5% is the same value used by MH in its 2013 update of some of the reference scenario assumptions.

We selected this sampling of cases[38] to illustrate the impacts that the change in discount rates has on the comparative economics of different development plans. This will also illustrate the impact such change has at different time intervals.

With the probability distributions, one simple metric that can be used to indicate the sensitivity of the results to the change in discount rates is the expected value, the probability-weighted average of the 27 cases for each plan. The following table provides the expected value results using the Alternate and MH discount rates in the analysis.

Discount Rates Sensitivity Case Summary Table - NPV after 78 years as compared to ALL Gas					
		Reference Assumptions		Higher Discount Rates	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$958	$464
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$728	$286
Plan 6	K19/Gas31/750MW	$1,091	$776	$706	$202
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	$906	($21)

Figure 9-38: Discount Rate Sensitivity Summary Selected Plans – Millions of 2014 Present Value Dollars

These results show that the change in discount rates has a material effect on the NPV results and the ranking of the alternative development plans. Using the Alternate Discount Rates, the Preferred Development Plan (Plan 14) is not the highest ranking plan on either a reference case assumptions basis (2nd) or on an expected value basis (5th) when considering the full 78 year NPV analysis. Plan 4 (K19/Gas 24/250 MW) becomes the highest ranking plan on both reference case assumptions and on expected value. These results make clear that the ranking of alternative development plans is sensitive to the discount rate assumptions used in the analysis. It is notable that the

[38] Our workpapers include the data and templates to allow the comparison of any combinations of cases that are of interest.

Preferred Development Plan loses all of its advantage over the All Gas Plan when the Alternate Discount Rates are used (expected value basis).

In this sensitivity analysis on discount rates, we develop a new set of NPV calculations for all of the uncertainty analysis cases considered by MH. The results for all cases are presented in Figure 9-37 for the 78 year period.

With these results, we develop several S-Curve charts to illustrate how the change in discount rates affect the relative economics of selected alternative development plans, including the All Gas Plan as the reference, the Preferred Development Plan, and Plans 4, 5, and 6. The results that are featured in the S-Curve charts are as follows:

Figure 9-39: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – Alternate Discount Rates

Figure 9-40: Plan 5 (K19, gas 24, 750MW (WPS & Inv)) - 20, 35, 50, and 78 Year NPV – Alternate Discount Rates

Figure 9-41: Preferred Development Plan – 78 Year NPV – Comparison of Results with MH and Alternate Discount Rates

Figure 9-42: Preferred Development Plan compared to Plans 4, 5, and 6 – 78 Year NPV – Alternate Discount Rates

Figure 9-43: Preferred Development Plan compared to Plans 4, 5, and 6 – 50 Year NPV – Alternate Discount Rates

Figure 9-44: Preferred Development Plan compared to Plans 4, 5, and 6 – 35 Year NPV – Alternate Discount Rates

Figure 9-39 provides the Preferred Development Plan results using the Alternate Discount Rates for 20, 35, 50 and 78 year NPV metrics in an S curve format. In the 78 year study period, there is approximately a 50% chance that the Preferred Development Plan will produce a higher economic value (NPV) than the All Gas plan. The shorter time periods follow this trend of the Preferred Development Plan yielding a lower relative CPV using the changed discount rates. At the end of 50 years of the study there is about a 65% probability that the All Gas Plan will have lower costs. At the end of 35 years this probability is 90% meaning there is a one in ten chance that at the end of 35

years the decision maker will be find the Preferred Development Plan to be lower cost than the All Gas Plan.

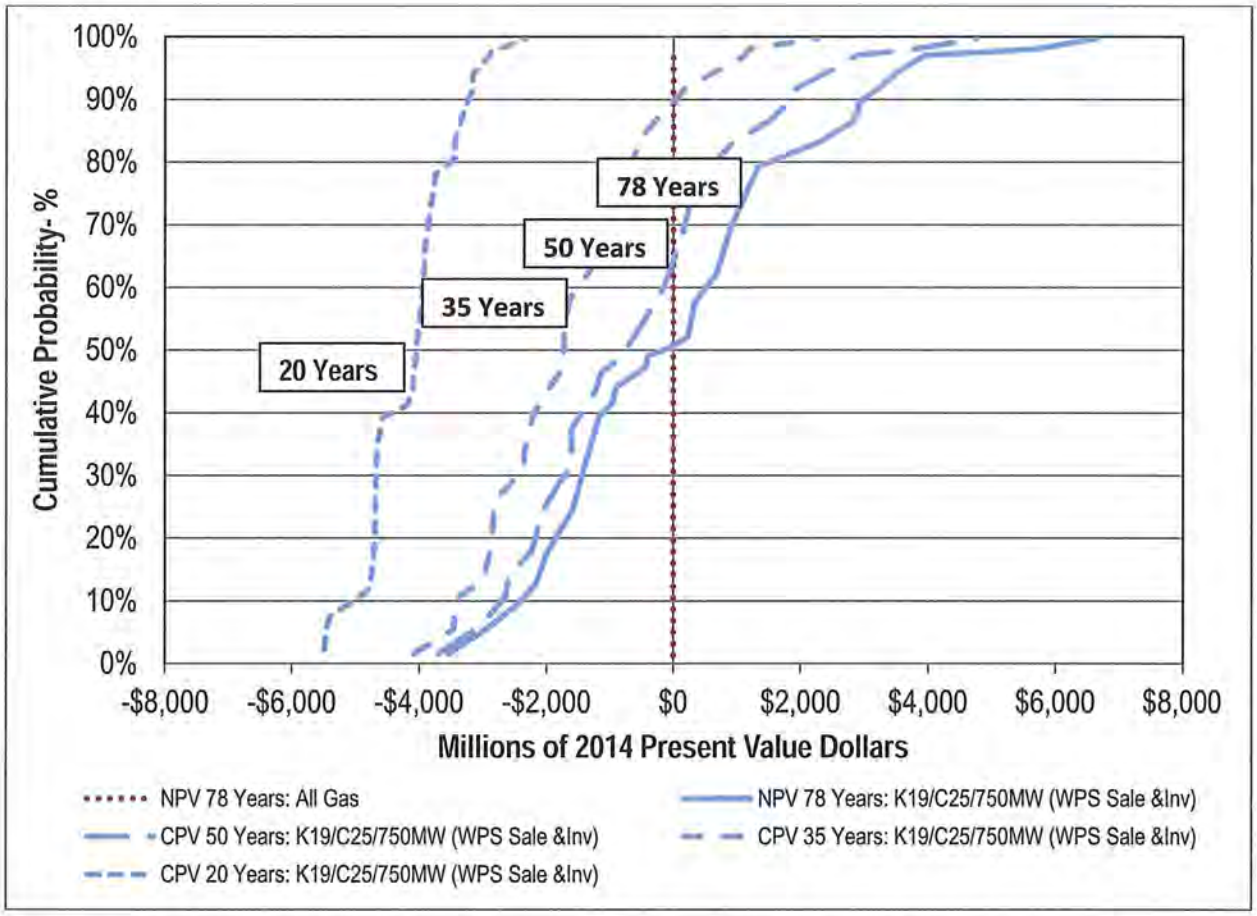


Figure 9-39: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan using LCA Sensitivity Discount Rates – Millions of 2014 Present Value Dollars

Also, it is informative to look at how this sensitivity affects Plan 5 (K19/Gas25/750 (WPS Sale & Inv)). Plan 5 is similar to the Preferred Development Plan except that it adds natural gas fired generation instead of the Conawapa GS Like the Preferred Development Plan, there is about a 50% chance the plan will produce a higher economic value (NPV) than the All Gas plan. In the case where gas replaces Conawapa and with

higher discount rates, Plan 5 is approximately 55% more likely to result in a higher 78 year NPV compared to the All Gas Plan. The 50 year time horizon yields an NPV that is still more than 50% likely to be higher than the All Gas base case.

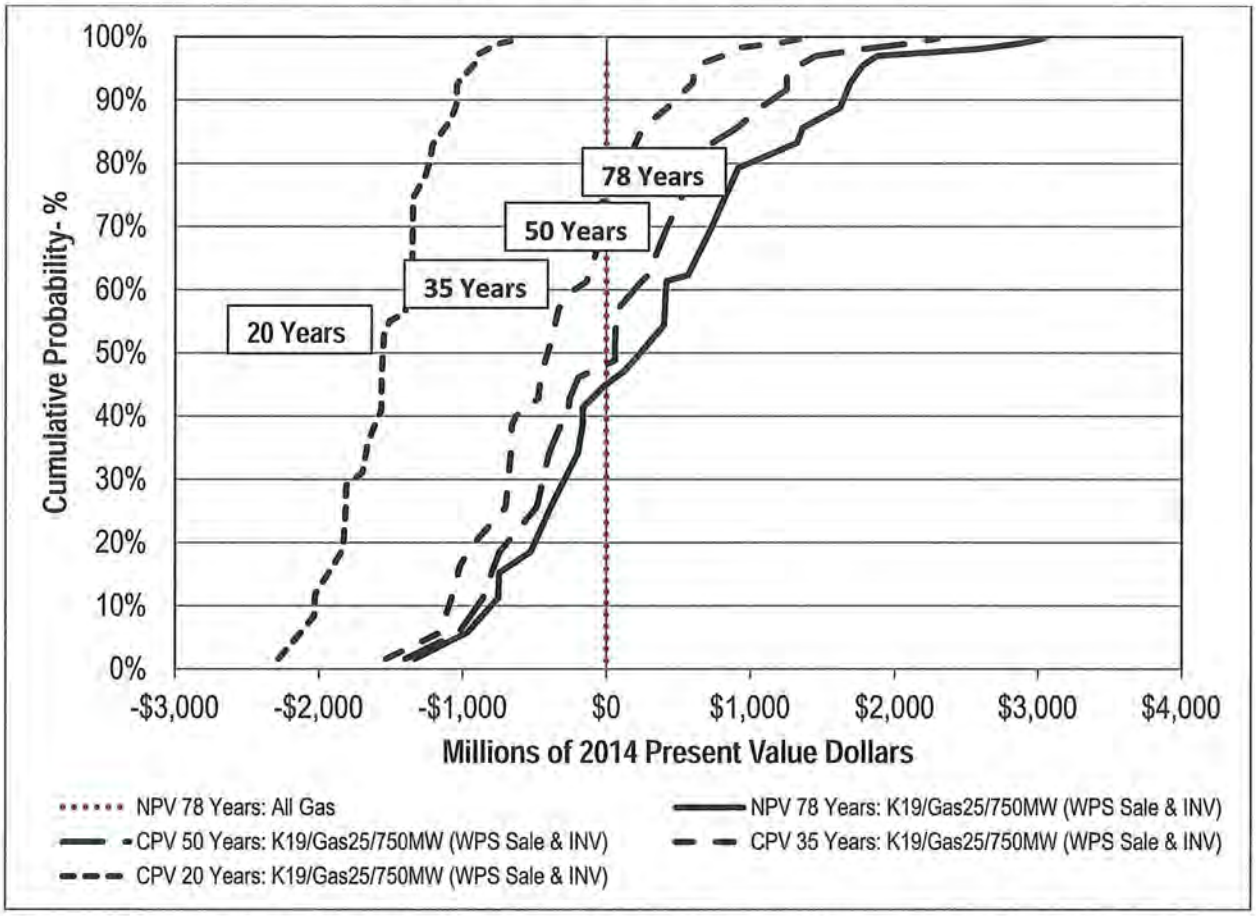


Figure 9-40: Probability Distributions of the Plan 5 K19/Gas25/750MW (WPS & Inv) having Higher Costs than the All Gas Plan using LCA Sensitivity Discount Rates – Millions of 2014 Present Value Dollars

The Figure 9-41 below illustrates the impact that the change in discount rates can have by showing how the 78-year NPV for the Preferred Development Plan changes when compared to the All Gas Plan. The probability that the All Gas Plan would have lower costs than the Preferred Development Plan increases to 50% with the Alternative Discount Rates.

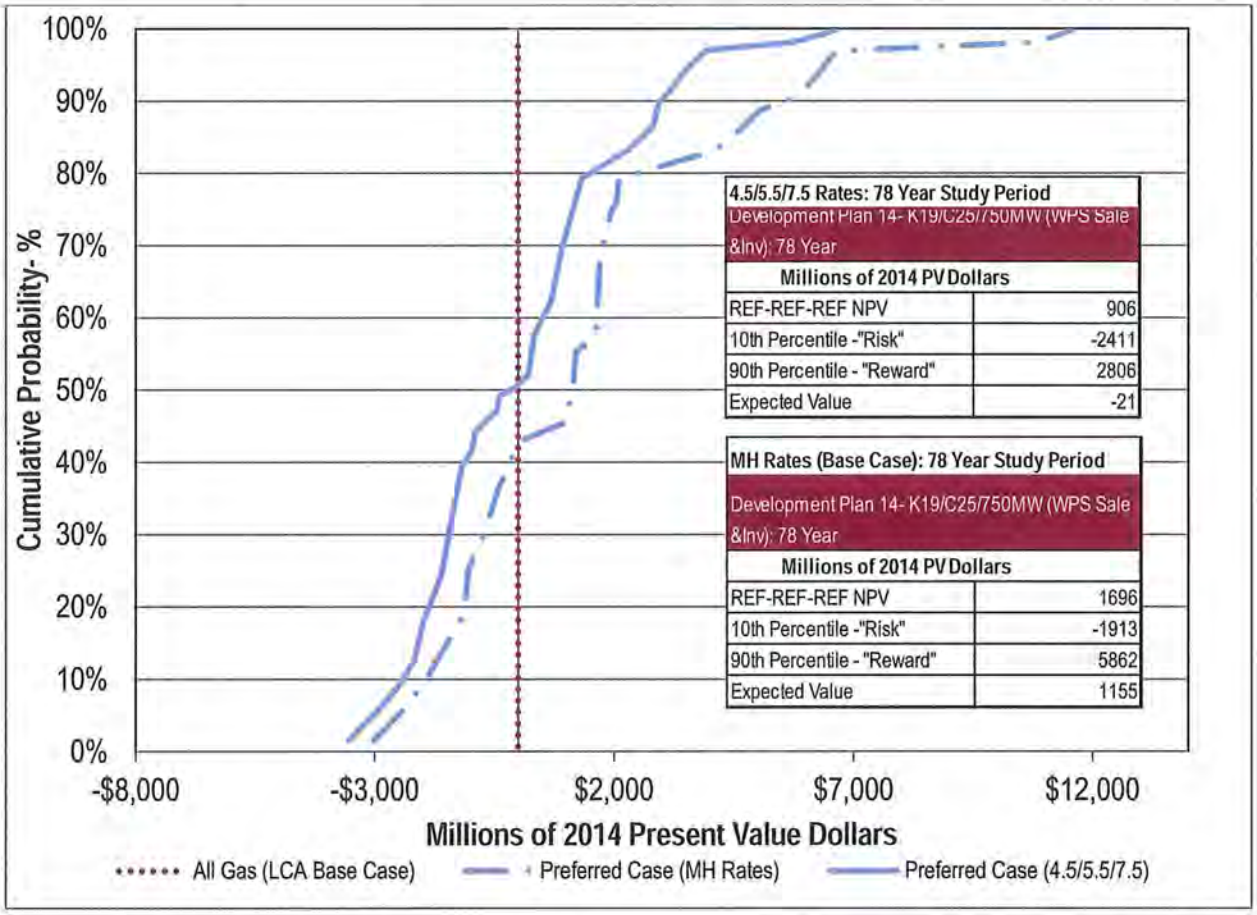
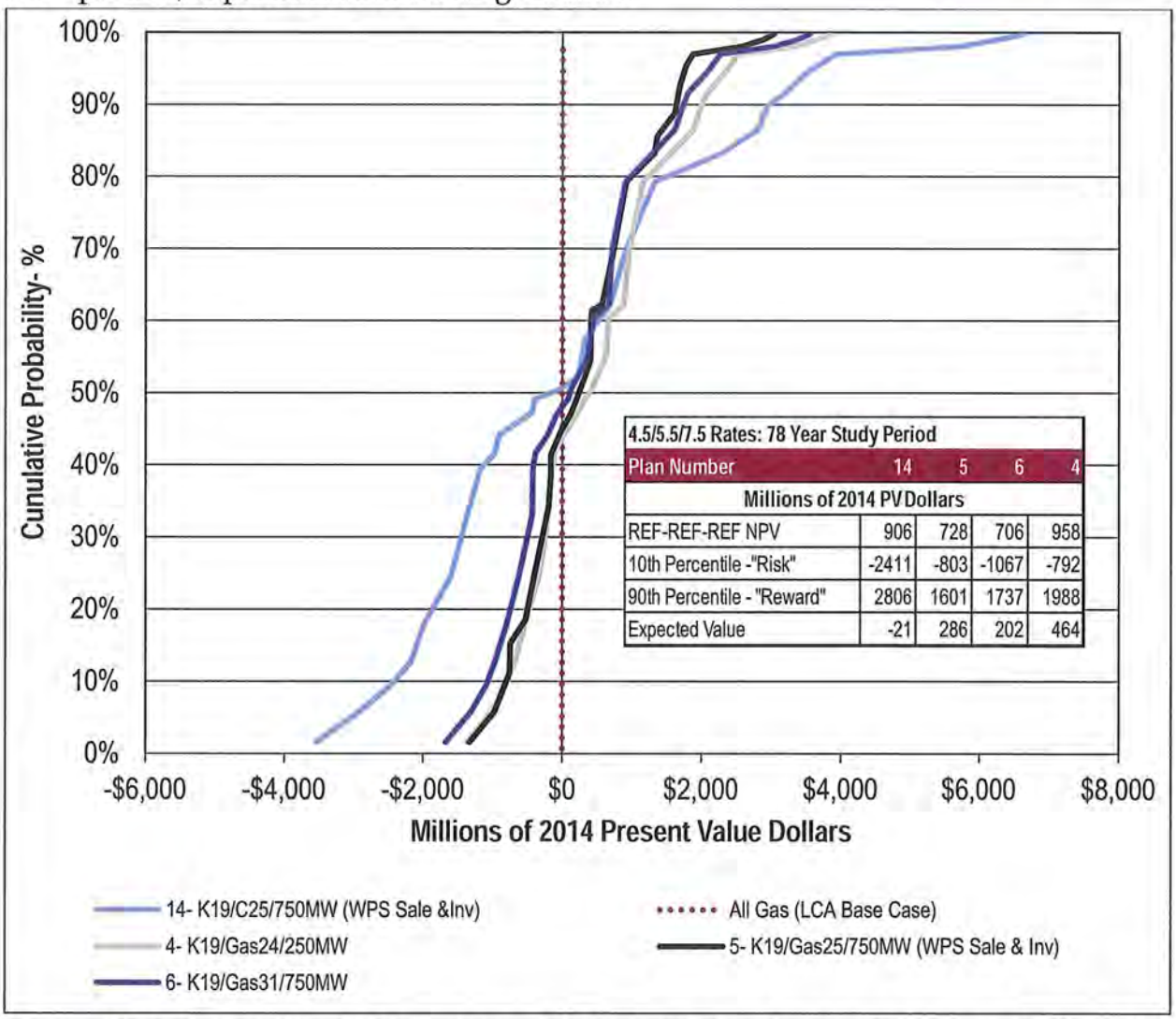


Figure 9-41: Probability Distribution of Plan 14 Preferred Development Plan and Plan 5 K19/Gas25/750MW/ WPS & Inv having higher costs than the All Gas Plan after 78 Years using the LCA Methodology and LCA Sensitivity Discount Rates – Millions of 2014 Present Value Dollars

Next, we have selected four development plans for comparison the Alternative Discount Rates. The following figures illustrate this economic comparison for the four study periods.

In Figure 9-42 the Preferred Development Plan is shown to have a greater range of possible economic outcomes than the three other development plans This indicates that the PDP has more potential risk and higher potential reward.. Also we see the risk with the Preferred Development Plan outweighs the reward since the PDP's expected value is negative $21 Million. The other plans shown on this figure have lower costs than the

All Gas. The shorter study period results in Figure 9-42, Figure 9-43 and Figure 9-44 show that for shorter study periods that the Preferred Development Plan has poorer NPV profiles, expected values and higher risks.



4.5/5.5/7.5 Rates: 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	906	728	706	958
10th Percentile -"Risk"	-2411	-803	-1067	-792
90th Percentile - "Reward"	2806	1601	1737	1988
Expected Value	-21	286	202	464

Figure 9-42: Probability Distribution of Selected Plans having higher costs than the All Gas Plan after 78 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

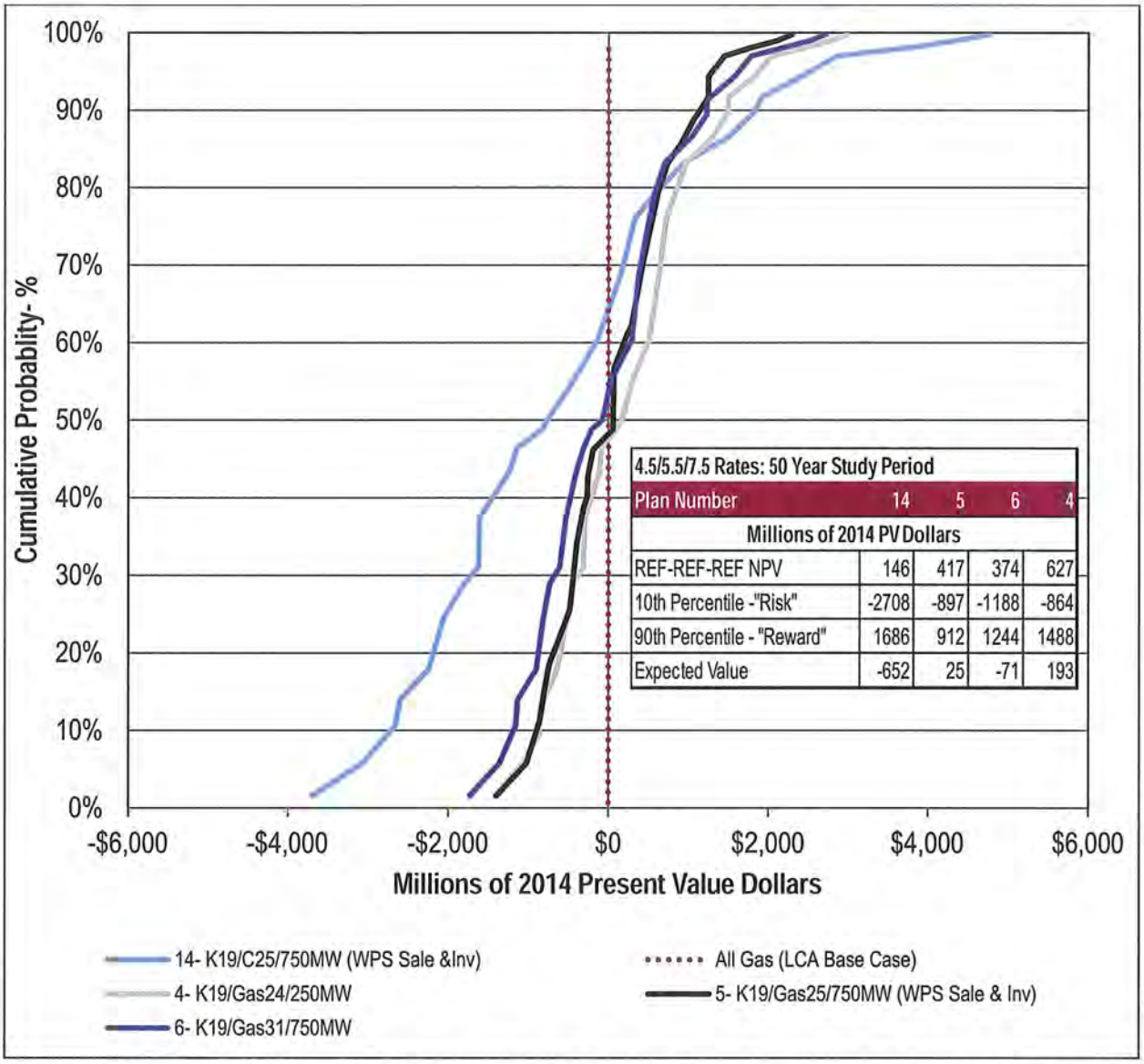


Figure 9-43: Probability Distribution of Selected Plans having higher costs than the All Gas Plan after 50 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

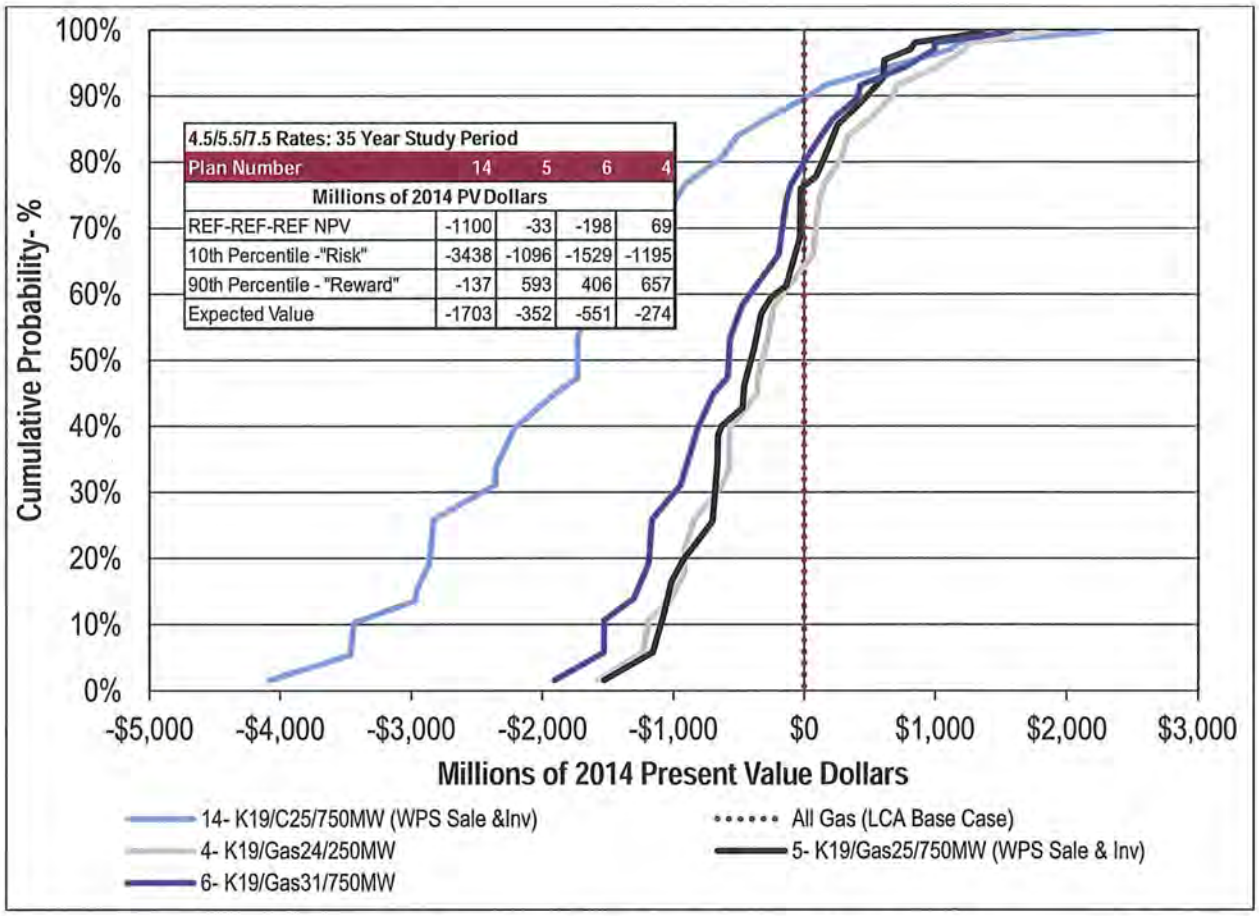


Figure 9-44: Probability Distribution of Selected Plans having higher costs than the All Gas Plan after 35 Years using the LCA Methodology – Millions of 2014 Present Value Dollars

2. Sensitivity – Elimination of the Low Discount Rate Scenarios

This analysis reflects the opinion being offered by Morrison Park Associates in their review of the NFAT application that the low discount rate scenario postulated by MH is not feasible over a 78-year period. In this sensitivity analysis, we assign a zero probability to the MH low discount rate scenario and 50% probability for each of the reference and high discount rate scenarios.

With these results, we develop several S-Curve charts to illustrate how the elimination the low discount rate scenarios affect the relative economics of selected alternative development plans, including the All Gas Plan as the reference, the Preferred Development Plan, and Plans 4, 5, and 6. The results that are featured in the S-Curve charts are as follows:

Figure 9-45: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – Elimination of Low Discount Rate Scenario

Figure 9-46: Preferred Development Plan – 78 Year NPV – Comparison of Results with MH Discount Rates and the Elimination of the Low Discount Rate Scenarios

The multiple time period CPV chart Figure 9-45 for the Preferred Development Plan as compared to the All Gas Plan shows similar results and trends to the previous sensitivity analysis using the Alternate Discount Rates. However, even in a 78 year study period, the Preferred Development Plan has a less than 50% probability that it will have lower costs than the All Gas Plan.

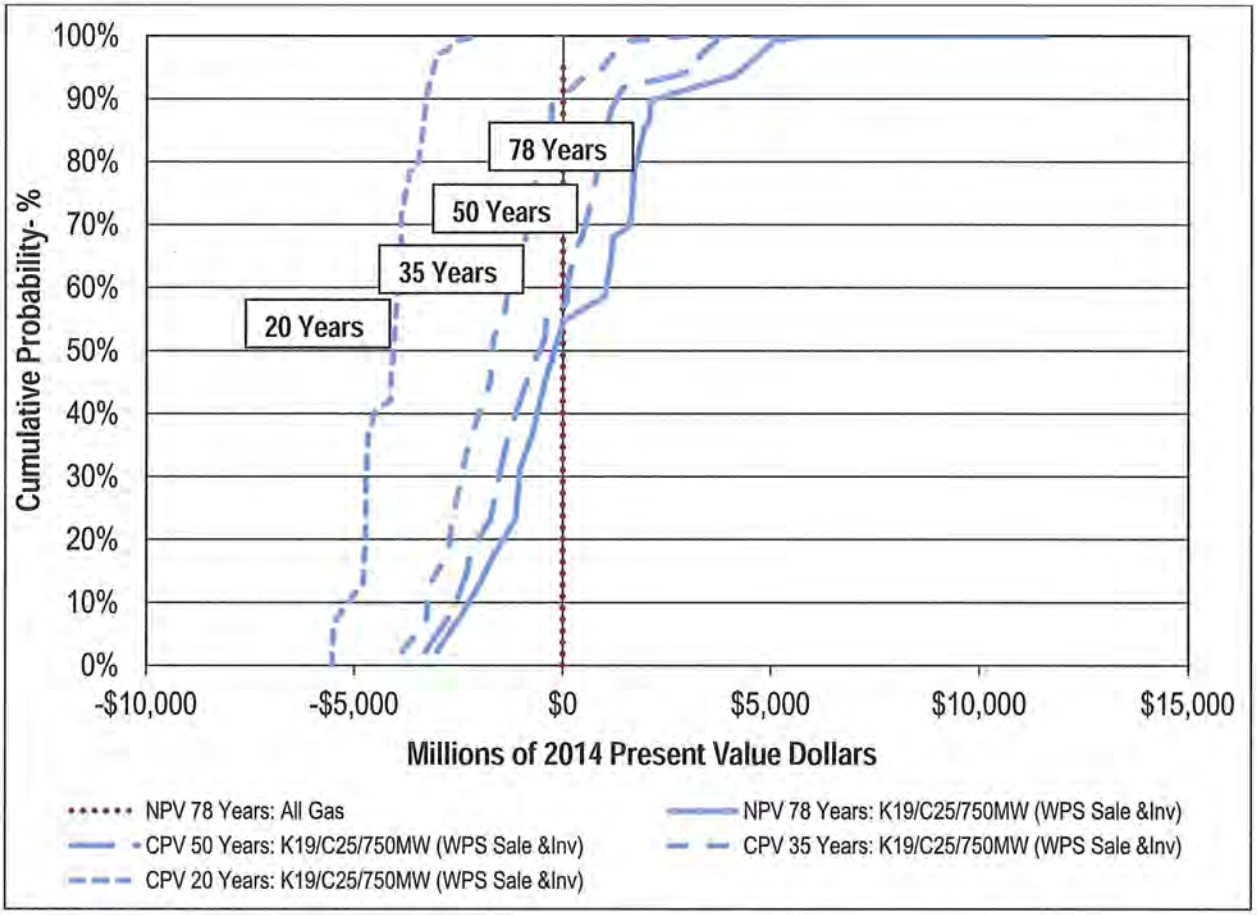


Figure 9-45: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years when eliminating Low Discount Rate Scenarios – Millions of 2014 Present Value Dollars

As seen in the Figure 9-46 comparison, the Preferred Development Plan without low discount rates is approximately 10% less likely to yield a better economic value (CPV) than the All Gas plan in 78 years. Even though both scenarios exhibit the about the

same range of potential outcomestheir expected values vary widely. This simple change in opinion, i.e., the elimination of considering the low discount rate scenario, can eliminate nearly all the benefits of the Preferred Development Plan under the expected value metric.

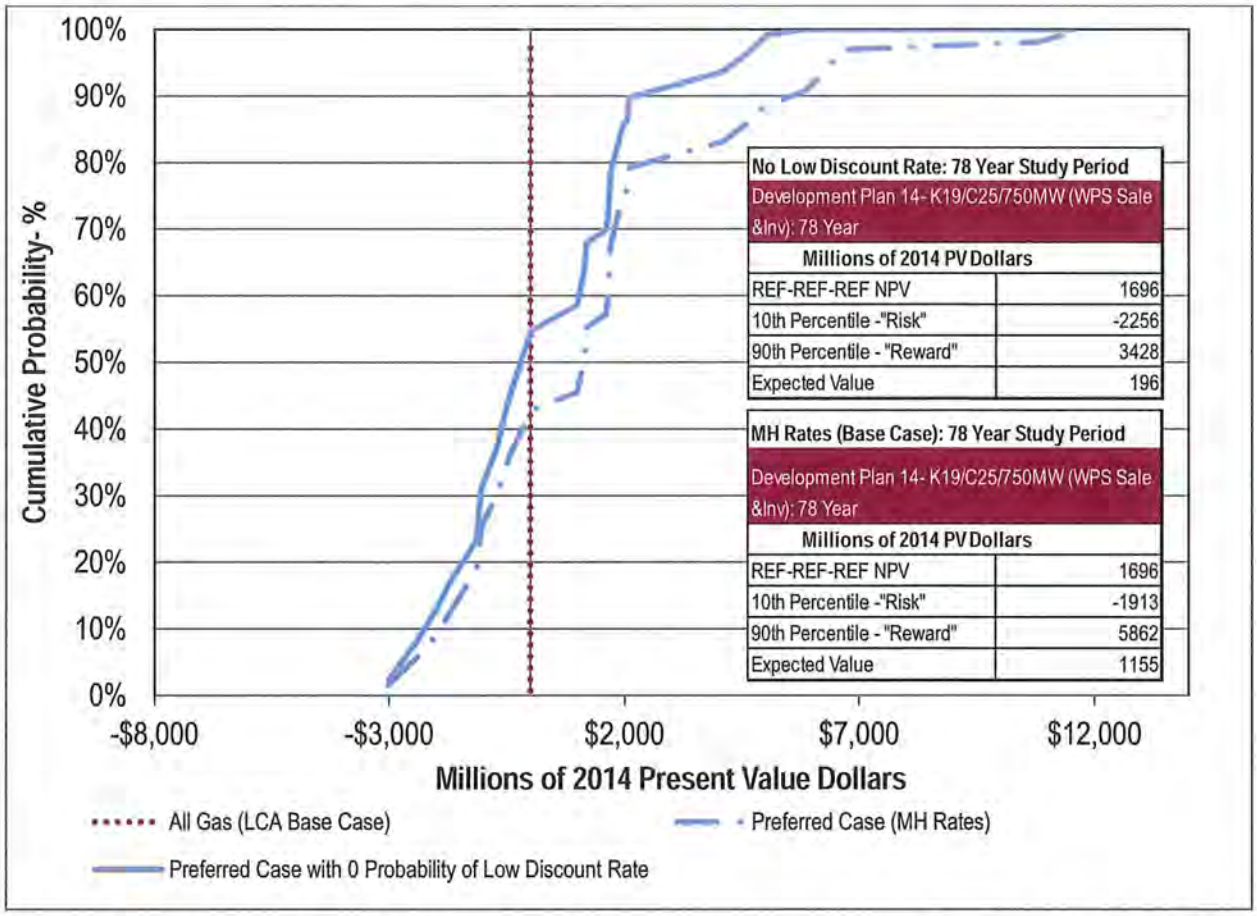


Figure 9-46: Probability Distribution of Plan 14 Preferred Development Plan and Plan 5 K19/Gas25/750MW/ WPS & Inv having higher costs than the All Gas Plan after 78 Years using the LCA Methodology and Eliminating the Low Discount Rate Scenarios – Millions of 2014 Present Value Dollars

C. Sensitivity to Alternative Probability Assumptions for Uncertainty Analysis

In the prior sections, we demonstrated two ways to test the sensitivity of the results to the uncertainty in discount rates. The first uses alternative probabilities on capital costs. In the second we change the probabilities assigned to energy prices.

Alternative probability assignment is a way to test the impact of different perspectives regarding the uncertainty associated with key assumptions. Perspectives, in this context, simply refers to the notion that another expert or decision maker may believe that energy market prices are more likely to be lower (or higher) than MH has assumed. That perspective can be reflected in the form of alternative probabilities to MH's low, reference and high energy price assumptions. Similarly, different perspectives on capital cost uncertainty can be reflective by changes in probabilities without having to do additional modeling.

MH had previously assigned the following probabilities to its three metrics as seen on each aforementioned quilt:

	Energy Prices	Discount Rates	Capital Costs
High	15%	35%	30%
Reference	55%	50%	50%
Low	30%	15%	20%

Figure 9-47: Manitoba Hydro Assigned Probabilities

In this sensitivity we have developed analyses centered around two views of the future; the first reflects an expectation that the probability of the High Capital Cost scenarios is more likely than estimated by MH and the second view is that Energy Prices are lower than MH expected.

Figure 9-48 below shows the reference case and expected value results using MH's view of probabilities as compared to sensitivity analyses that are described above. Descriptions of the exact modeling of these probability based sensitivities and more results in the form of S Curves are shown in Sections 1 and 2 below.

The economic results of these changes to probabilities vary in their impact. While all development plans lose some or all of their economic value (NPV) as compared to the All Gas Plan, when probabilities of the energy prices are shifted toward low the plans with Conawapa lose the greatest amount of their economic value. This is not that surprising when we realize that Conawapa in a development plan that is dependent on export energy prices to offset some of its costs. The small change we modeled in probabilities for the Capital Cost uncertainties has a minimal effect.

Probabilities Sensitivity Case Summary Table - NPV after 78 years as compared to ALL Gas							
		Reference assumptions		Capital Cost Probabilities		Energy Price Probabilities	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-	-	-
Plan 2	K22/Gas	$887	$634	$887	$593	$887	$424
Plan 3	Wind/Gas	($775)	($1,014)	($775)	($1,164)	($775)	($1,158)
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$1,346	$699	$1,346	$820
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$1,097	$792	$1,097	$684
Plan 6	K19/Gas31/750MW	$1,091	$776	$1,091	$723	$1,091	$553
Plan 7	SCGT/C26	$738	$525	$806	$516	$806	$290
Plan 8	CCGT/C26	$784	$529	$784	$500	$784	$269
Plan 9	Wind/C26	$531	$217	$531	$148	$531	($78)
Plan 10	K22/C29	$806	$418	$806	$354	$806	$34
Plan 11	K19/C31/250MW	$1,215	$806	$1,215	$729	$1,215	$427
Plan 12	K19/C31/750MW	$1,360	$891	$1,360	$805	$1,360	$479
Plan 13	K19/C25/250MW	$1,295	$782	$1,295	$699	$1,295	$345
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	$1,696	$1,058	$1,696	$727
Plan 15	K19/C25/750MW	$1,427	$830	$1,427	$728	$1,427	$350

Figure 9-48: Probability Sensitivity Results NPV after 78 years – Millions of 2014 Present Value Dollars

1. Capital Cost Sensitivities by adjusting Probabilities

This analysis starts with a change in perspective regarding capital costs. In this example, we increase the likelihood of the high cost by 10% and reduce the probability of the low cost by 10%, substituting MH's weighting of 20%/50%/30% with 10%/50%/40%. This reflects a perspective that considers higher costs to be a more likely outcome than MH has assumed.

With these results, we develop several S-Curve charts to illustrate how the increase the likelihood of the high cost by 10% and the reduced the probability of the low cost by 10% affect the relative economics of selected alternative development plans, including the All Gas Plan as the reference, the Preferred Development Plan, and Plans 4, 5, and 6.

The results that are featured in the S-Curve charts are as follows:

Figure 9-49: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – With an increase in the likelihood of the high capital cost by 10% and reduces the probability of the low capital cost by 10%

Figure 9-50: Preferred Development Plan – 78 Year NPV – Comparison of Results with MH Capital Cost Probabilities and LCA Alternate Capital Cost Probabilities

Figure 9-51: Preferred Development Plan compared to Plans 4, 5, and 6 – 78 Year NPV – With an increase in the likelihood of the high capital cost by 10% and reduces the probability of the low capital cost by 10%

Figure 9-52: Preferred Development Plan compared to Plans 4, 5, and 6 – 50 Year NPV – With an increase in the likelihood of the high capital cost by 10% and reduces the probability of the low capital cost by 10%

Figure 9-53: Preferred Development Plan compared to Plans 4, 5, and 6 – 35 Year NPV – With an increase in the likelihood of the high capital cost by 10% and reduces the probability of the low capital cost by 10%

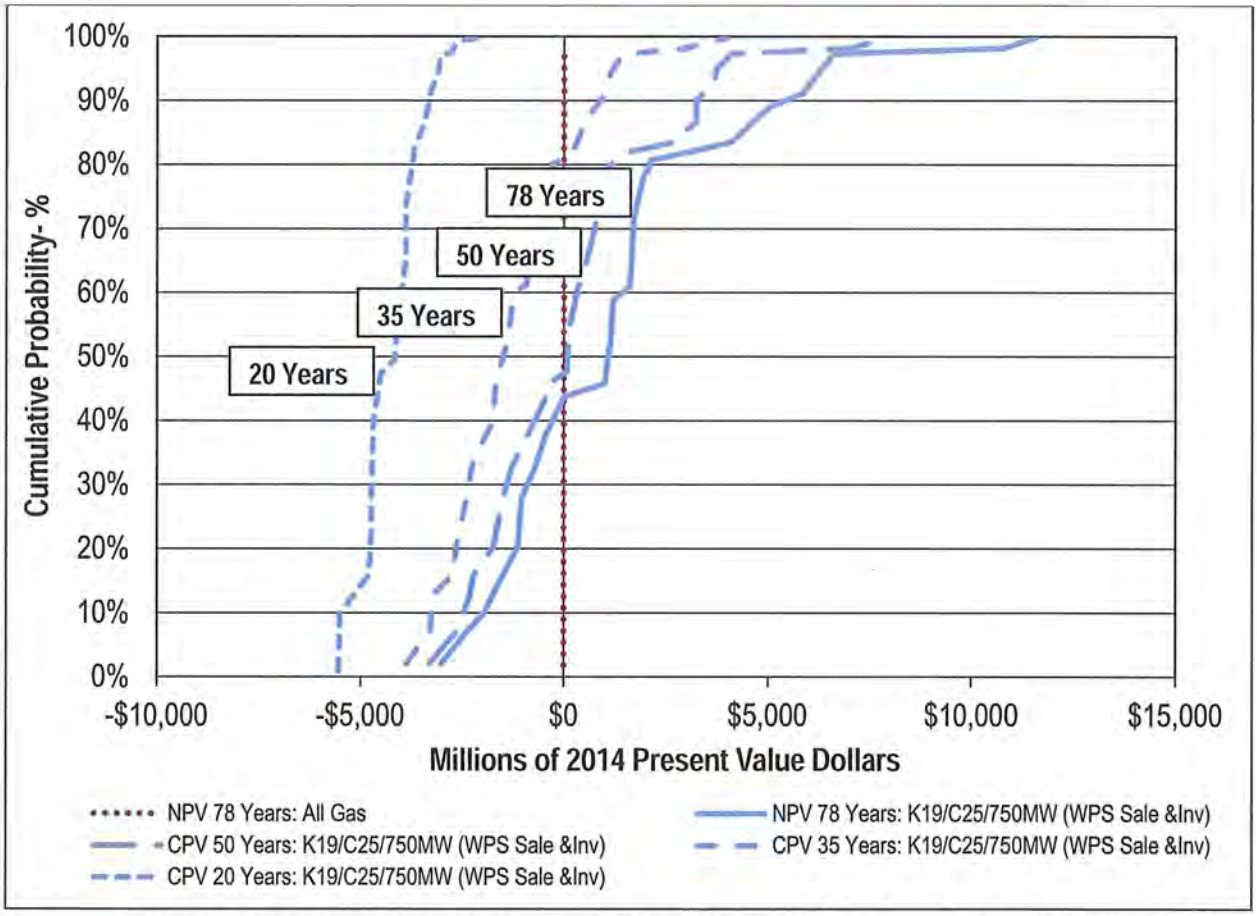


Figure 9-49: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan With Higher Probabilities of Higher Capital Costs after 78 years – Millions of 2014 Present Value Dollars

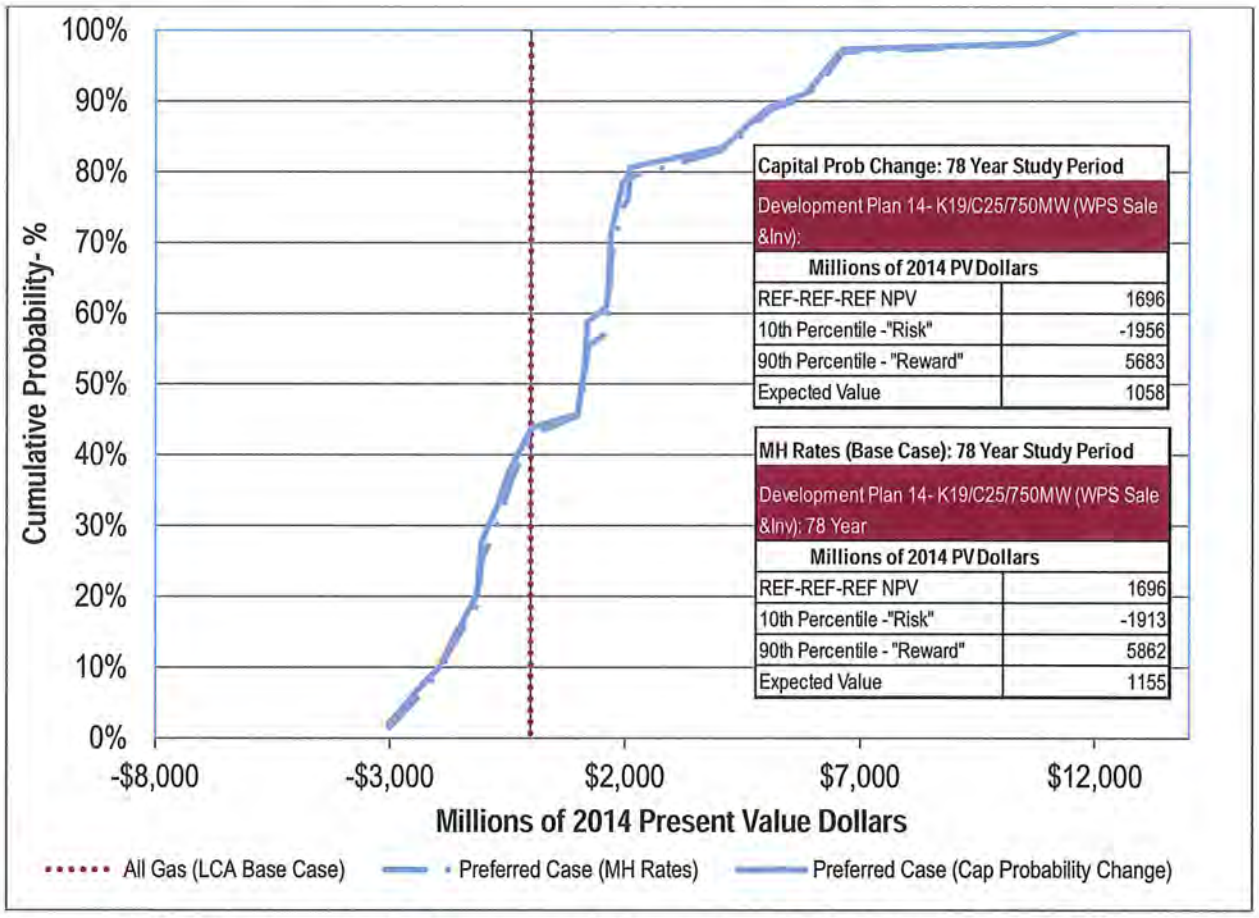


Figure 9-50: The Impact of the assumed change in Capital Cost Probabilities on the Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars

As demonstrated in the above figure, our assumed change in the capital cost probability assignment does not significantly change the economic outcome. A much more substantial change in expectations about capital costs would be required to have a material effect on the economic analysis results.

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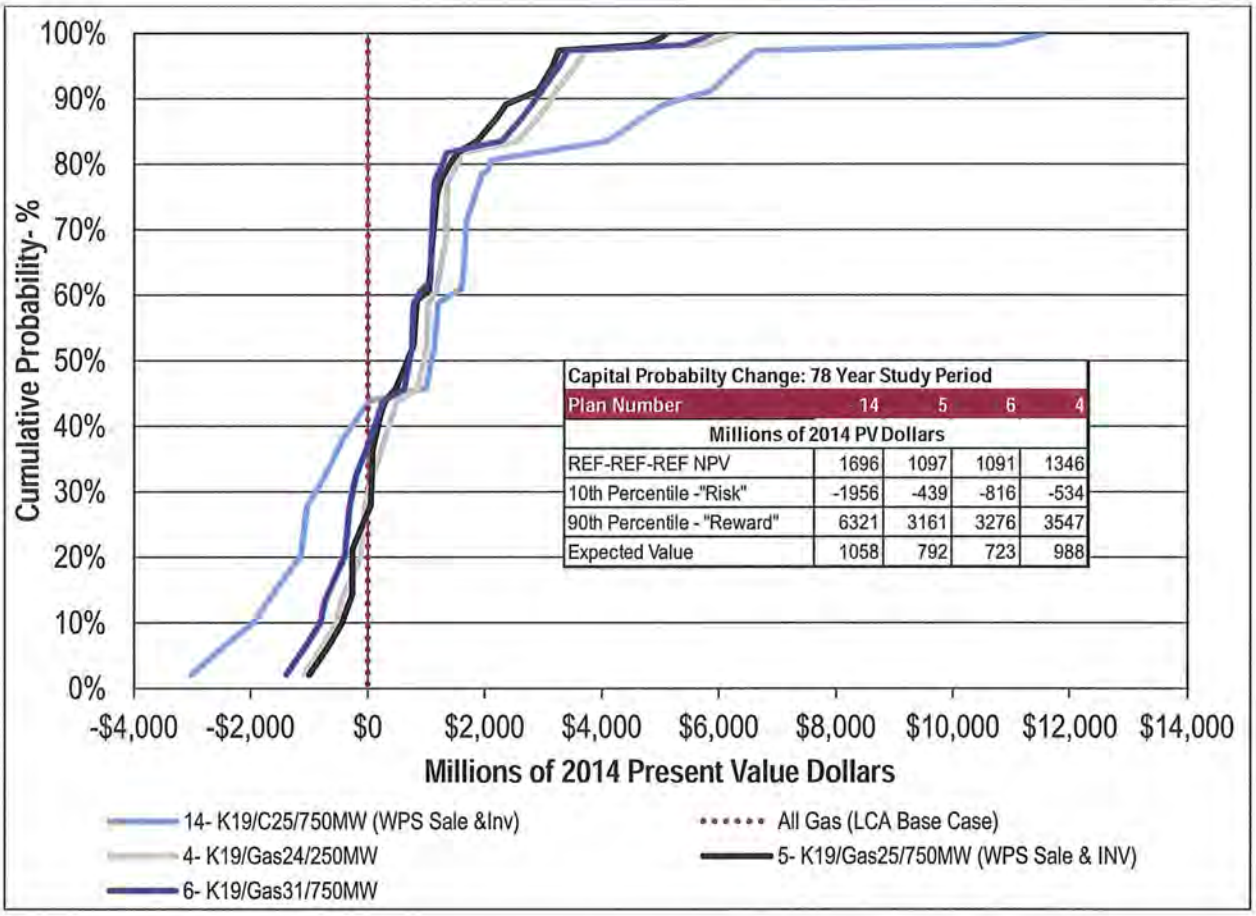
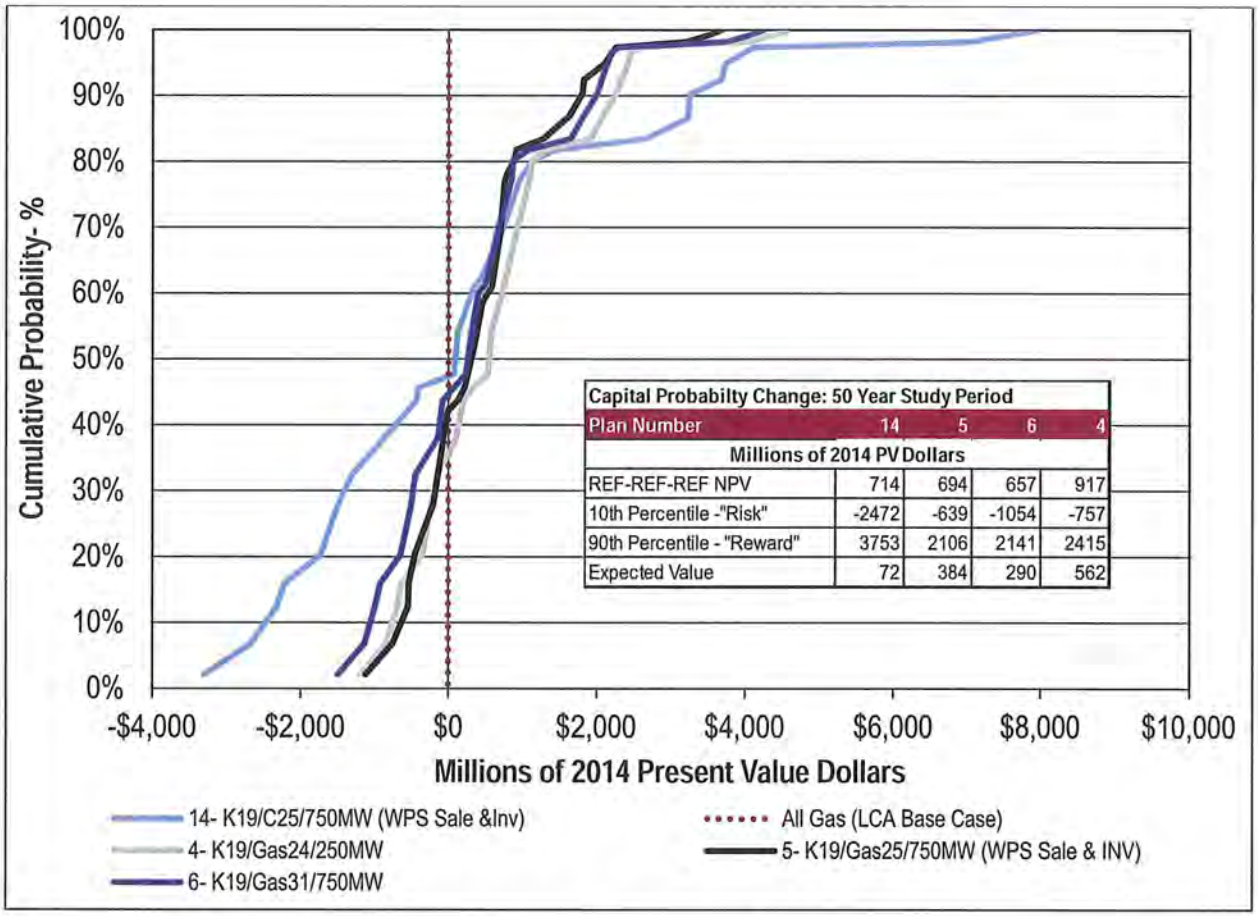


Capital Probabilty Change: 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	1696	1097	1091	1346
10th Percentile -"Risk"	-1956	-439	-816	-534
90th Percentile - "Reward"	6321	3161	3276	3547
Expected Value	1058	792	723	988

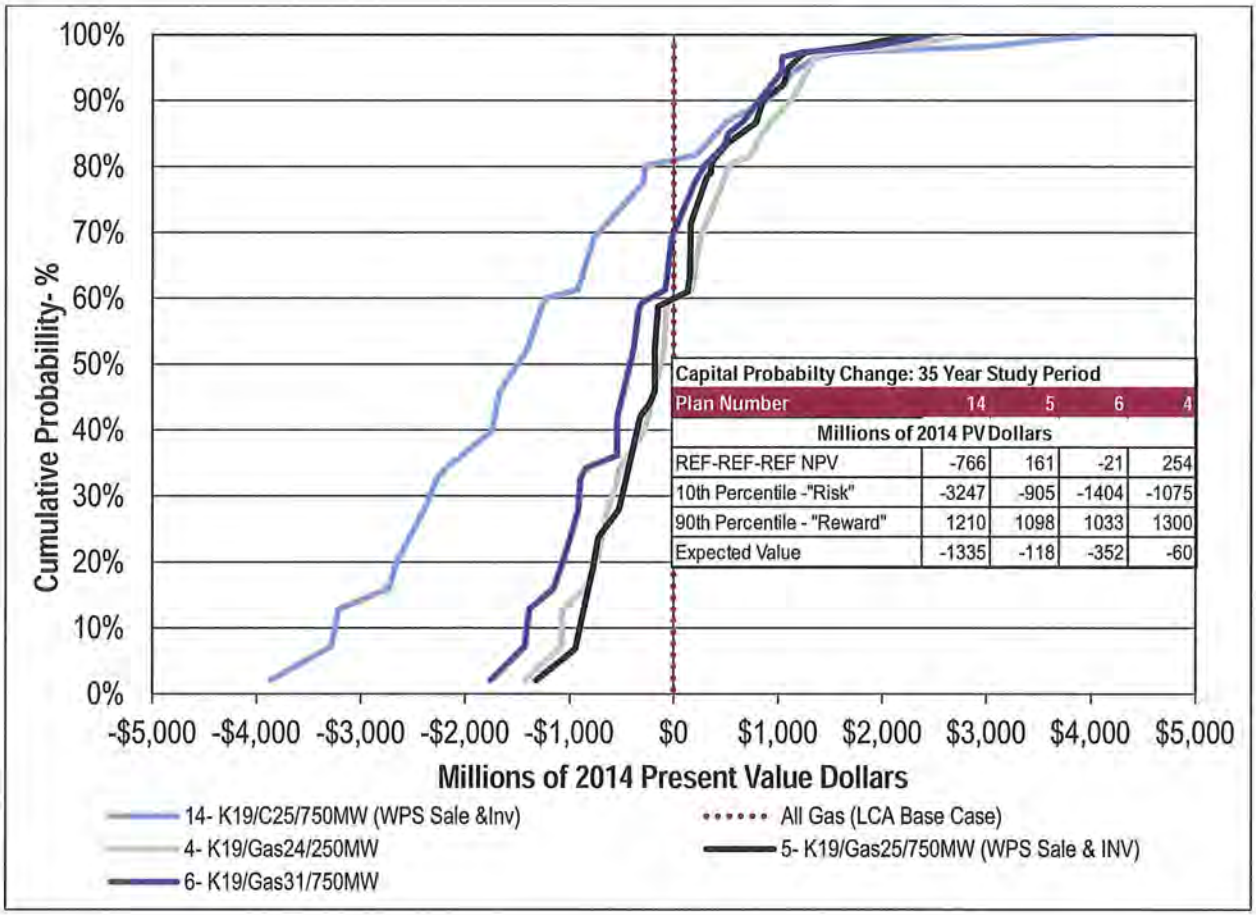
Figure 9-51: The Impact of the assumed change in Capital Cost Probabilities on the Probability Distributions of the Selected Development Plans having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.



Capital Probabilty Change: 50 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	714	694	657	917
10th Percentile -"Risk"	-2472	-639	-1054	-757
90th Percentile - "Reward"	3753	2106	2141	2415
Expected Value	72	384	290	562

Figure 9-52: The Impact of the assumed change in Capital Cost Probabilities on the Probability Distributions of the Selected Development Plans having Higher Costs than the All Gas Plan after 50 years – Millions of 2014 Present Value Dollars



Capital Probabilty Change: 35 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	-766	161	-21	254
10th Percentile -"Risk"	-3247	-905	-1404	-1075
90th Percentile - "Reward"	1210	1098	1033	1300
Expected Value	-1335	-118	-352	-60

Figure 9-53: The Impact of the assumed change in Capital Cost Probabilities on the Probability Distributions of the Selected Development Plans having Higher Costs than the All Gas Plan after 35 years – Millions of 2014 Present Value Dollars

2. Energy Price Probabilities

Similar to the discussion above on Capital Cost, this sensitivity was done to capture a different perspective from that of MH regarding energy prices. In our preliminary discussions with Potomac Economics, it indicated an energy price perspective that [redacted] in its analysis.

This analysis changes the probabilities assigned to the low, reference and high energy price scenarios from 30%/ 55%/15% to 40%/ 50%/10% for Low, Reference and High

Energy Price Scenarios, respectively. This technique incorporates an opinion that the energy price estimates are now lower than MH has assumed.

The results that are featured in the S-Curve charts are as follows:

Figure 9-54: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – Increasing the Probability of Low Energy Prices

Figure 9-55: Preferred Development Plan – 78 Year NPV – Comparison of Results with the MH Probabilities and with those where we have Increased the Probability of Low Energy Prices

Figure 9-56: Preferred Development Plan compared to Plans 4, 5, and 6 – 78 Year NPV – Increasing the Probability of Low Energy Prices

Figure 9-57: Preferred Development Plan compared to Plans 4, 5, and 6 – 50 Year NPV – Increasing the Probability of Low Energy Prices

Figure 9-58: Preferred Development Plan compared to Plans 4, 5, and 6 – 35 Year NPV – Increasing the Probability of Low Energy Prices

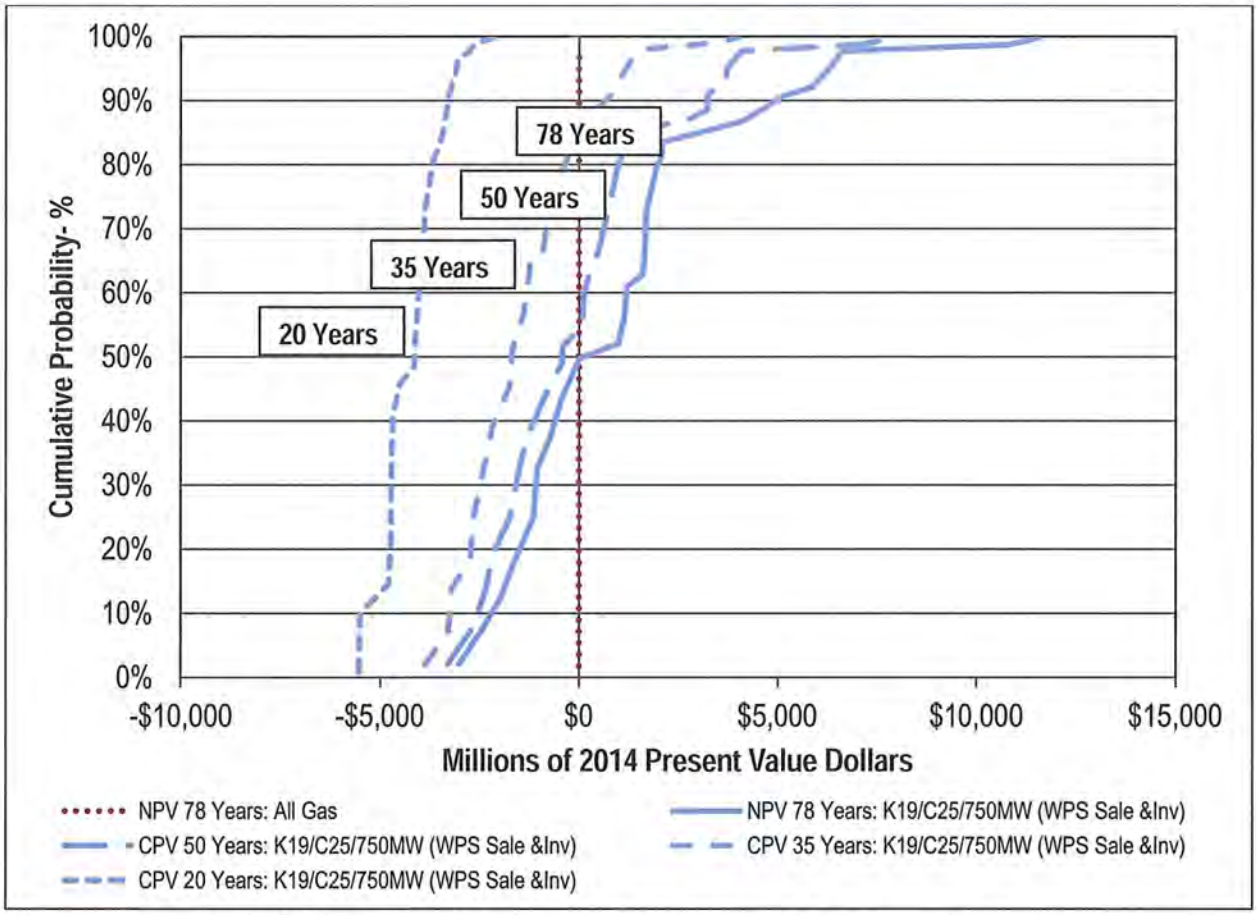


Figure 9-54: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan with Changing Energy Cost Probabilities after 78 years – Millions of 2014 Present Value Dollars

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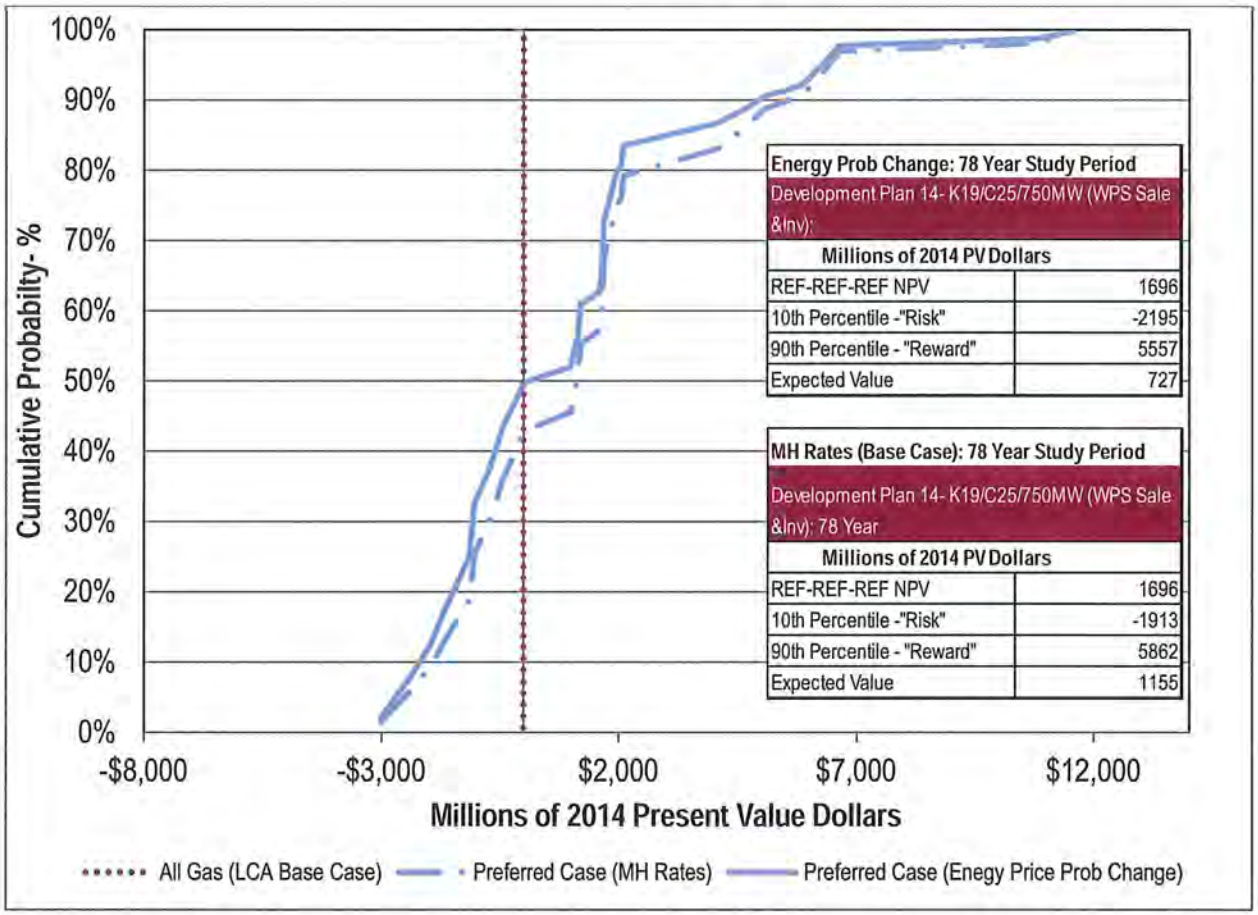
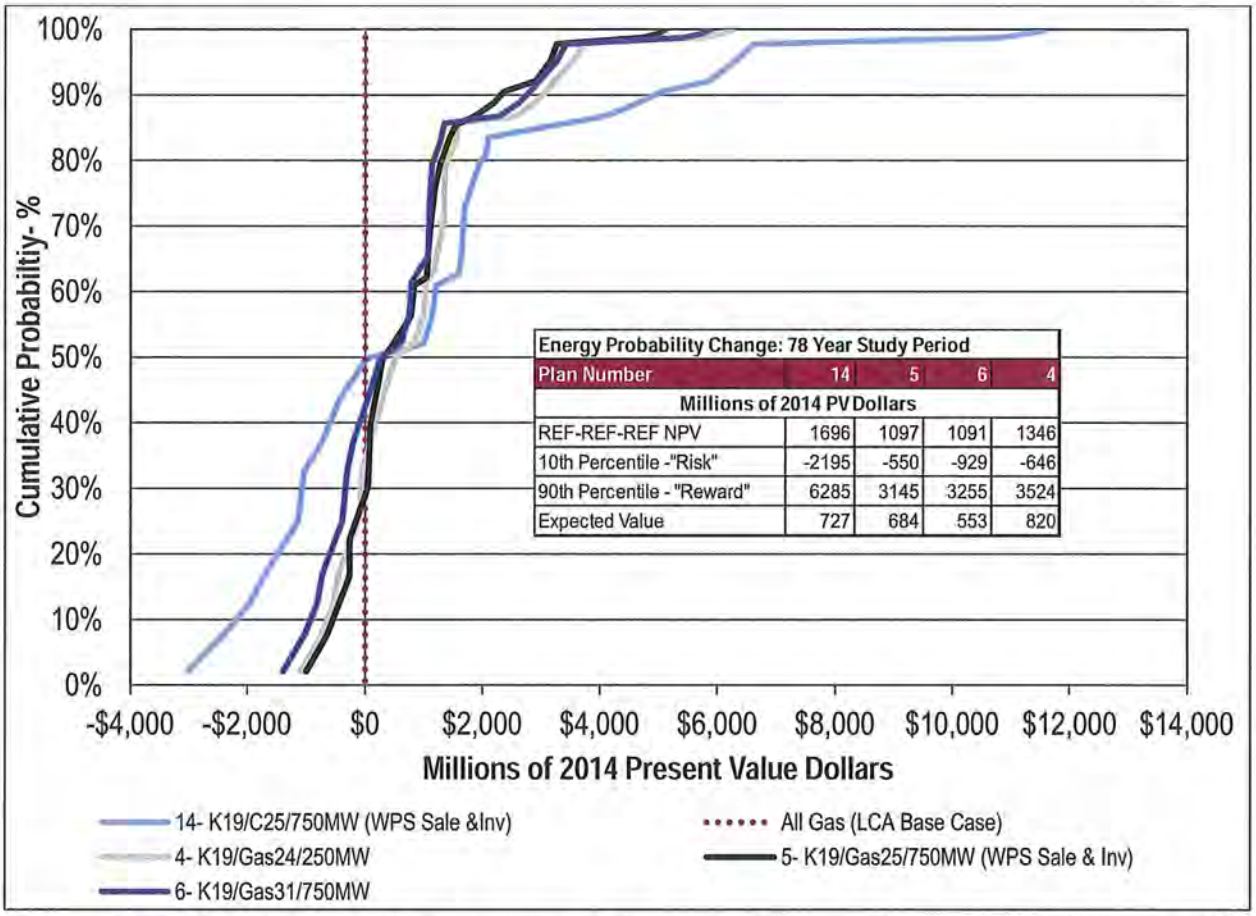


Figure 9-55: The Impact of the assumed change in Energy Price Probabilities on the Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars.

The above chart Figure 9-55, coupled with Figure 48, signifies that a change in energy price probabilities does have a significant effect on the range of NPVs, even changing the rank order of the plans on the NPV metric. Also, the change in probabilities does somewhat change the probability that the Preferred Development Plan will break even with the All Gas base case. With a higher probability that energy prices will be low, the Preferred Development Plan now has approximately a 50% probability of breaking even with the All Gas plan compared to more than 55% in the MH probabilities. It also reduces the expected value benefits of the Preferred Development Plan by just over $400M.

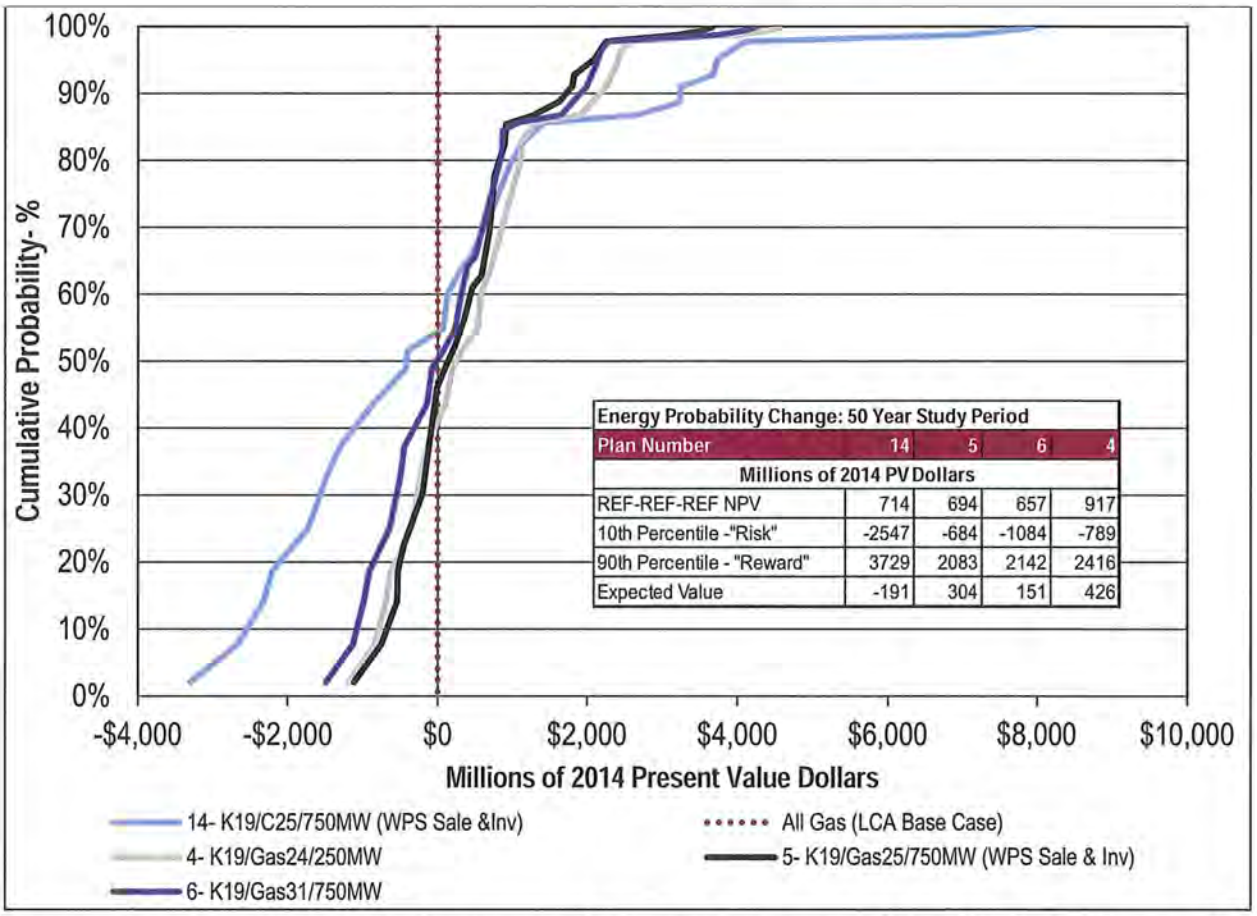
This change in energy price probabilities does produce a change in the ranking of the alternative development plans included in this example. With this move to somewhat lower energy price expectations, Plan 4 has the highest expected value of NPV benefits.



Energy Probability Change: 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	1696	1097	1091	1346
10th Percentile -"Risk"	-2195	-550	-929	-646
90th Percentile - "Reward"	6285	3145	3255	3524
Expected Value	727	684	553	820

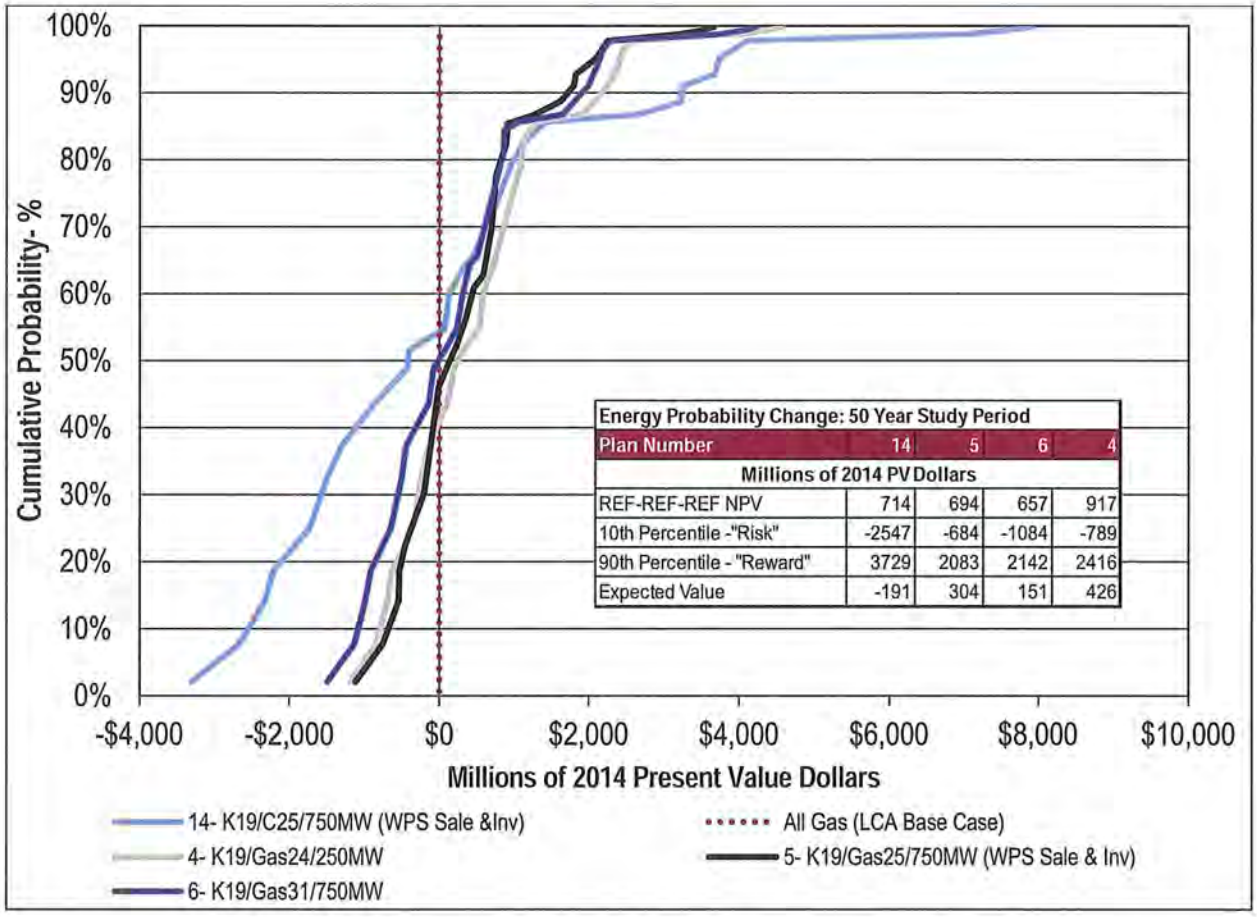
Figure 9-56: The Impact of the assumed change in Energy Price Probabilities on the Probability Distributions of the Selected Development Plans having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars.

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.



Energy Probability Change: 50 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	714	694	657	917
10th Percentile -"Risk"	-2547	-684	-1084	-789
90th Percentile - "Reward"	3729	2083	2142	2416
Expected Value	-191	304	151	426

Figure 9-57: The Impact of the assumed change in Energy Price Probabilities on the Probability Distributions of the Selected Development Plans having Higher Costs than the All Gas Plan after 50 years – Millions of 2014 Present Value Dollars



Energy Probability Change: 50 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	714	694	657	917
10th Percentile -"Risk"	-2547	-684	-1084	-789
90th Percentile - "Reward"	3729	2083	2142	2416
Expected Value	-191	304	151	426

Figure 9-58: The Impact of the assumed change in Energy Price Probabilities on the Probability Distributions of the Selected Development Plans having Higher Costs than the All Gas Plan after 35 years – Millions of 2014 Present Value Dollars

D. Sensitivity to Capital Costs of Keeyask and Conawapa

This analysis examines the impact of two potential scenarios that test the robustness of observations and results to a concern that there should be higher capital costs evaluated for Keeyask and Conawapa. In MH's analysis it estimated the range of uncertainty around the capital costs on Keeyask, Conawapa, SCGT, CCGT, and Wind. The following table was provided by MH in the NFAT filing[39].

[39] NFAT Submission, Appendix 9.3, Table 2.5, p. 37.

Resource	Low	Reference	High
Keeyask (2019)	-8.5%	-	+13.2%
Conawapa (2026)	-8.8%	-	+11.8%
SCGT (2022)	-30.5%	-	+38.2%
CCGT (2022)	-31.6%	-	+40.0
Wind	-26.2%	-	+34%

Figure 9-59: MH Percentage Difference of Low and High capital Costs relative to Reference[40]

In this sensitivity section we have two different ways of modeling the concern that capital costs for Keeyask and Conawapa may be higher than the high cost estimates developed by MH and used in MH's economic uncertainty analysis. One situation would be a modest increase in the high cost scenario's capital costs. The other would represent a very pessimistic view on the realities of the MH estimates. This was modeled by LCA assigning the MH estimate for reference capital cost for Keeyask and Conawapa to the low scenario. The reference and high scenario estimates for capital cost were each increased by 20%. We have analyzed the results of the NPV metrics utilizing each of these methods independently in this section

Figure 9-60 below shows the reference case and expected value results comparing results based upon MH's assumptions and these alternative values of capital costs. Descriptions of the exact modeling of these discount rate sensitivities and more results in the form of S Curves are shown in Sections 1 and 2 below.

The economic results of increasing the capital costs across all three scenarios are very dramatic. Only Plans 2, 4, 5, and 6 now show to be lower cost than the All Gas Case even after 78 years. The other sensitivity with only a modest increase in the high scenario capital cost estimates has a minimal effect on the NPV results.

[40] *Id.*

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.

Capital Cost Sensitivity Summary Table - NPV after 78 years as compared to ALL Gas							
		Reference assumptions		Higher Hydro Capital Cost in High Scenario		Higher Hydro Capital Costs in All Scenarios	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-	-	-
Plan 2	K22/Gas	$887	$634	$887	$548	$383	$167
Plan 3	Wind/Gas	($775)	($1,014)	($775)	($1,014)	($775)	($1,014)
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$1,346	$946	$785	$523
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$1,097	$747	$535	$324
Plan 6	K19/Gas31/750MW	$1,091	$776	$1,091	$680	$529	$258
Plan 7	SCGT/C26	$738	$525	$806	$396	($380)	($189)
Plan 8	CCGT/C26	$784	$529	$784	$400	$6	($185)
Plan 9	Wind/C26	$531	$217	$531	$88	($246)	($498)
Plan 10	K22/C29	$806	$418	$806	$219	($380)	($679)
Plan 11	K19/C31/250MW	$1,215	$806	$1,215	$606	$25	($295)
Plan 12	K19/C31/750MW	$1,360	$891	$1,360	$691	$170	($210)
Plan 13	K19/C25/250MW	$1,295	$782	$1,295	$553	($71)	($475)
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	$1,696	$926	$330	($102)
Plan 15	K19/C25/750MW	$1,427	$830	$1,427	$602	$61	($426)

Figure 9-60: Impact of Capital Cost Sensitivity – Millions of 2014 Present Value Dollars

1. The Increase of 10% in high scenario of capital costs for Conawapa and Keeyask generating stations

The first sensitivity increases by 10% the capital cost of Keeyask and Conawapa in the high capital cost scenario. This is targeted to see how the results change even if we are comfortable with the reference capital cost estimation process and we believe that the lower capital cost estimate is also possible. As one would expect this has only a small effect on the probability distributions of the economics of the Preferred Development Plan.

The results that are featured in the S-Curve charts are as follows:

Figure 9-61: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – With an increase of 10% in high scenario of capital costs for Conawapa and Keeyask generating stations

Figure 9-62: Preferred Development Plan – 78 Year NPV – Comparison of Results of MH Capital Cost values for the scenarios and one with an increase of 10% in high scenario of capital costs for Conawapa and Keeyask generating stations

Figure 9-63: Preferred Development Plan compared to Plans 4, 5, and 6 – 78 Year NPV – With an increase of 10% in high scenario of capital costs for Conawapa and Keeyask generating stations

Figure 9-64: Preferred Development Plan compared to Plans 4, 5, and 6 – 50 Year NPV – With an increase of 10% in high scenario of capital costs for Conawapa and Keeyask generating stations

Figure 9-65: Preferred Development Plan compared to Plans 4, 5, and 6 – 35 Year NPV – With an increase of 10% in high scenario of capital costs for Conawapa and Keeyask generating stations

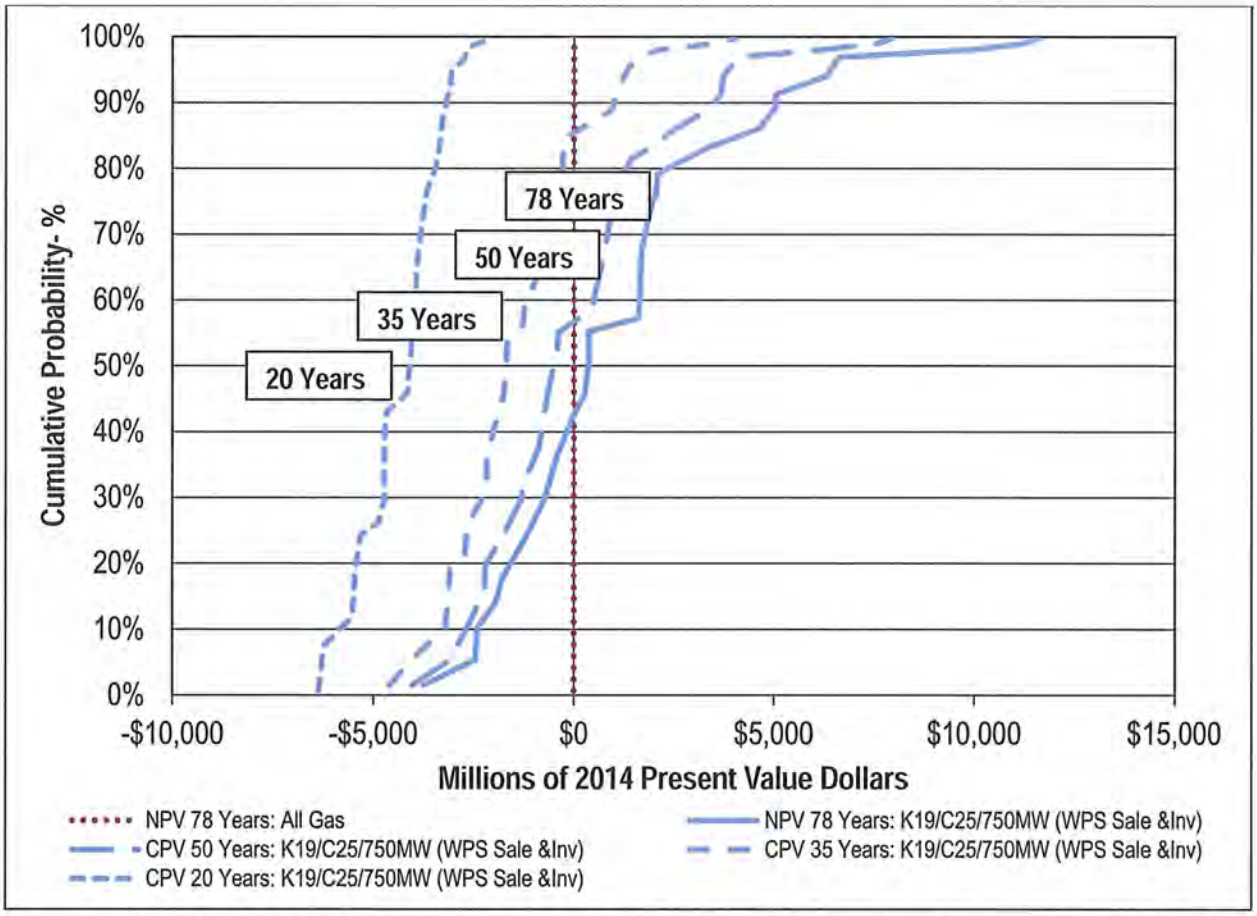


Figure 9-61: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan with 10% Higher Capital Costs for the Keeyask G. S. and Conawapa G. S. in the High Capital Cost Scenarios after 78 years – Millions of 2014 Present Value Dollars

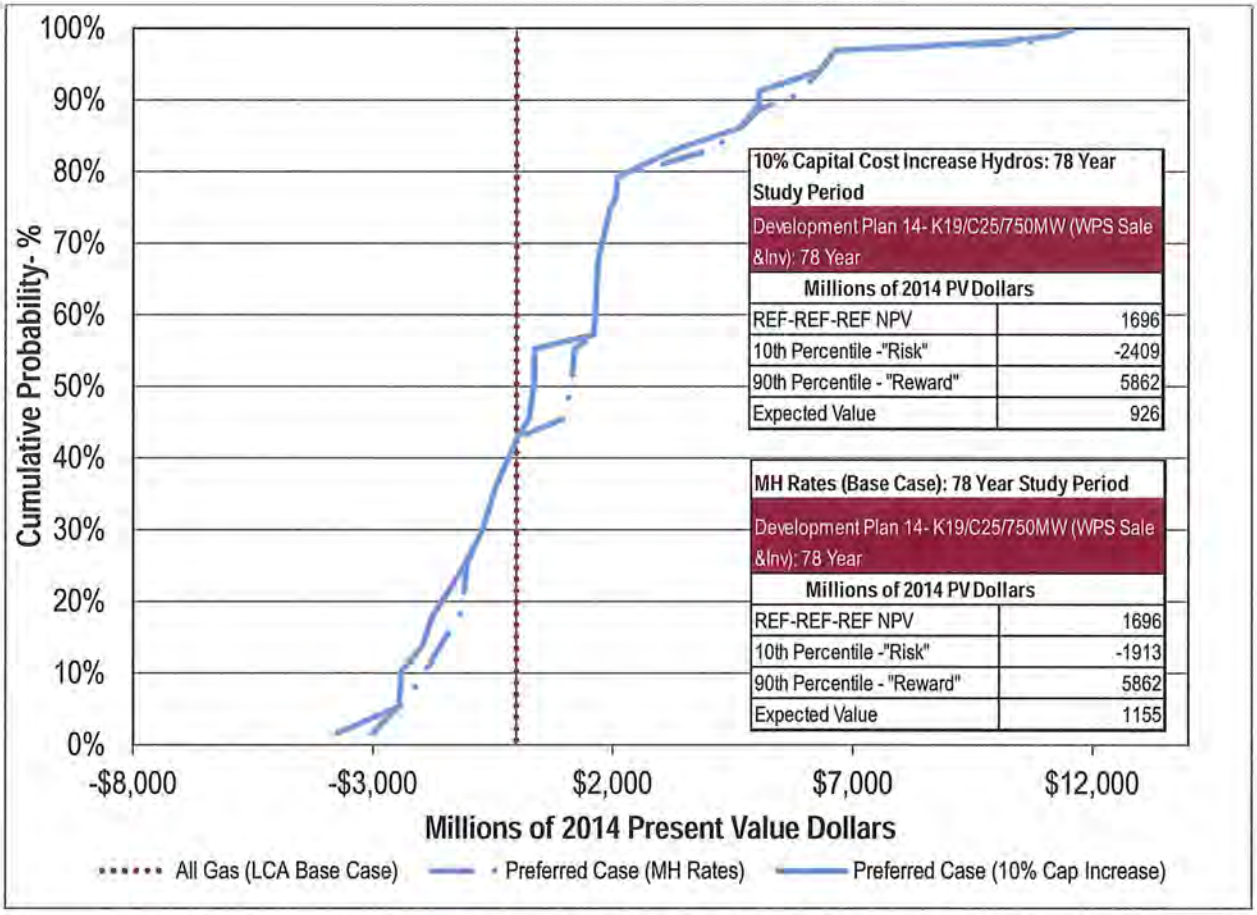


Figure 9-62: The Impact of increasing by 10% the High Capital Costs for the Keeyask G. S. and Conawapa G. S. in the High Capital Cost Scenarios on the Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years– Millions of 2014 Present Value Dollars

When we look at the four plan comparisons on the Figure 9-63 we see that the Preferred Development Plan now has an expected value for the 78 year NPV that is lower than Plan 4. The largest difference in these plans is that Plan 4 does not include the Conawapa G. S. This relatively small change has eliminated the economic advantage of the Preferred Development Plan. A similar observation from Figure 9-64 is that at the end of 50 years of the study the expected value of the Preferred Development Plan is now negative while the other three plans in the comparison are positive. This meaning not only are the other three plans in this comparison lower cost to the All Gas Plan and the Preferred Development Plan, the All Gas Plan through 50 years is lower cost than the Preferred Development Plan through 50 years.

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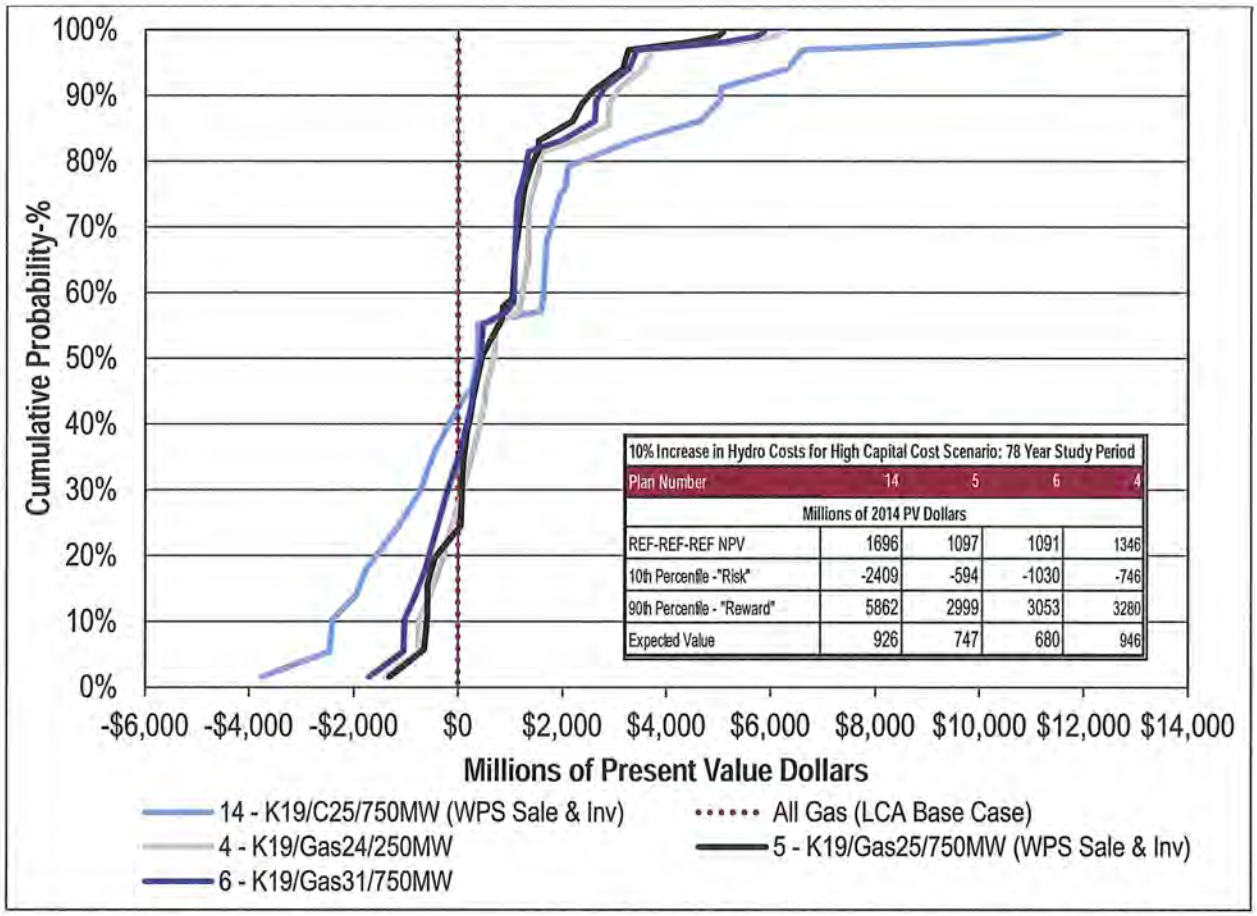

10% Increase in Hydro Costs for High Capital Cost Scenario: 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	1696	1097	1091	1346
10th Percentile -"Risk"	-2409	-594	-1030	-746
90th Percentile - "Reward"	5862	2999	3053	3280
Expected Value	926	747	680	946

Figure 9-63: The Impact of increasing by 10% the High Capital Costs for the Keeyask G. S. and Conawapa G. S. in the High Capital Cost Scenarios on the Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 78 years– Millions of 2014 Present Value Dollars

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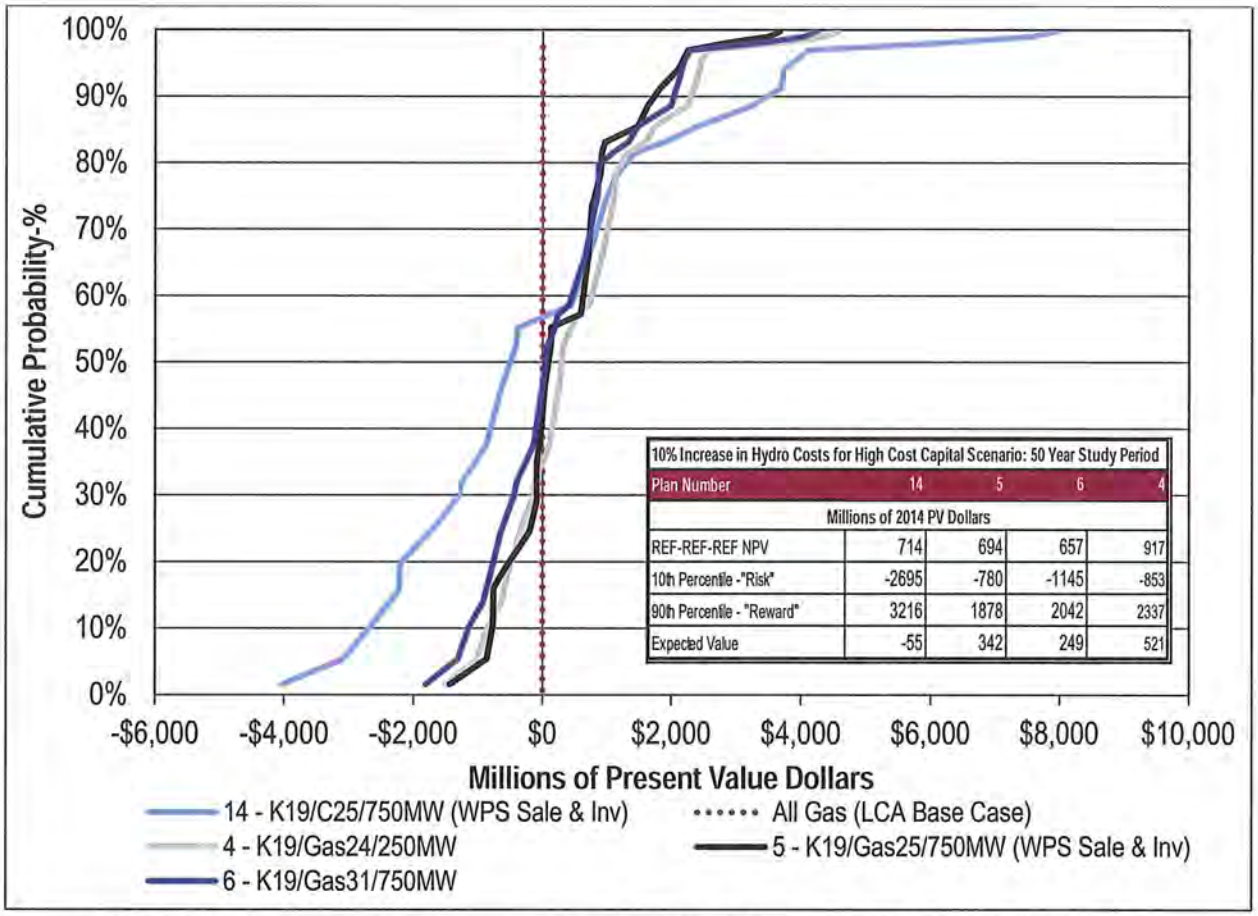
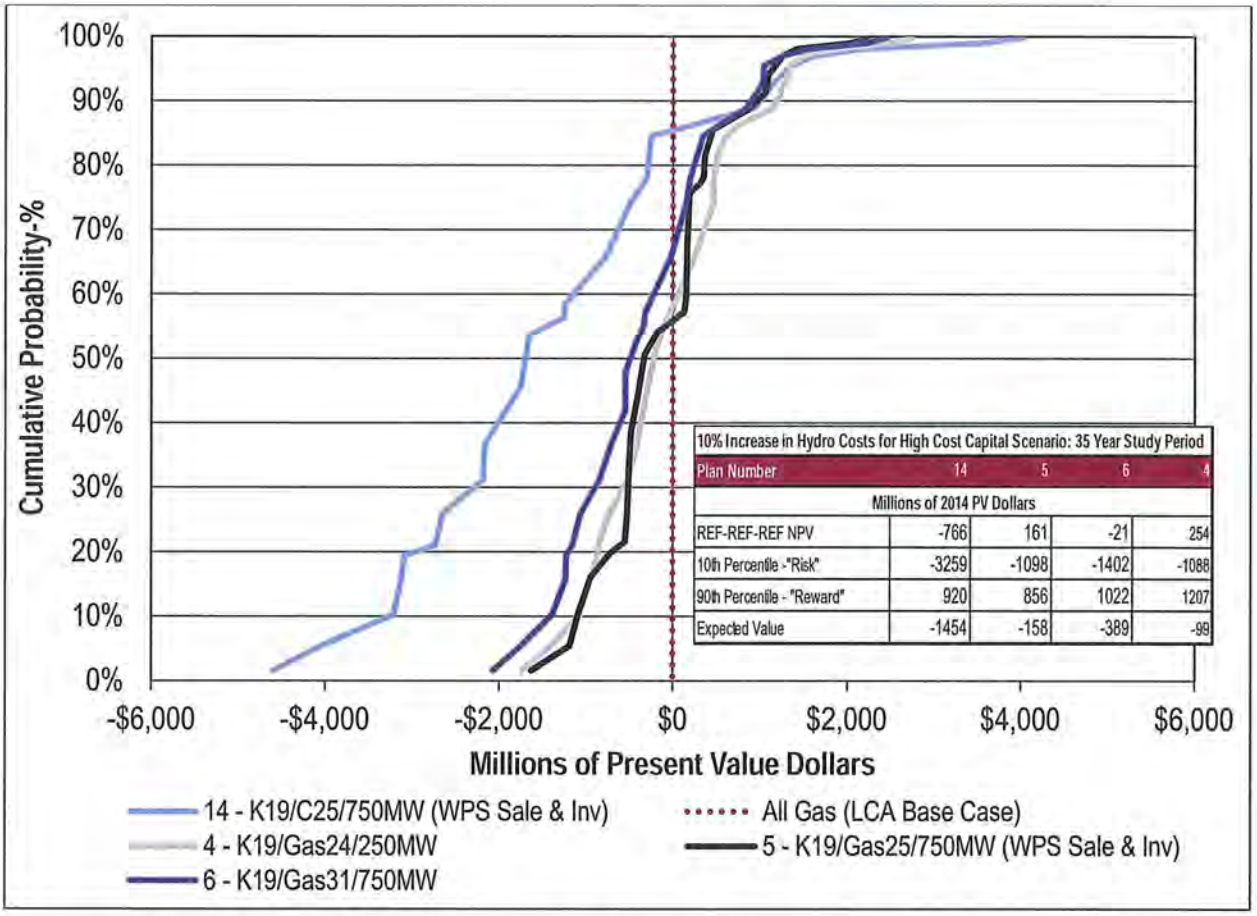


10% Increase in Hydro Costs for High Cost Capital Scenario: 50 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	714	694	657	917
10th Percentile - "Risk"	-2695	-780	-1145	-853
90th Percentile - "Reward"	3216	1878	2042	2337
Expected Value	-55	342	249	521

Figure 9-64: The Impact of increasing by 10% the High Capital Costs for the Keeyask G. S. and Conawapa G. S. in the High Capital Cost Scenarios on the Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 50 years– Millions of 2014 Present Value Dollars



10% Increase in Hydro Costs for High Cost Capital Scenario: 35 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	-766	161	-21	254
10th Percentile -"Risk"	-3259	-1098	-1402	-1088
90th Percentile - "Reward"	920	856	1022	1207
Expected Value	-1454	-158	-389	-99

Figure 9-65: The Impact of increasing by 10% the High Capital Costs for the Keeyask G. S. and Conawapa G. S. in the High Capital Cost Scenarios on the Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 35 years– Millions of 2014 Present Value Dollars

2. Higher Keeyask and Conawapa Capital Costs

The second sensitivity that we analyzed regarding the capital cost estimates for the Keeyask and Conawapa facilities is intended to capture a perspective that the low, reference and high capital cost estimates are all too low. While there have been prior hydro projects that have shown 40% or more final capital costs compared to the estimated capital cost we did not want to jump to such a pessimistic outcome. However based upon discussions with Knight Piesold we believe we settled on a

range that is feasible to have for someone skeptical of MH estimates. In the Low cost scenario. LCA used capital costs for Conawapa and Keeyask MH used with the Reference.

The Figures 9-66 through Figure 9-70 demonstrate that the impact of these increases in capital costs for Keeyask and Conawapa will, as expected, generate more costs than revenues for the Preferred Development Plan than the All Gas base case. Using the 78 year NPV metric there is less than a 50% chance that the Preferred Development Plan would be lower cost than the All Gas Plan. In the MH analysis (i.e., their capital cost estimates), the expected value of the Preferred Development Plan was to have a 78 year NPV that was nearly $1.2 Billion better than the All Gas Plan. This change in capital cost perspective for the proposed hydroelectric stations eliminates that advantage for the PDP entirely and results in Plan 4 having the lowest cost at the end of 78 years.

The results that are featured in the S-Curve charts are as follows:

Figure 9-66: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – Increased Capital Cost Of Keeyask and Conawapa in all Scenarios

Figure 9-67: Preferred Development Plan – 78 Year NPV – Comparison of Results of MH Capital Cost estimates and Increased Capital Cost Of Keeyask and Conawapa in all Scenarios

Figure 9-68: Preferred Development Plan compared to Plans 4, 5, and 6 – 78 Year NPV – Increased Capital Cost Of Keeyask and Conawapa in all Scenarios

Figure 9-69: Preferred Development Plan compared to Plans 4, 5, and 6 – 50 Year NPV – Increased Capital Cost Of Keeyask and Conawapa in all Scenarios

Figure 9-70: Preferred Development Plan compared to Plans 4, 5, and 6 – 35 Year NPV – Increased Capital Cost Of Keeyask and Conawapa in all Scenarios

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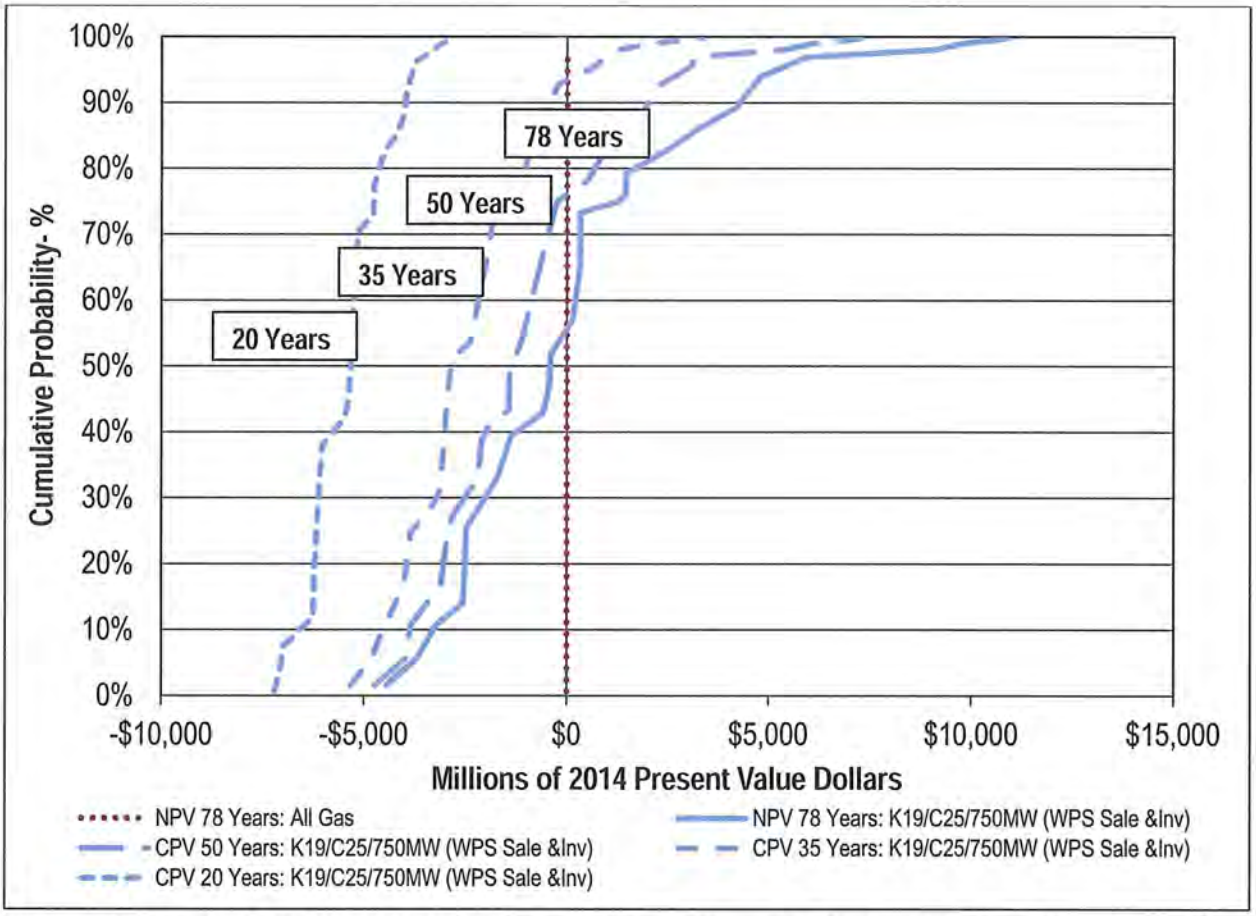

Figure 9-66: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan with Higher Capital Costs for the Keeyask G. S. and Conawapa G. S. in all Scenarios after 78 years – Millions of 2014 Present Value Dollars

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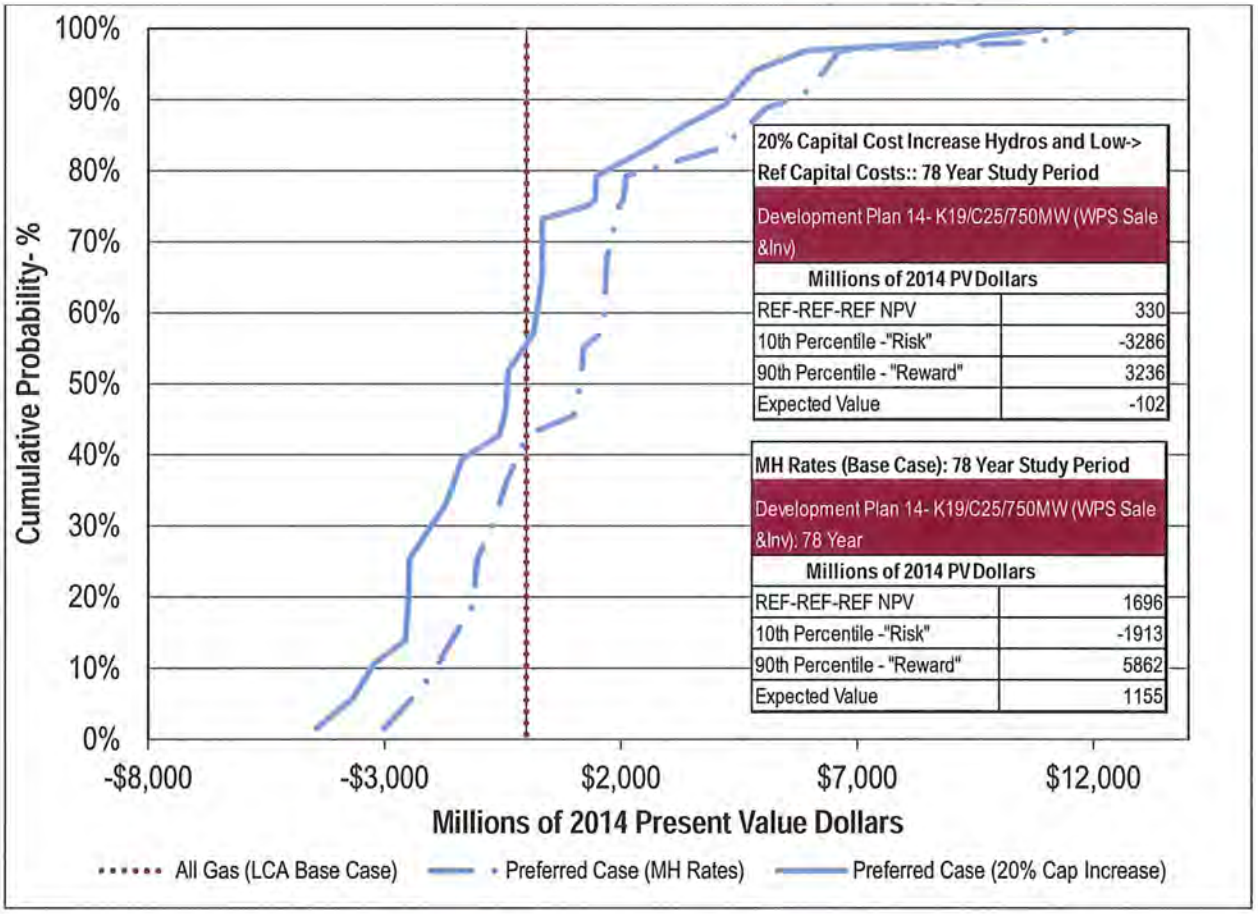

Figure 9-67: The Impact of Higher Capital Costs for the Keeyask G. S. and Conawapa G. S. in all Scenarios on the Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years– Millions of 2014 Present Value Dollars

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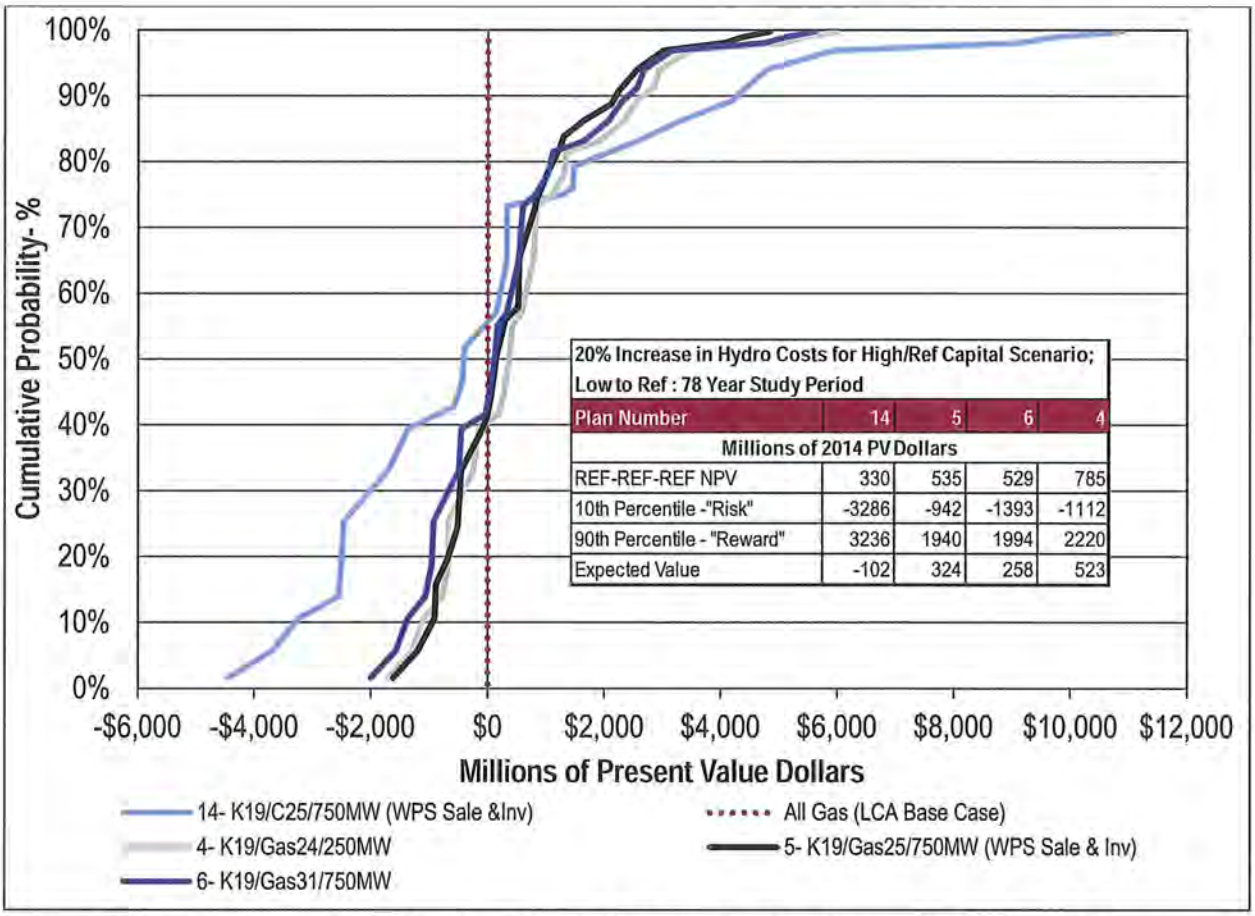
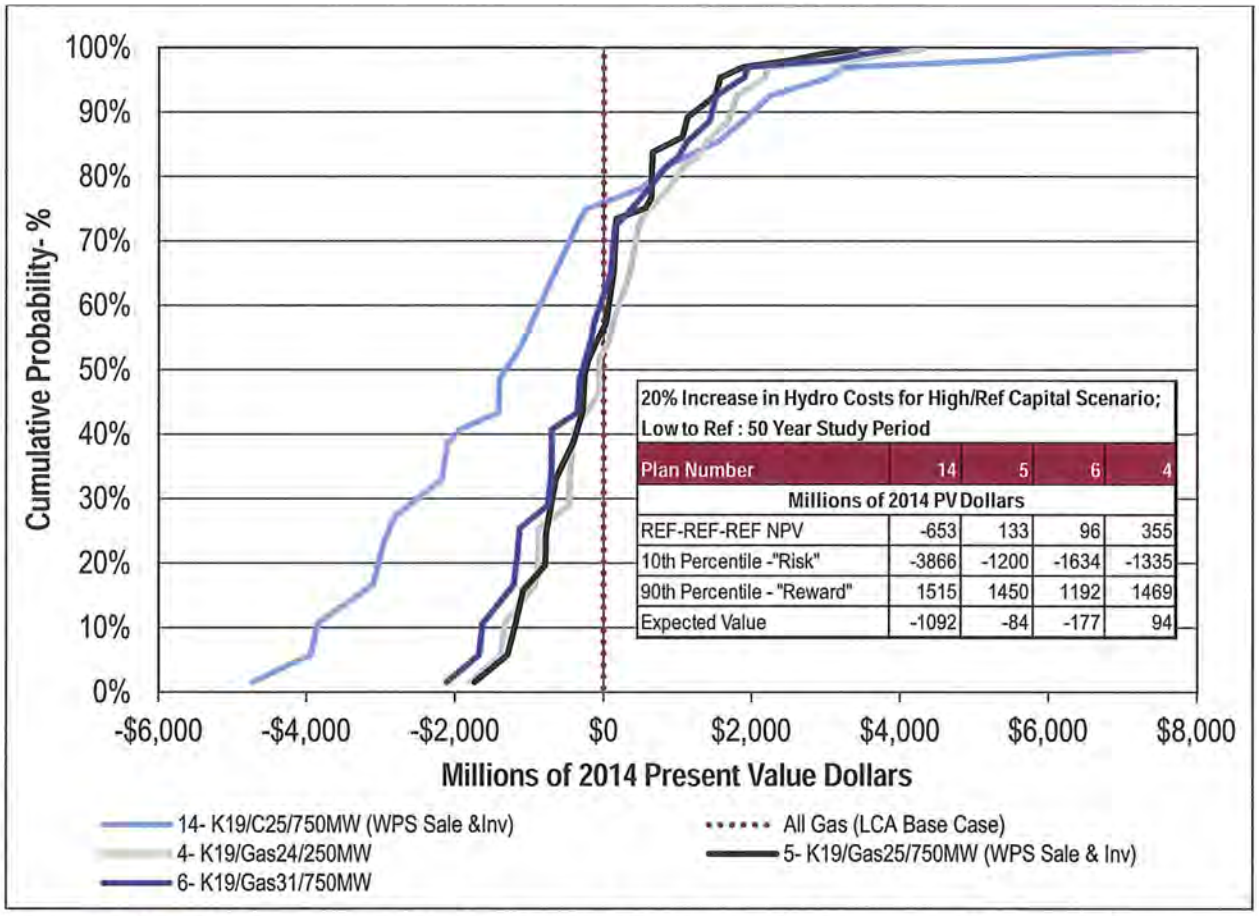


20% Increase in Hydro Costs for High/Ref Capital Scenario; Low to Ref : 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	330	535	529	785
10th Percentile -"Risk"	-3286	-942	-1393	-1112
90th Percentile - "Reward"	3236	1940	1994	2220
Expected Value	-102	324	258	523

Figure 9-68: The Impact of Higher Capital Costs for the Keeyask G. S. and Conawapa G. S. in all Scenarios on the Probability Distributions of Selected Development Plans having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars

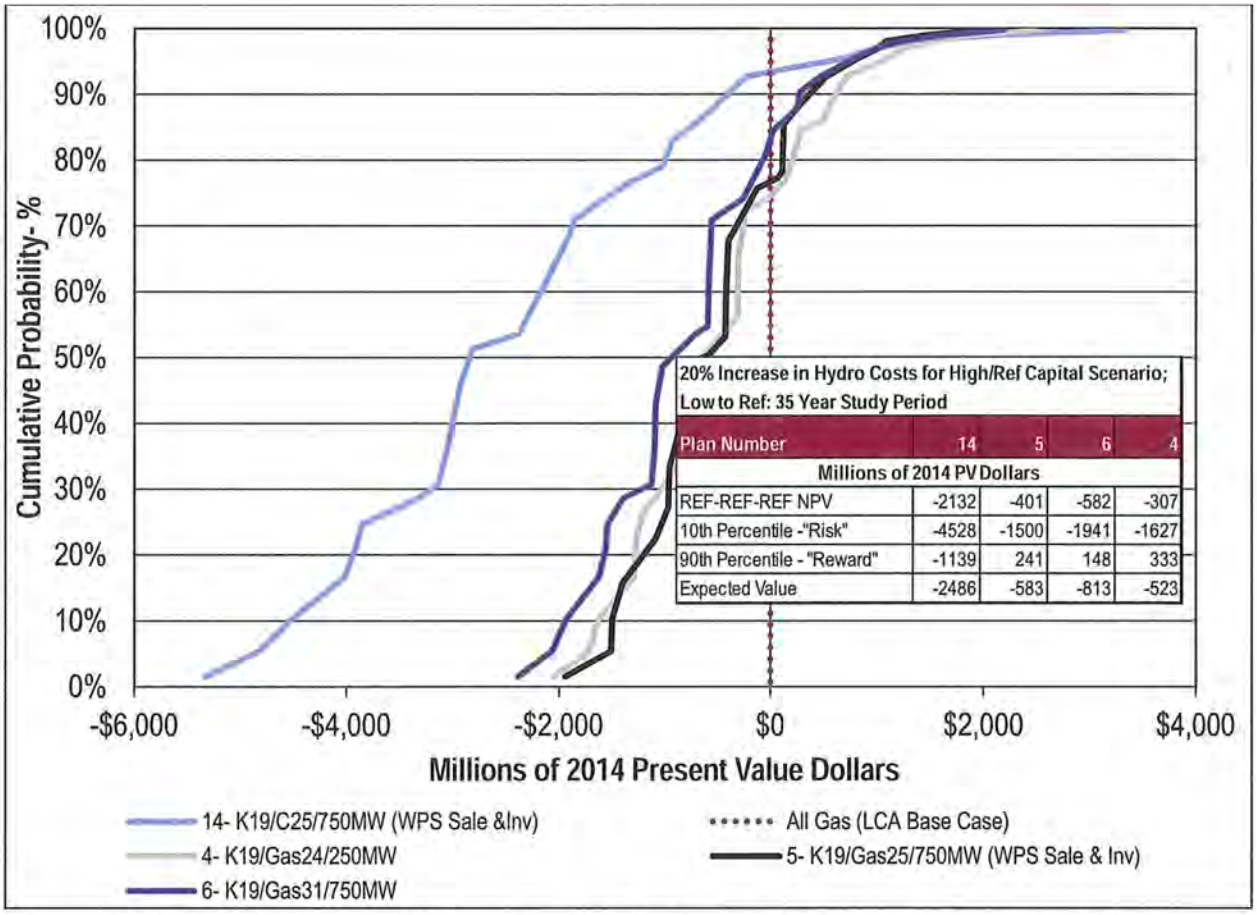
In figures comparing four plans, the Preferred Development Plan arises as even more of an outlier as compared to the All Gas Plan base case from the three other plans. The larger range in values suggests more potential risk and reward of the PDP. The comparison of the expected value at 78 years identifies the Preferred Development Plan as the only plan not to break even with the All Gas plan in this study period.



20% Increase in Hydro Costs for High/Ref Capital Scenario; Low to Ref : 50 Year Study Period

Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	-653	133	96	355
10th Percentile -"Risk"	-3866	-1200	-1634	-1335
90th Percentile - "Reward"	1515	1450	1192	1469
Expected Value	-1092	-84	-177	94

Figure 9-69: The Impact of Higher Capital Costs for the Keeyask G. S. and Conawapa G. S. in all Scenarios on the Probability Distributions of Selected Development Plans having Higher Costs than the All Gas Plan after 50 years – Millions of 2014 Present Value Dollars



20% Increase in Hydro Costs for High/Ref Capital Scenario; Low to Ref: 35 Year Study Period

Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	-2132	-401	-582	-307
10th Percentile -"Risk"	-4528	-1500	-1941	-1627
90th Percentile - "Reward"	-1139	241	148	333
Expected Value	-2486	-583	-813	-523

Figure 9-70: The Impact of Higher Capital Costs for the Keeyask G. S. and Conawapa G. S. in all Scenarios on the Probability Distributions of Selected Development Plans having Higher Costs than the All Gas Plan after 35 years– Millions of 2014 Present Value Dollars

E. Sensitivity to Thermal and Wind Capital Cost

In this pair of sensitivities LCA sought to test whether the metrics were sensitive to assumptions around the capital costs of natural gas generation and wind turbine generation. It was apparent that the methodology adopted by MH that assigns wider capital costs uncertainties to projects that are in the earliest planning stages. This leads to an unusual view around capital cost uncertainty ranges that there is much greater uncertainty in the capital costs for Thermal and Wind Capacity than there is on the Keeyask and Conawapa projects, even though the hydro projects are much more

complex. Thermal and Wind Generation projects can even be completed under turn-key contracting approaches, which can minimalize the uncertainty in project related cost uncertainties. For these reasons LCA sought to test the impact of different ranges for uncertainty in capital costs of thermal and wind generation projects.

1. Reduced Uncertainty Band for Thermal and Wind Capital Costs –

LCA wanted to understand what would happen to the S Curve and expected values if the generation capital costs other than Keeyask and Conawapa had been the result of a more detailed study. To model this we have reduced the High Capital Costs Reduced by 20%, Low Capital Costs Increased by 15%. Figure 9-71 and Figure 9-72 which follow show that there is minimal impact.

The results that are featured in the S-Curve charts are as follows:

Figure 9-71: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – Reduced Uncertainty Band for Thermal and Wind Capital Costs

Figure 9-72: 78 Year NPV – Comparison of Results of MH Uncertainty Capital Costs for Thermal and Wind with a Reduced Uncertainty Band for Thermal and Wind Capital Costs

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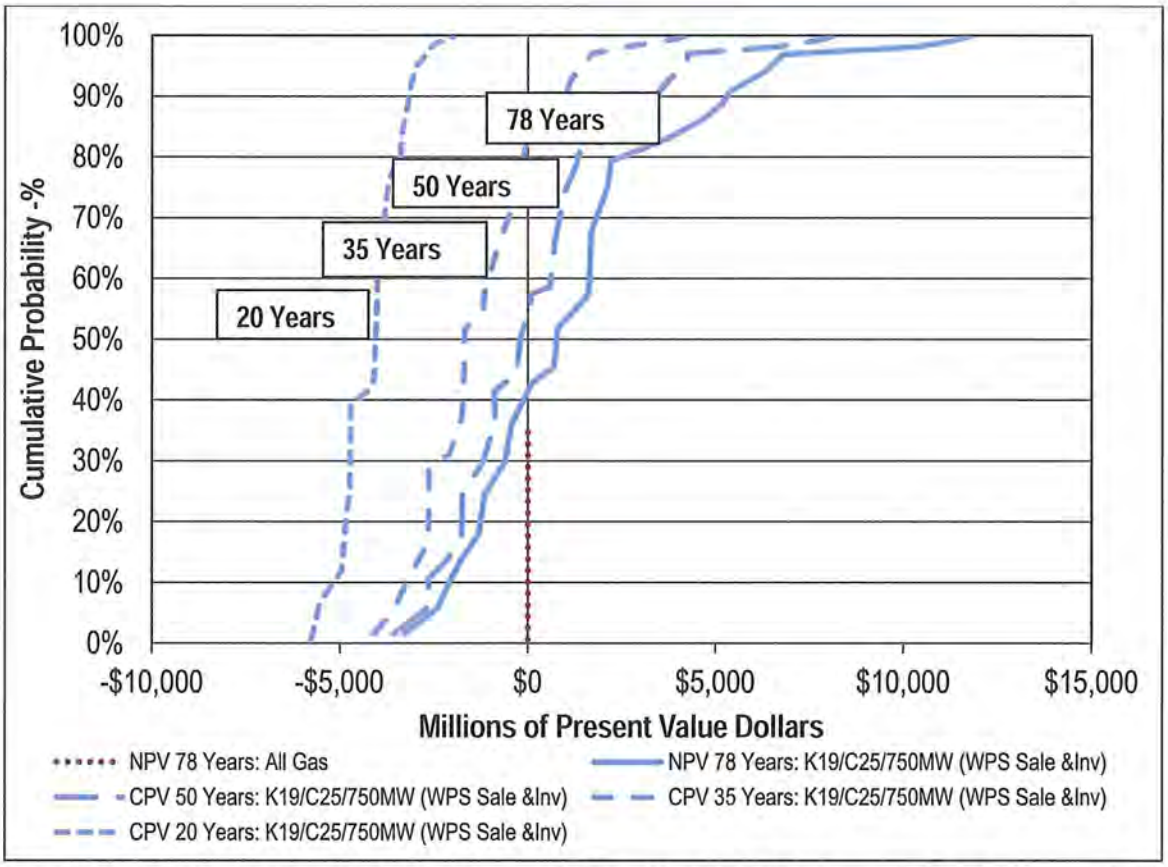

Figure 9-71: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan with one-half the variation in the High and Low capital cost uncertainty range for Thermal and Wind generation after 78 years – Millions of 2014 Present Value Dollars

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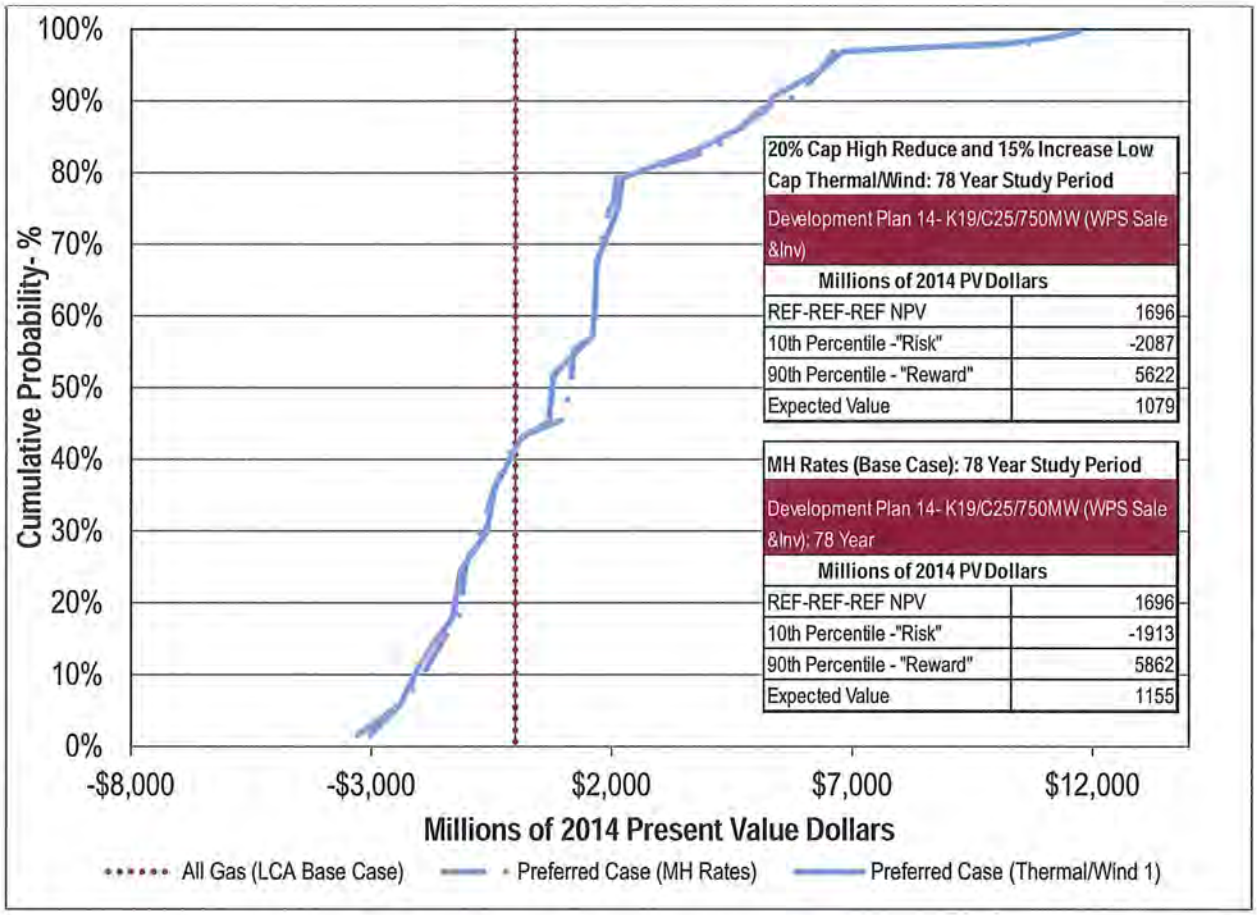

20% Cap High Reduce and 15% Increase Low Cap Thermal/Wind: 78 Year Study Period	
Development Plan 14- K19/C25/750MW (WPS Sale &Inv)	
Millions of 2014 PV Dollars	
REF-REF-REF NPV	1696
10th Percentile -"Risk"	-2087
90th Percentile - "Reward"	5622
Expected Value	1079

MH Rates (Base Case): 78 Year Study Period	
Development Plan 14- K19/C25/750MW (WPS Sale &Inv); 78 Year	
Millions of 2014 PV Dollars	
REF-REF-REF NPV	1696
10th Percentile -"Risk"	-1913
90th Percentile - "Reward"	5862
Expected Value	1155

Figure 9-72: The Impact of changing to one-half the variation in the High and Low capital cost uncertainty range for Thermal and Wind generation on the Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars

1. Testing for No Uncertainty in Thermal and Wind Capital Costs –

In addition, LCA wanted to disconnect the joined capital cost uncertainty of the hydroelectric and non-hydroelectric projects. To model this effect we have made the capital costs of thermal and wind projects equal to reference in the high and low capital cost scenarios. In the high and low scenarios the hydroelectric projects still have uncertain capital costs. Figures 9-73 and 9-74 below show that this effect is minimal.

The results that are featured in the S-Curve charts are as follows:

Figure 9-73: Preferred Development Plan - 20, 35, 50, and 78 Year NPV – No Uncertainty in Thermal and Wind Capital Costs

Figure 9-74: 78 Year NPV – Comparison of Results of MH Capital Costs for Thermal and Wind and No Uncertainty in Thermal and Wind Capital Costs

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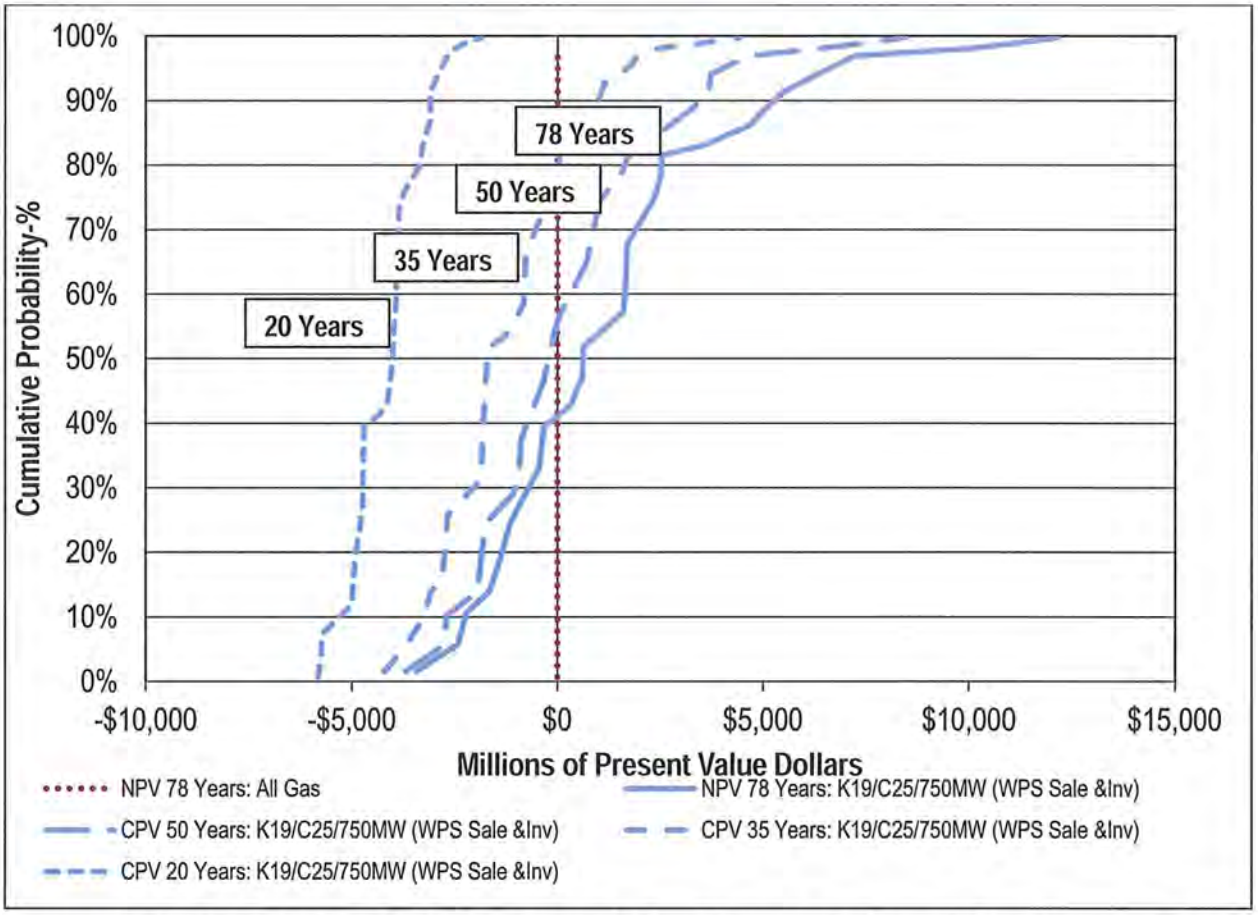


Figure 9-73: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan assuming NO variation in the High and Low capital cost uncertainty range for Thermal and Wind generation after 78 years – Millions of 2014 Present Value Dollars

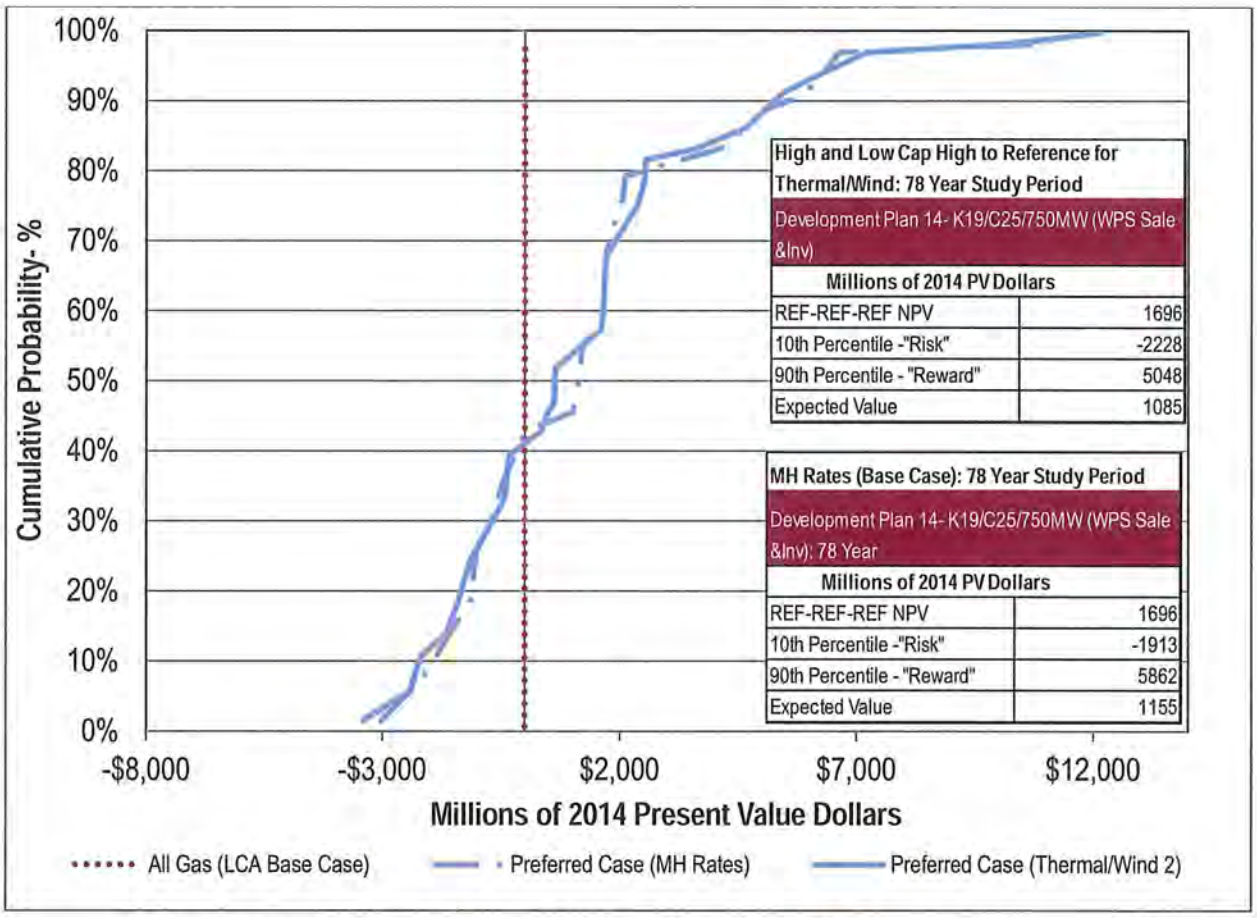


Figure 9-74: Preferred Development Plan Showing the impact of assuming NO variation in the High and Low capital cost uncertainty range for Thermal and Wind generation

F. Synopsis

LCA performed various sensitivity tests to understand how robust the observations and conclusions are that were made by MH, given that there can be differing opinions on certain core assumptions. LCA developed a working Economic Modeling spreadsheet that would us to vary the probability distributions of key uncertainties, the capital cost of generation additions, and the discount rates. Earlier in this report we showed by comparing the NPV differences to capital costs of development plans that there is actually only a small relative NPV compared to the large increase in investment required for the Preferred Development Plan. We also showed that the IRR of the Preferred Development Plan was only 6.15% compared to a discount rate of 5.05%, both

on a real dollar basis. It also showed that other development plans have IRR higher than the Preferred Development Plan when compared to the All Gas Plan. Lastly our analysis in Sections II and III showed that for time periods as lengthy as 50 years there are development plans with lower costs and lower risks than the Preferred Development Plan. All these metrics indicated a very small margin of savings being created even with all MH assumptions and analyses and even going out the full 78 years.

The last step in testing the robustness of MH conclusion that MH prefers Plan 14 is to review the sensitivities performed in this section. The sensitivities chosen by LCA are not intended to be extremes, but are intended to be reflective of more current information, the opinions of IECs in this proceeding, or to reflect a risk factor. The key observation we draw from the sensitivity analyses are the following:

1. A modest increase in discount rates or the elimination from consideration the low discount rate scenarios postulated by MH would make the Preferred Development Plan have the same present values of costs over 78 years as the All Gas Plan on an Expected Value basis.
2. Several Plans are have lower costs than the Preferred Development Plan, even over 78 years, when higher discount rates are assumed.
3. Modest increases in Capital cost assumptions for the Keeyask and Conawapa projects would also result in other Development Plans having lower costs than the Preferred Development Plan, even over 78 years.
4. A slightly lower view of export market prices substantially erodes the MH expected economic benefits of the Preferred Development Plan.
5. The economics used by MH to arrive at their preference for the Preferred Development Plan is not robust and, depending upon the perspective of the decision maker, could actually conclude that other development plans are preferred.

V. Economic Analysis Provincial Perspective

A. Introduction

All the prior economic analysis in this Technical Appendix was conducted as a cash flow perspective of MH and its ratepayers. In this prior analysis, this means that any cost incurred by MH is included, whether it be a hard expenditure or payments made to the province of Manitoba. In order to make this a change to the Province of Manitoba Perspective, one would look at which costs were included in the MH perspective analysis which are made to the Province that do not have a cost to the Province (i.e., essentially a tax payment of sort). MH has identified three candidate costs which can be labeled as Provincial Transfer Payments: Water Rental Fees, Capital Tax and the 1% Provincial Guarantee Fee on Borrowing made on behalf of MH.

In this section, we will show how the economics of plans with investments in one or more of the proposed hydroelectric facilities—Keeyask or Conawapa—are improved by removing those costs. As will be discussed, LCA, after consultation with Morrison Park Associates, differs in opinion as to whether all three of the cost types that MH assumes to be Provincial Transfers should be considered Provincial Transfers.

B. Manitoba Hydro Analysis

In MH's Section 9.3.3 they provide NPVs in a 78 year study period using reference scenario assumptions for "*additional assumed cash transfers to the Province of Manitoba,*"[41] which includes water rentals, capital taxes, and provincial guarantee fees. MH defines the water rentals as "*based on the operation of Manitoba Hydro's hydro-electric generation and are calculated and paid to the Province of Manitoba in accordance with the Water Power Act.*" Capital taxes are defined as "*provincial tax(es) assessed under The Corporation Capital Tax Act of Manitoba. In general terms, the tax is applied at a rate of 0.5% to the capital invested by Manitoba Hydro in the province, where "capital" can be generally defined as the "total debt and retained earnings of the corporation."*

MH defined the provincial guarantee fee as "*an annual fee payable to the Province of Manitoba in return for guarantee of corporation's debt (with exception of some MHEB bonds) and is calculated using a rate of 1% multiplied the gross outstanding debt at March 31 of the*

[41] NFAT Submission, Chapter 9, p. 23.

previous fiscal year."[42] The fee is 1%of the total capital invested for each development plan. The percentages for each of these fees are assumed to remain constant for economic analysis purposes.

MH includes a review of these cash transfers in their economic analysis because the fees benefit the provincial government and, indirectly, the Manitoban taxpayers. Because these fees are classified and used as costs in the economic analysis, MH believed specific attention and analysis would provide a more holistic understanding of these cash flows. MH concludes that the *"greatest cash transfers to the Province result from those development plans that include both Keeyask and Conawapa generating stations; these cash transfers are significantly greater than those development plans that include only one or no hydro-electric generating station."*[43]

[42] *Id.*, p. 24.

[43] *Id.*, p. 25.

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.

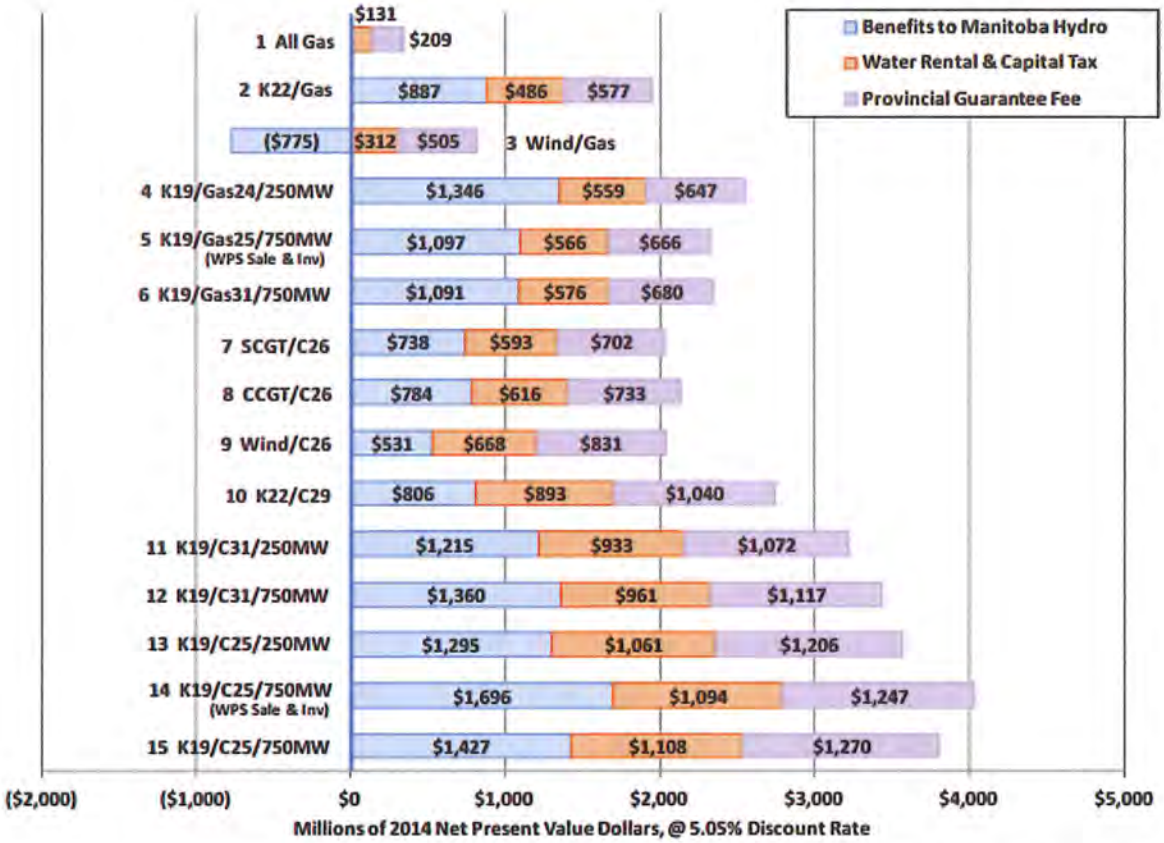


Figure 9-75: Resource Plan Economic Benefits after 78 year to the Province of Manitoba as filed in the NFAT application by Manitoba Hydro – Millions of 2014 Present Value Dollars

C. La Capra Associates' Critique of Manitoba Hydro Analysis

As mentioned in the introduction, LCA, after consultation with Morrison Park Associates, does not agree that the 1% Provincial Loan Guarantee Fee that the province charges MH is a Provincial Transfer. The rationale for our opinion is that this Fee, unlike the Water Rental Fee, is merely compensation to the Province for the risks the Province has assumed by providing the Guarantee. By taking on the risks, the Province has some probability that this will have a cost to the Province if the Guarantee is called upon.

In addition, as with the MH perspective economic analysis discussed earlier in this report, LCA views the MH sole reliance on the 78 year study time period metric of NPV for decision making lacks the important visibility as to what are the impacts during shorter time periods.

Lastly, LCA believes there are some additional insights that can be gained by analyzing the IRR metric which captures the time period impacts more acutely than a present value analysis alone.

D. La Capra Associates' Analysis—Economics of Resource Plans from the Provincial Perspective-Reference Scenario

As mentioned in the introduction, LCA, after consultation with Morrison Park Associates, does not agree that the 1% Provincial Loan Guarantee Fee that the province charges MH is merely a transfer payment. The analysis in this section is LCA's view of the economic analysis from the perspective of the Province of Manitoba. This view removes the Water Rental Fees and Capital Tax as costs associated with the Keeyask GS and the Conawapa GS.

In order to properly illustrate the results, the following chart is shown differently than the MH version above. The blue bars represent the economics to MH that we discussed in all the prior chapters in this Technical Appendix. The red bars represent the present value of the Water rental and Capital Tax charges. By adding these two together to get the gray bar, we have the Total direct benefits to the Province of Manitoba associated with each specific resource development plan.

We see that the 78 year study period economics of the development plans, which include both hydroelectric generating stations, have over $2 Billion of benefits compared to the All Gas Plan (assuming the modeling results of MH). The development plans with only one of the hydroelectric generating stations have benefits of over $1 Billion to $1.7 Billion on a 78 year NPV basis.

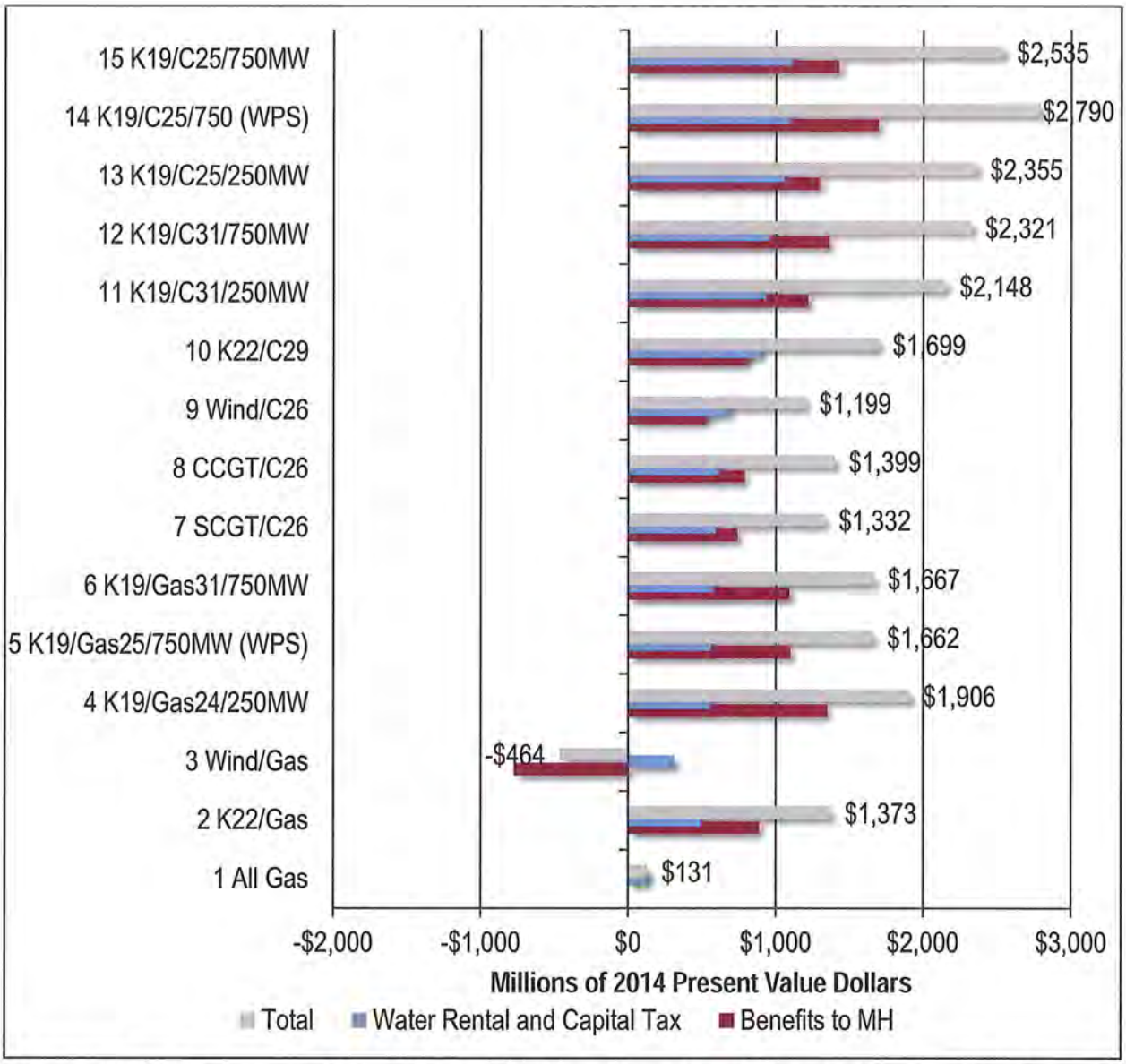


Figure 9-76: Resource Plan Economic Benefits after 78 year to the Province of Manitoba LCA Perspective – Millions of 2014 Present Value Dollars

The effects of looking at economics of the resource plans to the Province, when one looks at the shorter study periods of 50, 35 and 20 years, show reduced and even negative benefits of resource plans relative to the All Gas Plan. This is shown in Figure 9-77, Figure 9-78, and Figure 9-79 below.

Next, we should look at the 50 year CPV metric shown below in Figure 9-77. We see in this figure that from the MH perspective the plans have negative CPV, meaning they have higher costs to MH than the All Gas Plan. However the majority of the development plans' benefits from the proposed Keeyask GS And Conawapa GS are taken by the Province through the provincial 'tax' revenue, Capital tax and Water rental fees.

In the 35 year period, we can see in Figure 9-78 below that there are substantial Provincial Transfers made for Water Rental Fees and Capital tax charges made to MH and its ratepayers even though the resource plans have no net benefits when compared to the All Gas Plan. After 35 years, only three plans have lower costs than the all Gas Plan, even when the Provincial transfers have been taken away from the resource plan costs. After 35 years, the lowest cost resource plan is Plan 4, followed closely by Plan 5. These two plans include only the Keeyask GS and natural gas generation. Plan 4 assumes the smaller 250 MW of incremental transmission, while Plan 5 assumes the larger 750 MW transmission project.

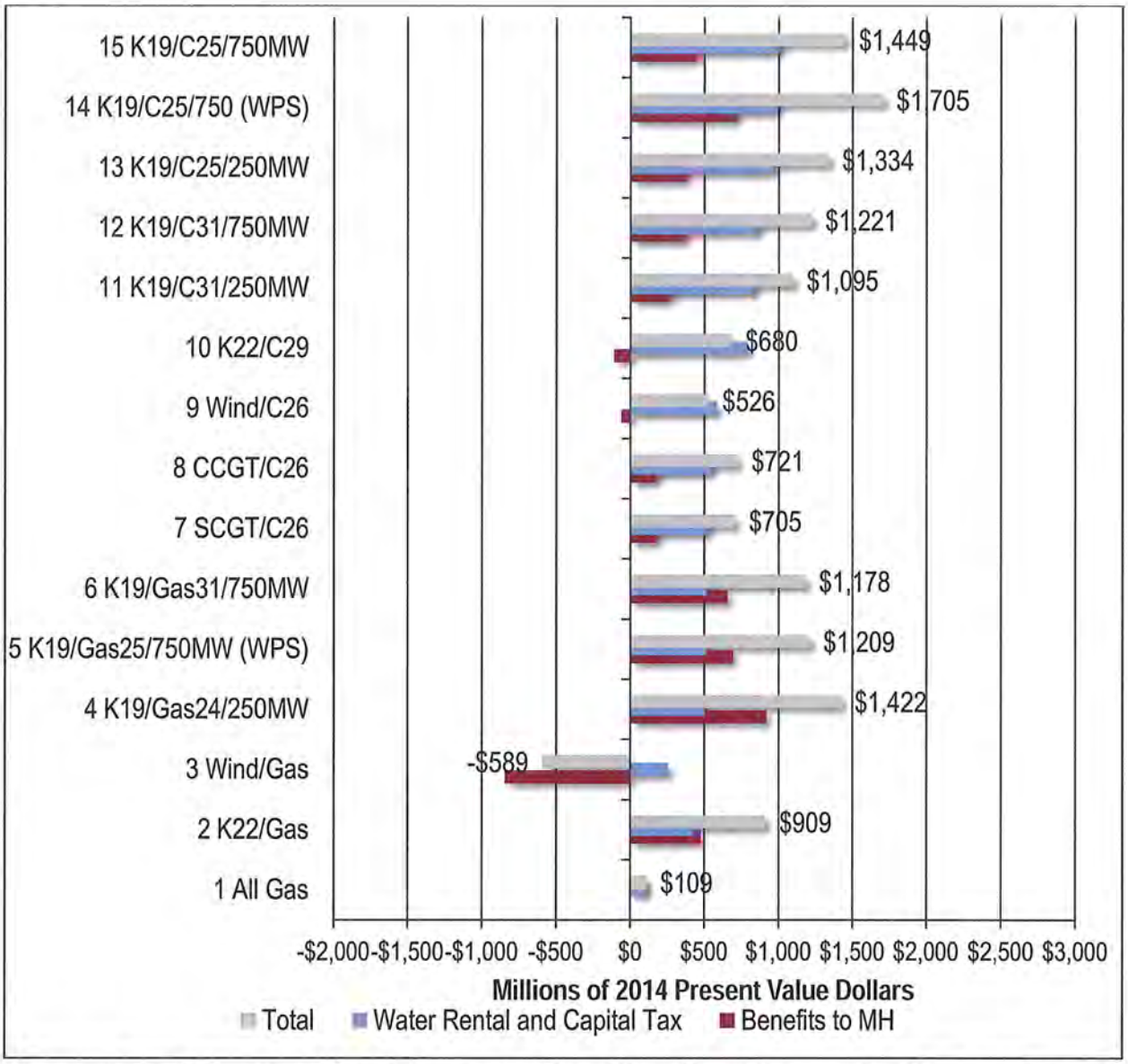


Figure 9-77: Resource Plan Economic Benefits after 50 year to the Province of Manitoba LCA Perspective – Millions of 2014 Present Value Dollars

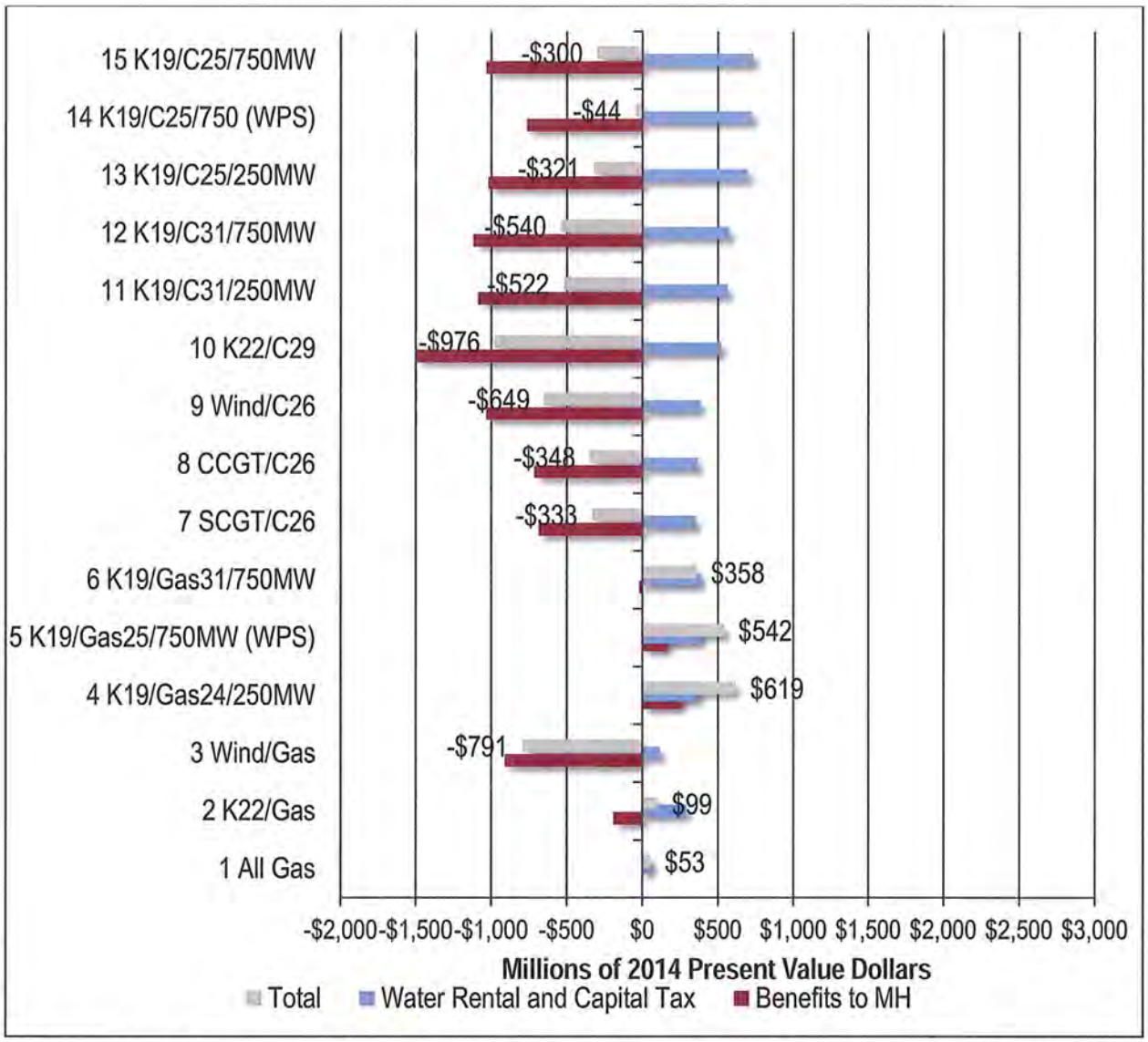


Figure 9-78: Resource Plan Economic Benefits after 35 year to the Province of Manitoba LCA Perspective – Millions of 2014 Present Value Dollars

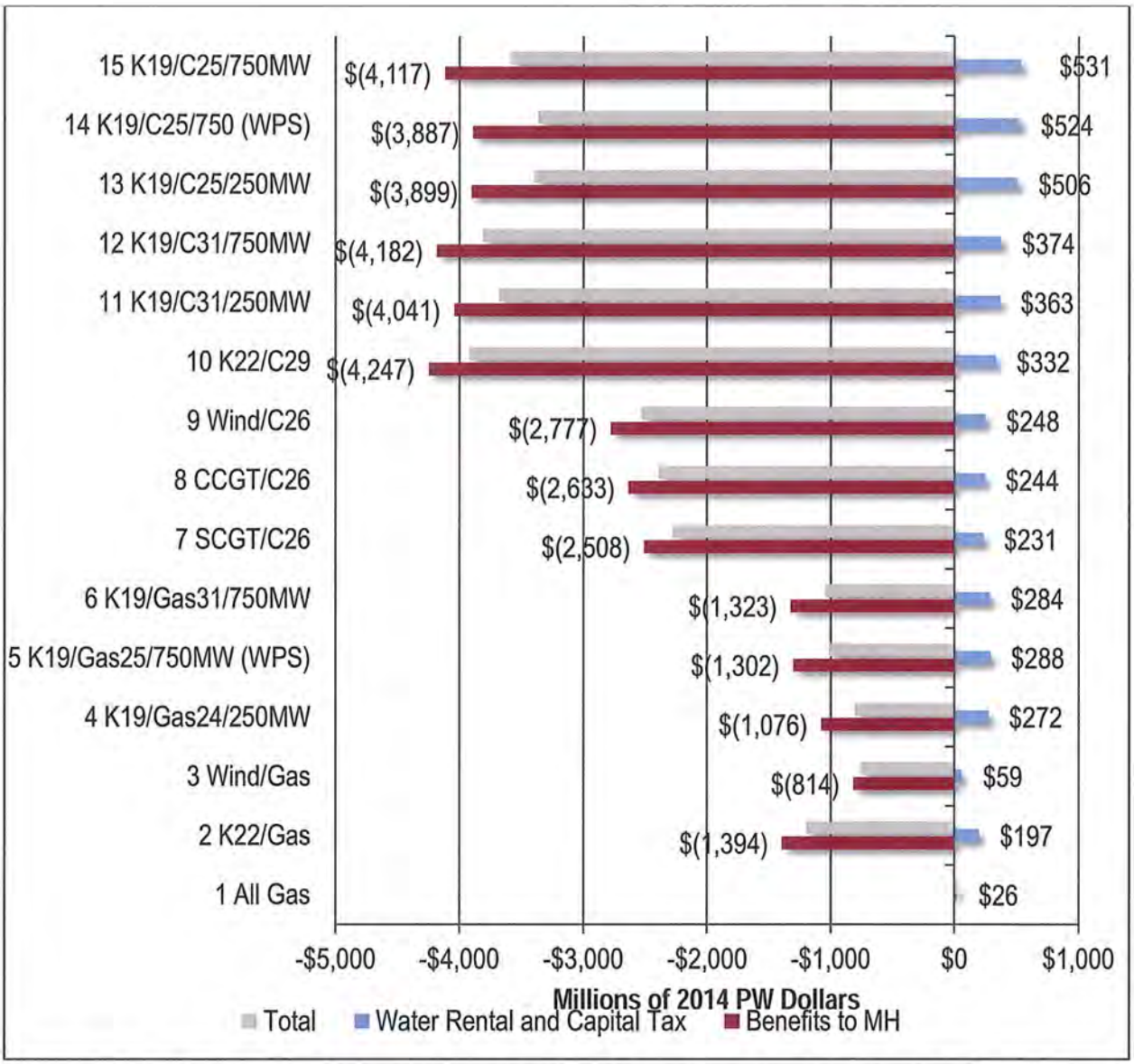


Figure 9-79: Resource Plan Economic Benefits after 35 year to the Province of Manitoba LCA Perspective – Millions of 2014 Present Value Dollars

E. La Capra Associates Analysis – Uncertainty

LCA also extended the analysis without Provincial Transfers, The Province of Manitoba Perspective, beyond the reference scenario analysis, bringing in the full uncertainty probabilistic analysis. In this section LCA applies its comparison methodology by determining the incremental NPV of a development plan under a given scenario to the All Gas Plan NPV under that same scenario. This is shown in Figure 9-80 to Figure 9-85 below.

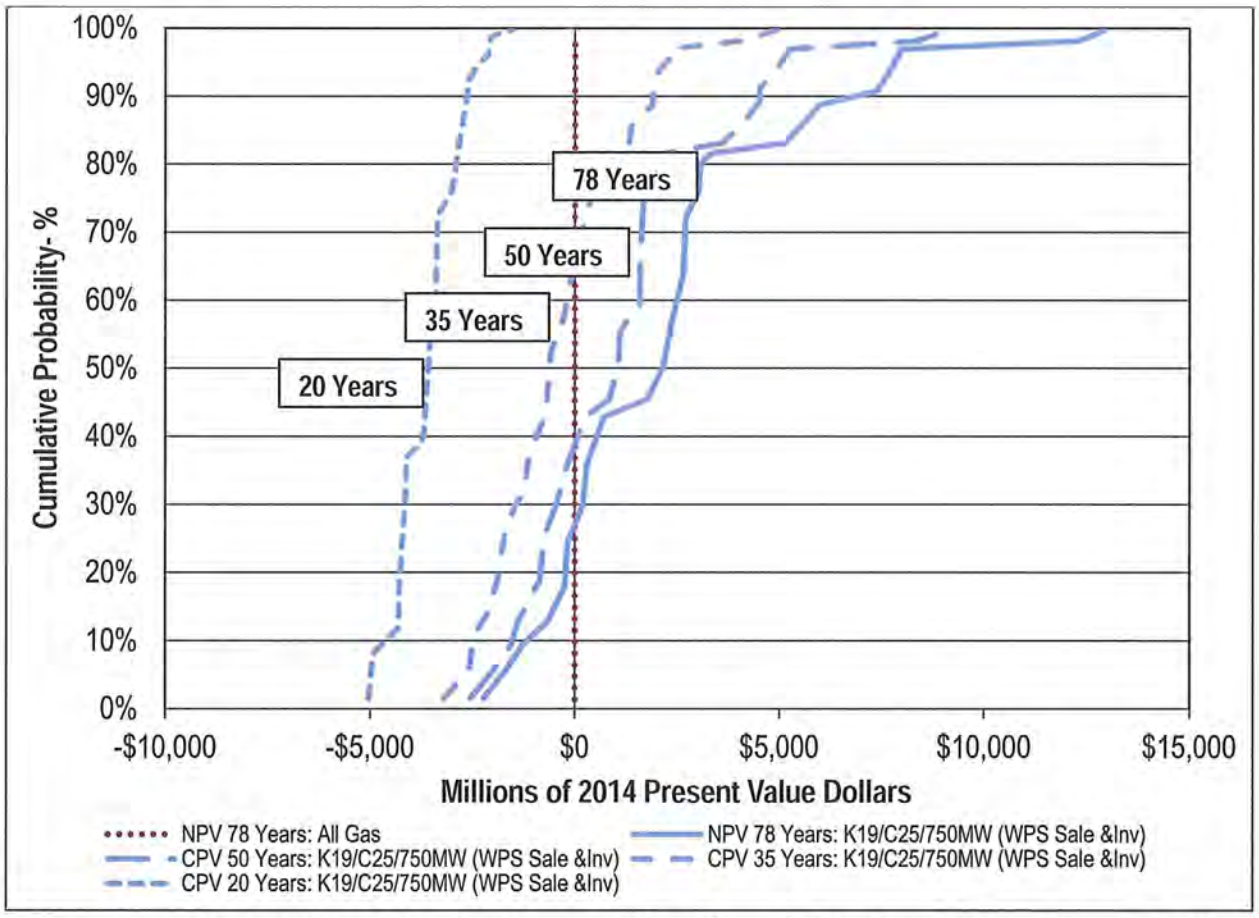
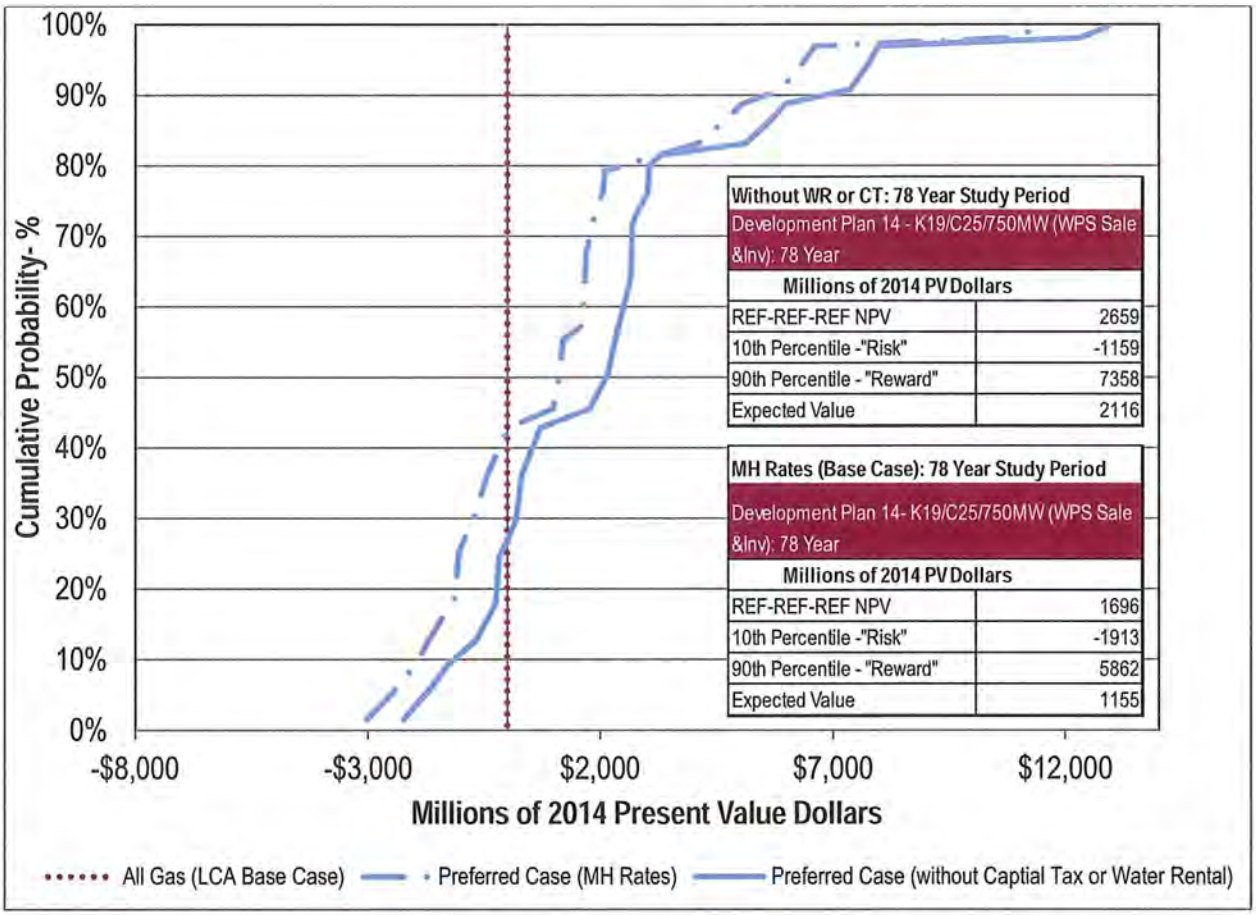


Figure 9-80: Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years from the Province of Manitoba Perspective by eliminating LCA view of Intra-provincial transfers – Millions of 2014 Present Value Dollars

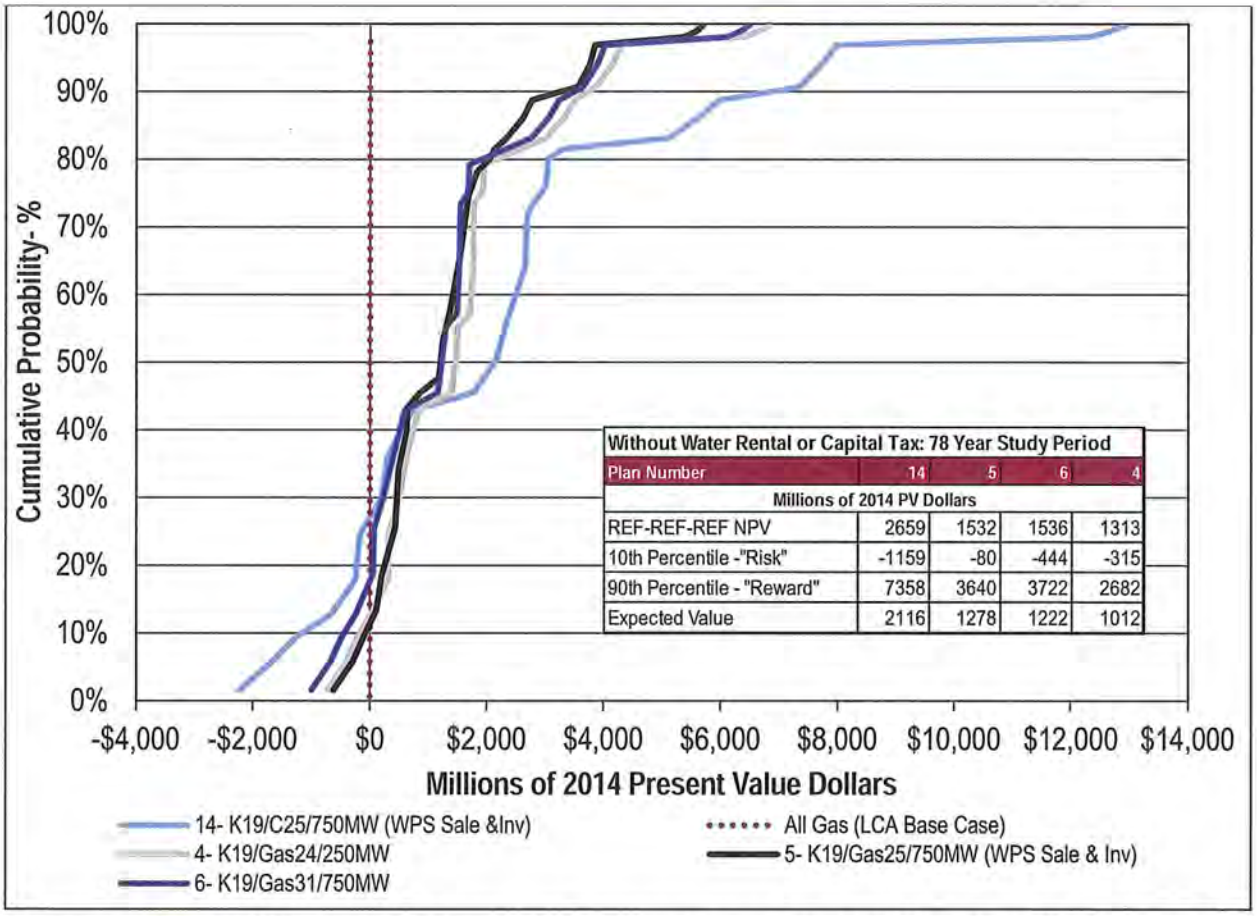


Without WR or CT: 78 Year Study Period	
Development Plan 14 - K19/C25/750MW (WPS Sale &Inv): 78 Year	
Millions of 2014 PV Dollars	
REF-REF-REF NPV	2659
10th Percentile -"Risk"	-1159
90th Percentile - "Reward"	7358
Expected Value	2116

MH Rates (Base Case): 78 Year Study Period	
Development Plan 14- K19/C25/750MW (WPS Sale &Inv): 78 Year	
Millions of 2014 PV Dollars	
REF-REF-REF NPV	1696
10th Percentile -"Risk"	-1913
90th Percentile - "Reward"	5862
Expected Value	1155

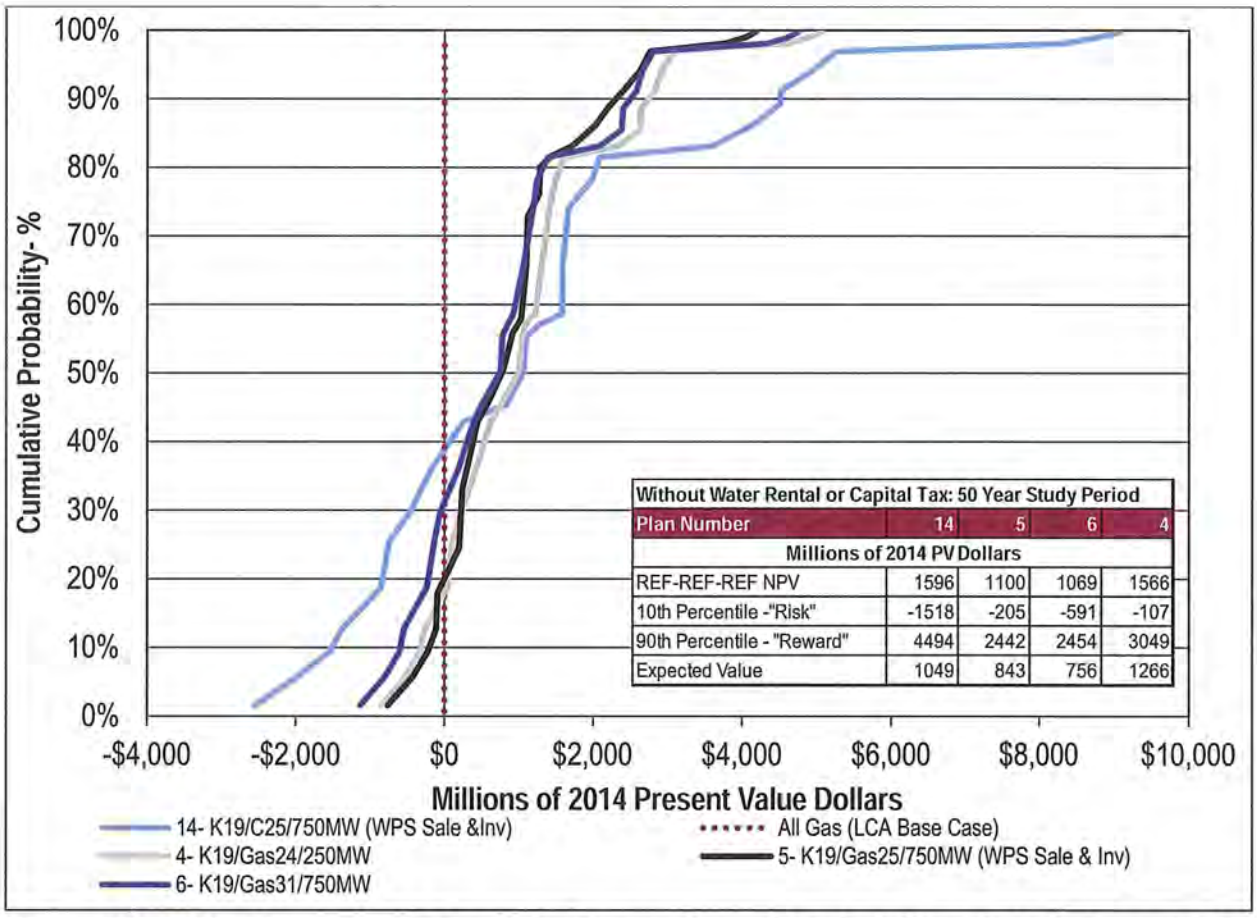
Figure 9-81: Comparisons of the Manitoba Hydro Perspective and the Province of Manitoba Perspectives of the Probability Distributions of the Plan 14 Preferred Development Plan having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.



Without Water Rental or Capital Tax: 78 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	2659	1532	1536	1313
10th Percentile -"Risk"	-1159	-80	-444	-315
90th Percentile - "Reward"	7358	3640	3722	2682
Expected Value	2116	1278	1222	1012

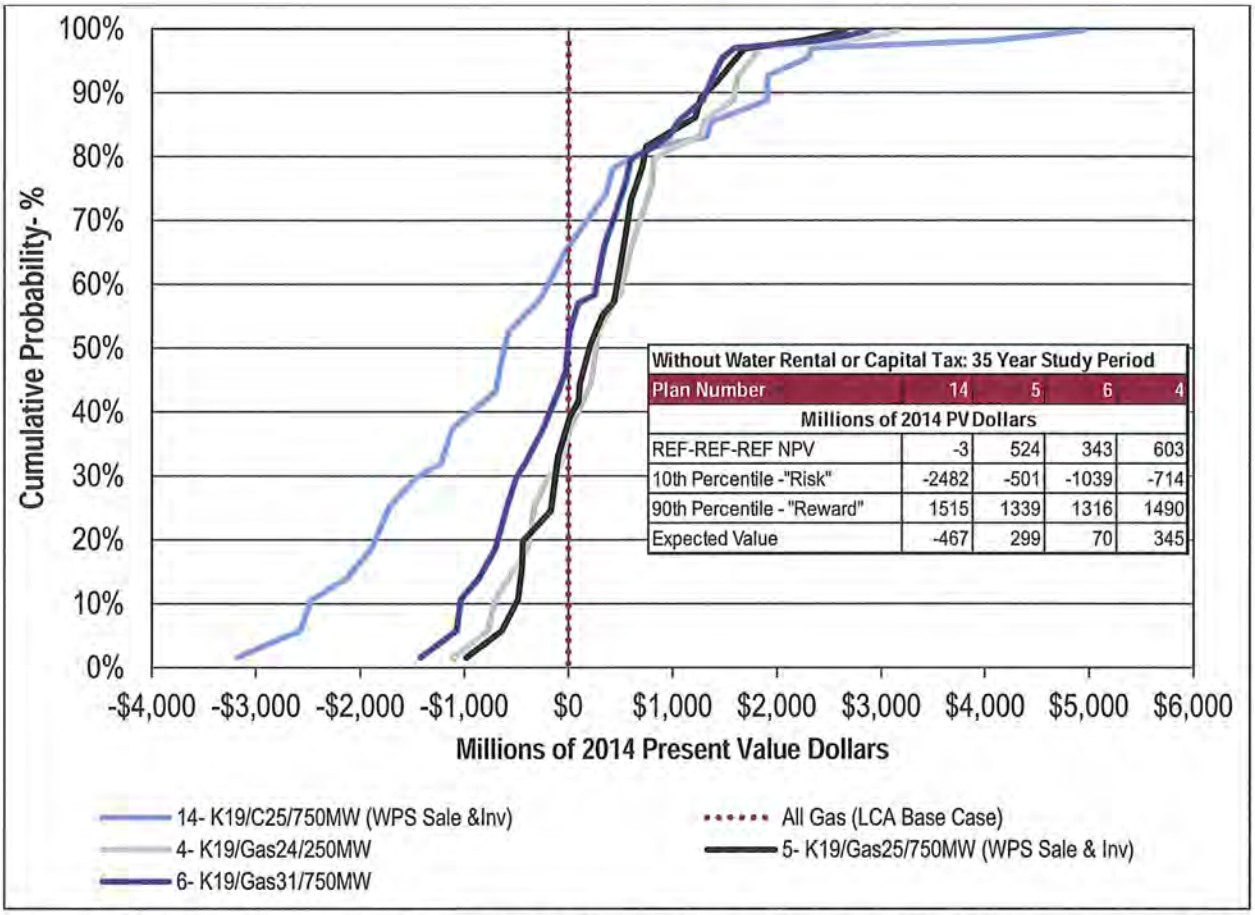
Figure 9-82: The Province of Manitoba Perspective of Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 78 years – Millions of 2014 Present Value Dollars



Without Water Rental or Capital Tax: 50 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	1596	1100	1069	1566
10th Percentile -"Risk"	-1518	-205	-591	-107
90th Percentile - "Reward"	4494	2442	2454	3049
Expected Value	1049	843	756	1266

Figure 9-83: The Province of Manitoba Perspective of Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 50 years – Millions of 2014 Present Value Dollars

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.



Without Water Rental or Capital Tax: 35 Year Study Period				
Plan Number	14	5	6	4
Millions of 2014 PV Dollars				
REF-REF-REF NPV	-3	524	343	603
10th Percentile -"Risk"	-2482	-501	-1039	-714
90th Percentile - "Reward"	1515	1339	1316	1490
Expected Value	-467	299	70	345

Figure 9-84: The Province of Manitoba Perspective of Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 35 years – Millions of 2014 Present Value Dollars

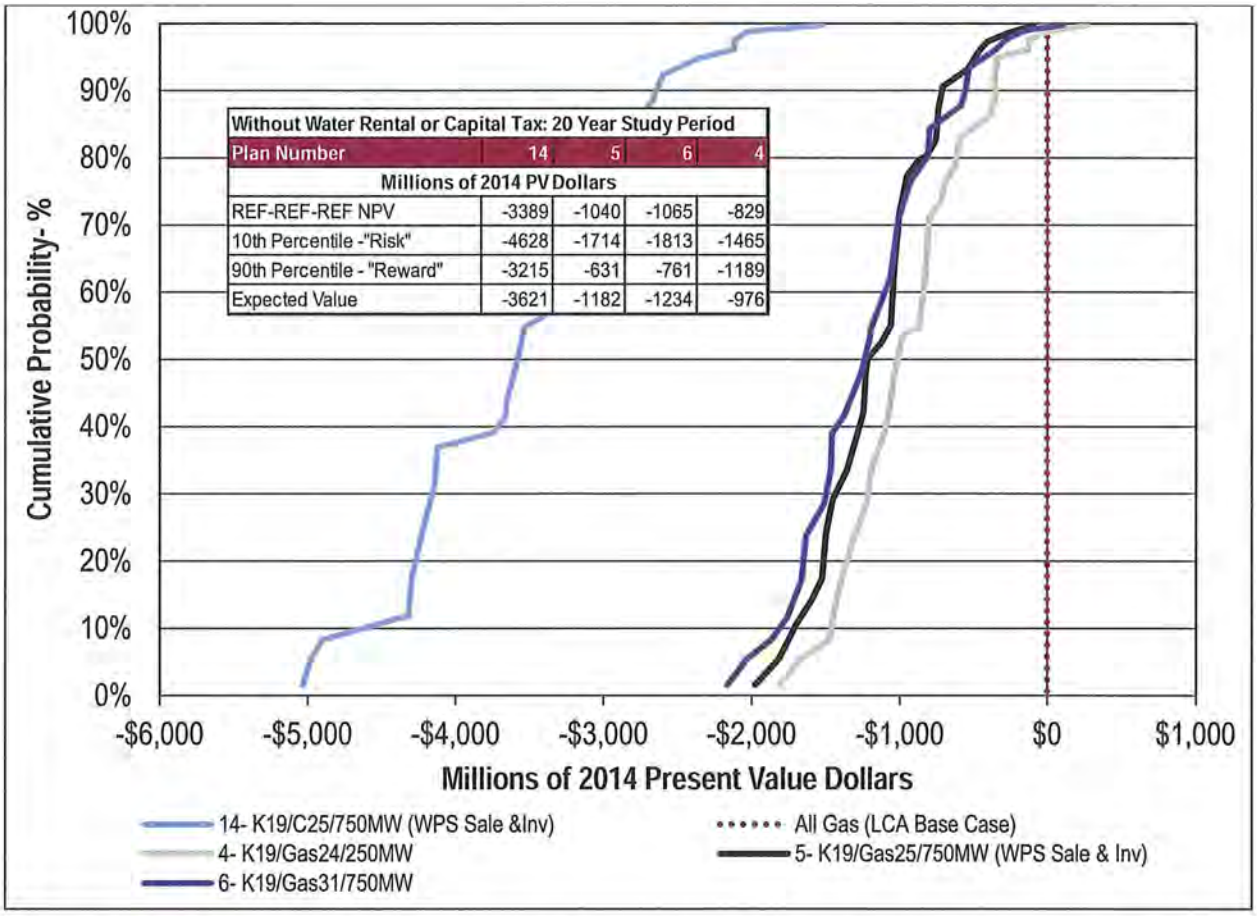


Figure 9-85: The Province of Manitoba Perspective of Probability Distributions of the Selected Plans having Higher Costs than the All Gas Plan after 20 years – Millions of 2014 Present Value Dollars

Figure 9-86 through Figure 9-88 provide comparisons of the economic value of a development plan from the MH perspective with the results from the Province of Manitoba perspective.

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.

Comparative Economic Value Case Summary Table - NPV after 78 years as compared to ALL Gas					
		Manitoba Hydro Perspective		Province of Manitoba Perspective	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-
Plan 2	K22/Gas	$887	$634	$1,242	$990
Plan 3	Wind/Gas	($775)	($1,014)	($594)	$823
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$1,775	$1,471
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$1,532	$1,278
Plan 6	K19/Gas31/750MW	$1,091	$776	$1,536	$1,222
Plan 7	SCGT/C26	$738	$525	$1,201	$984
Plan 8	CCGT/C26	$784	$529	$1,268	$1,011
Plan 9	Wind/C26	$531	$217	$1,068	$754
Plan 10	K22/C29	$806	$418	$1,568	$1,178
Plan 11	K19/C31/250MW	$1,215	$806	$2,017	$1,607
Plan 12	K19/C31/750MW	$1,360	$891	$2,190	$1,721
Plan 13	K19/C25/250MW	$1,295	$782	$2,224	$1,708
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	$2,659	$2,116
Plan 15	K19/C25/750MW	$1,427	$830	$2,404	$1,806

Figure 9-86: Comparative Economic Value after 78 years - Provincial Perspective Millions of 2014 Present Value Dollars

The Commercially Sensitive Information contained within this report has been redacted in accordance with the protective order.

Comparative Economic Value Case Summary Table - NPV after 50 years as compared to ALL Gas					
		Manitoba Hydro Perspective		Province of Manitoba Perspective	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-
Plan 2	K22/Gas	$887	$634	$800	$550
Plan 3	Wind/Gas	($775)	($1,014)	($698)	($907)
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$1,313	$1,012
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$1,100	$843
Plan 6	K19/Gas31/750MW	$1,091	$776	$1,069	$756
Plan 7	SCGT/C26	$738	$525	$596	$372
Plan 8	CCGT/C26	$784	$529	$612	$350
Plan 9	Wind/C26	$531	$217	$417	$103
Plan 10	K22/C29	$806	$418	$571	$174
Plan 11	K19/C31/250MW	$1,215	$806	$986	$567
Plan 12	K19/C31/750MW	$1,360	$891	$1,112	$637
Plan 13	K19/C25/250MW	$1,295	$782	$12,226	$705
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	$1,596	$1,049
Plan 15	K19/C25/750MW	$1,427	$830	$1,340	$739

Figure 9-87: Comparative Economic Value after 50 years - Provincial Perspective Millions of 2014 Present Value Dollars

Comparative Economic Value Case Summary Table - NPV after 35 years as compared to ALL Gas					
		Manitoba Hydro Perspective		Province of Manitoba Perspective	
Plan	Description	Reference Scenario	Expected Value	Reference Scenario	Expected Value
Plan 1	All Gas	-	-	-	-
Plan 2	K22/Gas	$887	$634	$84	($126)
Plan 3	Wind/Gas	($775)	($1,014)	($811)	($976)
Plan 4	K19/Gas24/250MW	$1,346	$1,041	$603	$345
Plan 5	K19/Gas25/750MW (WPS)	$1,097	$842	$524	$299
Plan 6	K19/Gas31/750MW	$1,091	$776	$343	$70
Plan 7	SCGT/C26	$738	$525	($334)	($519)
Plan 8	CCGT/C26	$784	$529	($347)	($563)
Plan 9	Wind/C26	$531	$217	($636)	($900)
Plan 10	K22/C29	$806	$418	($937)	($1,260)
Plan 11	K19/C31/250MW	$1,215	$806	($482)	($824)
Plan 12	K19/C31/750MW	$1,360	$891	($495)	($888)
Plan 13	K19/C25/250MW	$1,295	$782	($283)	($730)
Plan 14	K19/C25/750 (WPS)	$1,696	$1,155	($3)	($467)
Plan 15	K19/C25/750MW	$1,427	$830	($257)	($776)

Figure 9-88: Comparative Economic Value after 35 years - Provincial Perspective Millions of 2014 Present Value Dollars

F. Synopsis

LCA believes it is appropriate to study the economics of alternative development plans from the view of the Province of Manitoba, as well as the from the MH perspective. LCA believes that these views should be studied with equal scrutiny of metrics. LCA created additional metrics for different periods of time. In this section we also utilized the MH modeling results to study the Province of Manitoba Perspective of the economic analysis under probabilistic uncertainty analysis. The probabilistic uncertainty analysis from the Province of Manitoba Perspective above used the same LCA Methodology

discussed in Section III. Important observations that we make from the Province of Manitoba Perspective are as follows:

1. LCA, in consultation with Morrison Park Associates, does not agree with MH's assessment that the 1% interest rate guarantee fee that the Province of Manitoba adds to the borrowing costs is a Provincial Transfer Payment. This fee is believed to be compensation to the Province for it taking on potential costs should the loan guarantee be needed. LCA agrees with the MH assumption that water rental fees and the capital tax collected can be considered Provincial Transfers.
2. The removal of the Provincial Transfers as 'costs' of the Development Plans provides measurable improvement the present value metrics used in the economic analysis for the development plans with Keeyask and/or Conawapa The Provincial Perspective results shows that development of Keeyask and some new transmission to be a common element among the lowest cost plans of the 15 Development Plans studied in the NFAT application by MH.
3. The Provincial Perspective results would not favor developing Conawapa unless there is a willingness to give the 78 year NPV metrics more weight than the 50 year NPV metric.
4. The benefits of the Preferred Development Plan over other plans accrue after year 50 of the study, even from the Provincial Perspective.
5. The Preferred Development Plan is not lowest cost through the next 50 years even from the Provincial Perspective.
6. The Provincial Perspective Analysis shows that at least half of the positive benefits of development plans that develop *either* or *both* of the hydroelectric stations are captured by the Province and not MH electric ratepayers.
7. In the first 35 years of this study, the Province of Manitoba would collect tax benefits from the hydroelectric development, even when the development plan has yet to yield benefits to MH customers on a present value basis.

VI. Summary of Economic Analysis Review Part A

Our review of the NFAT Application's Economic Analysis included consideration of MH's economic and planning models and methods as they have been used in the Economic Model, its Economic Uncertainty analysis and MH's assessment of the Development Plan economics from the Province of Manitoba Perspective. While there are many observations as shown below, there are four high level observations that should be considered in the NFAT review.

1) ***Alternatives metrics such as IRR and Break-Even Year do not show the Preferred Development Plan to be the best development plan.***
2) ***The use of NPV metrics for different points in time, other than the end of 78 years, show that many other development plans, including the All Gas Plan, are lower cost than the Preferred Development Plan for at least the next 40 years.***
3) ***The conclusion that Plan 14, which includes Keeyask, Conawapa, a 750 MW Transmission Line, and the WPS Contract and Investment, should be the Preferred Development Plan based upon MH's analysis and observations is not robust to withstand simple sensitivities to changing assumptions, such as capital costs, discount rates and energy prices.***
4) ***While a Provincial Perspective in this study shows improved economics for all the development plans with either or both Keeyask and Conawapa, there are other plans with metrics superior to the Preferred Development Plan even when taking the Provincial Perspective***

A. Economic Analysis

MH's Economic Model is a spreadsheet model that is used to conduct the economic analysis of the alternative development plans. It is used to compile forecast of future operations costs and market revenues (SPLASH output) and capital spending into a forecast of future costs and market revenues. The model is used to derive the NPV of those costs and revenues over the planning period to compare the economics of alternative development plans.

In this report we have identified number of comments and concerns with MH's Economic Model and the features of the economic analysis structure. Specifically, the key issues we identified with the MH economic analysis approach are as follows:

1) The economic differentials at the end of 78 years between the alternative development plans is relatively small compared to the scale of the investments proposed in the Preferred Development Plan. The relative economic value of the plans considered can be materially affected by relatively small changes in assumptions.
2) A 78 year planning horizon analysis is particularly susceptible to forecast uncertainty.
3) MH's singular focus on the 78-year NPV metric as the basis for comparing alternative development plans is too limited in scope for a decision of this magnitude. MH does not offer any comparative metrics that capture important differences in the plans through the study period that bear on the timing of costs and benefits and the associated risks.
4) MH's use of an unleveraged cash flow analysis for its economic evaluation is a relatively simple approach for economic analysis of alternative plans with investments of the scale that are under consideration in this NFAT proceeding.
5) MH does not feature the annual differences in cash flow between the plans in its application, which is important foundational information for assessing relative ratepayer cost and risk implications between the alternative plans. LCA has prepared those comparisons.
6) MH does not provide a break-even evaluation of the alternative plans. This analysis provides important information on the time required for proposed investments to provide benefits and on assessing implications of forecast risk. LCA has prepared comparisons of the plans using a cumulative NPV analysis.
7) MH does not provide conventional metrics comparing alternative plans over time. LCA has prepared in Section II comparisons of the alternative plans for 20-year, 35-year and 50-year NPV analysis and IRR analysis.

The MH economic modeling for the 78-year study period includes a 35-year detailed evaluation of the alternative development plans with SPLASH. For the balance of the

study period, years 36 to 78, system operations, loads, and market interactions are being represented with much less detailed evaluation. Overall, there is both simplified modelling and the inherent reliance on very long-term projections to derive the 78-year NPV results that MH has presented.

B. Economic Uncertainty Analysis

MH conducted an uncertainty analysis as part of its economic analysis presentation in the NFAT Application. As discussed in Section II of this report, MH evaluated the alternative development plans in its Economic Model treating several variables collected into three groupings as uncertain: Discount Rate; Energy Prices; and Capital Costs. For each of these three groups, MH defined the uncertainty with three values (low, reference, and high) and assigned its assessment of the probability of those three values occurring. For each alternative development plan, MH used the Economic Model to evaluate the 27 combinations of inputs to develop a distribution of economic results for those plans.

As with the Economic Model, LCA created our own working uncertainty analysis model to conduct our review of MH's work and to conduct the analysis required of us in the LCA SOW. A working version of this model is provided in the workpapers accompanying LCA Technical Appendix 9A: Economic Analysis. Through the process of building this model, we have been able to replicate MH's results and confirm our understanding of the functionality of the MH Economic Model. We have also constructed an alternative formulation which we view as a better approach to considering the uncertainty cases MH has evaluated.

Our concerns with the MH uncertainty analysis methodology are several.

First, the uncertainty methodology relies on the Economic Model for all of its analysis. Thus, all of the issues discussed above regarding the Economic Model are resident in the uncertainty analysis.

Secondly, MH's method of comparing cases and presenting the results is unconventional and can be misleading, as a result. MH' method compares all cases to a single case, All Gas using reference case assumptions on discount rate, energy prices, and capital costs. This does not compare the performance of All Gas to the other plans with comparable sets of assumptions, which we view as more informative and is the more conventional approach to this method of analysis. LCA has developed a model that does the comparative analysis of MH's cases. The LCA Methodology provides a comparative analysis across plans on consistent assumptions of uncertain parameters. Using this method with MH's economic analysis results and probability assessments, the comparative assessments of the plans are quite different than depicted in the MH S-Curve analysis.

Thirdly, MH reports only one performance metric in their uncertainly analysis results, 78 year NPV. LCA has developed a broader set of metrics to display, which we believe provides a more complete perspective on the results of the analysis for decision makers.

Lastly, the assessment of probabilities that MH used to develop its probabilities for the uncertainty scenarios begins with opinions of experts at a given point in time as the key inputs. This makes the probabilities as a very important input that can be changed to reflect updated information or differences of opinions. LCA is concerned that the perspective of the experts that was captured in the probabilistic analysis has likely changed in the two years since the analysis was conducted.

There are several important aspects of this uncertainty analysis resulting from LCA's review of the MH Probabilistic Uncertainty Economic Analysis:

1. The expected benefits from the PDP relative to the alternative plans are largely derived from upside opportunities after the first 50 years of the study period. Based on MH's economic analysis and probability assessments, the PDP recommendation requires a long-term view of benefits.
2. The LCA Methodology provides a comparative analysis across plans on consistent assumptions of uncertain parameters. Using this method with MH's economic analysis results and probability assessments, the comparative assessments of the plans are quite different than depicted in the MH S-Curve analysis.

3. When interim period economic analysis results are used to develop metrics for 20-, 35- and 50-year study periods, the Preferred Development Plan does not appear to be the lowest cost resource plan alternative even when a probabilistic scenario analysis covering 27 scenarios is included.
4. Plans with Keeyask GS but without Conawapa GS have more favorable economic uncertainty profile of their economics than the Preferred Development Plan.

C. Sensitivity Analysis

LCA in this report performed various sensitivities to understand how robust the observations and conclusions are that were made by MH, given that there can be differing opinions on certain core assumptions. LCA developed a working Economic Modeling spreadsheet that would be used to vary the probability distributions of key uncertainties, the capital cost of generation additions, and the discount rates.

Earlier in this report we showed by comparing the NPV differences to capital costs of development plans that there is actually only a small relative NPV compared to the large increase in investment required for the Preferred Development Plan.

We also showed that the IRR of the Preferred Development Plan was only 6.15% compared to a discount rate of 5.05%, both on a real dollar basis. It also showed that other development plans have IRR higher than the Preferred Development Plan when compared to the All Gas Plan.

Lastly, our analysis in Sections II and III showed that for time periods as lengthy as 50 years there are other MH alternative development plans with lower costs and lower risks than the Preferred Development Plan.

All these metrics indicated a very small margin of savings being created even with all MH assumptions and analyses and even going out the full 78 years.

The last step in testing the robustness of MH conclusion that MH prefers Plan 14 is to review the sensitivities performed in those section. These sensitivities change costs and/or probabilities somewhat from the MH assumptions. The sensitivities chosen by LCA are not intended to be extremes, but are intended to reflective of more current

information, the opinions of IECs in this proceeding or to inject a risk preference. The key observation we draw from the sensitivity analyses are the following:

1. A modest increase in discount rates or the elimination from consideration the low discount rate scenarios postulated by MH would make the Preferred Development Plan have the same present values of costs over 78 years as does the All Gas Plan on an Expected Value basis
2. Several Plans have lower costs than the Preferred Development Plan, even over 78 years, when higher discount rates are assumed
3. Modest increases in Capital cost assumptions for the Keeyask and Conawapa projects would also result in other Development Plans having lower costs than the Preferred Development Plan, even over 78 years.
4. A slightly lower view of export market prices substantially erodes the MH expected economic benefits of the Preferred Development Plan.
5. The economics used by MH to arrive at their preference for the Preferred Development Plan is not robust and depending upon the perspective of the decision maker could actually conclude that other development plans are preferred.

D. Provincial Perspective

LCA believes it is appropriate to study the economics of alternative development plans from the view of the Province of Manitoba as well as the from MH perspective as was discussed in Sections II and III. LCA believes that these views should be studied with equal scrutiny of metrics. LCA created additional metrics for different periods of time. In this section we also utilized the MH modeling results to study the Province of Manitoba Perspective of the economic analysis under probabilistic uncertainty analysis. Important observations that we make from the Province of Manitoba Perspective are as follows:

1. LCA, in consultation with Morrison Park Associates, does not agree with MH's assessment that the 1% interest rate guarantee fee that the Province of Manitoba adds to the borrowing costs is a Provincial Transfer Payment. This fee is

believed to be compensation to the Province for it taking on potential costs should the loan guarantee be needed. LCA agrees with the MH assumption that water rental fees and the capital tax collected can be considered Provincial Transfers.

2. The removal of the Provincial Transfers as 'costs' of the Development Plans provides measurable improvement the present value metrics used in the economic analysis for the development plans with Keeyask and/or Conawapa. The Provincial Perspective results show that development of Keeyask and some new transmission to be a common element among the lowest cost plans of the 15 Development Plans studied in the NFAT application by MH.
3. The Provincial Perspective results would not favor developing Conawapa unless there is a willingness to give 78-year NPV metrics more weight than 50-year NPV.
4. The benefits of the Preferred Development Plan over other plans accrue after year 50 of the study, even from the Provincial Perspective
5. The Preferred Development Plan is not lowest cost through the next 50 years even from the Provincial Perspective.
6. The Provincial Perspective Analysis shows that at least half of the positive benefits of development plans that develop either or both of the hydroelectric stations are captured by the Province and not MH electric ratepayers.
7. In the first 35 years of this study the Province of Manitoba would collect tax benefits from the hydroelectric development, even when the development plan has yet to yield benefits to MH customers on a present value basis.

This report contains information that has been deemed Commercially Sensitive Information and is, therefore, subject to a protective order

Attachment

List of Workpapers and Models Electronically Provided by La Capra Associates

La Capra Associates, Inc.
One Washington Mall, 9th Floor
Boston, Massachusetts 02108

lacapra.com

List of Workpapers and Models Electronically Provided by La Capra Associates

The Workpapers listed below include charts and tables seen in Technical Appendix 9A. The names all correspond to the electronic Excel spreadsheet workbooks that La Capra Associates is providing along with the filing of this report. The workpaper Excel spreadsheet workbooks are working files (formulas intact and readable) that contain the figures, chart or tables, in Technical Appendix 9A.

The Models listed below are the Economic Uncertainty Models developed by La Capra Associates and used for the sensitivity analysis included in Technical Appendix 9A. These models are interactive workpapers that are working models (formulas intact and readable) in Excel spreadsheet workbooks. These models differ from workpapers in that the user can select various input variables to produce different comparisons for different time periods. The models do produce charts and tables but are dynamic in nature. For example Model 16, below, is set up so that a user can input their assumptions for discount rates for the analysis. The models will have user instructions contained within the spreadsheet.

Workpapers

1. **Incremental CPV Bar Charts, Break Even Years on Cumulative Present Value Basis**
   Sections: II.B.4, II.C.5
   Figures: 9-4, 9-16, 9-18, 9-19, 9-20, 9-21
2. **Total Capital Expenditures**
   Sections: II.C.1
   Figures: 9-5
3. **Cash Flows and Cumulative Incremental CF for Plans 4, 5, 6 and 14**
   Sections: II.C.5
   Figures: 9-6, 9-7, 9-8, 9-9, 9-10, 9-11, 9-12, 9-13, 9-14, 9-15, 9-17
4. **Summary Table of Expected Economic Value**
   Sections: III.D.1, IV.B, IV.C, IV.D
   Figures: 9-27, 9-37, 9-38, 9-48 ,9-60
5. **S-Curves of Selected Plans Compared after 78 years, Sensitivity Comparison**
   Sections: III.D.1, IV.B.1, IV.B.2, IV.C.1, IV.C.2, IV.D.1, IV.D.2, IV.E.1, IV.E.2, V.E
   Figures: 9-28, 9-41, 9-46, 9-50, 9-55, 9-62, 9-67, 9-72, 9-74, 9-77
6. **S-Curves of Plan 14 and Plan 5**
   Sections: III.D.2
   Figures: 9-30, 9-31, 9-32, 9-33
7. **S-Curves of Selected Plans Compared after 78 years**
   Sections: III.D.3
   Figures: 9-34, 9-35, 9-36
8. **S-Curves of Selected Plans after 78 years, LCA Sensitivity Discount Rates**
   Sections: IV.B.1
   Figures: 9-42, 9-43, 9-44
9. **S-Curves of Selected Plans after 78 years, change in Capital Cost Probabilities**
   Sections: IV.C.1

Figures: 9-51, 9-52, 9-53

10. **S- Curves of Selected Plans after 78 years, change in Energy Price Probabilities**
    Sections: IV.C.2
    Figures: 9-56, 9-57, 9-58
11. **S-Curves of Selected Plans after 78 years, 10% Higher Capital Costs for Keeyask G.S. and Conawapa G.S.**
    Sections: IV.D.1
    Figures: 9-63, 9-64, 9-65
12. **S-Curves of Selected Plans after 78 years, All Higher Capital Costs for Hydros**
    Sections: IV.D.2
    Figures: 9-68, 9-69, 9-70
13. **S-Curves of Selected Plans after 78 years , Province of Manitoba Perspective**
    Sections: V.E
    Figures: 9-78, 9-79, 9-80, 9-81
14. **Resource Plan Economic Benefits after 78 years to the Province of Manitoba**
    Sections: V.E.
    Figures: 9-82, 9-83, 9-84

Models

15. **Probability Distributions: Section III D2, Section IV B2, Section IV C1**
    Sections: III.D.1, III.D.2, IV.B.2, IV.C.1, IV.C.2
    Figures: 9-26, 9-2, 9-4, 9-49, 9-54
16. **Probability Distributions, LCA Sensitivity Discount Rates**
    Sections: IV.B.1
    Figures: 9-39, 9-40
17. **Probability Distributions, 10% Higher Capital Costs for Keeyask G.S. and Conawapa G.S.**
    Sections: IV.D.1
    Figures: 9-61
18. **Probability Distributions, Higher Capital Costs for Keeyask G.S. and Conawapa G.S. in all Scenarios**
    Sections: IV.D.2
    Figures: 9-66
19. **Probability Distributions with Changing to One-half the Variation in High and Low Capital Cost for Thermal and Wind**
    Sections: IV.E.1
    Figures: 9-71
20. **Probability Distributions, No Variation in High and Low Capital Cost for Thermal and Wind**
    Sections: IV.E.2
    Figures: 9-73
21. **Probability Distributions, the Province of Manitoba Perspective**
    Sections: V.E
    Figures: 9.76

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Attachment

Probabilistic Adaptable Query (PAQ) Quilts

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Boston, Massachusetts 02108

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III.D.1. PAQ 1: 78 Year Probabilistic Analysis Quilt with LCA Methodology for Determining Comparisons to All Gas Plan

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	1202	401	1188	489	625	584	853	537	0	-3726	251	-22	734	514	-500
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	1955	1217	1544	1224	1072	1178	1356	1148	0	-1419	657	474	592	620	206
	Ref (50%)	High (30%	-1692	-2353	-267	-1861	-729	-2047	-448	-1699	0	-2593	-749	-2076	-834	-1068	-1780
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-730	-1335	224	-993	-202	-1223	87	-926	0	-1072	-342	-1428	-744	-779	-1085
	High (35%)	High (30%	-3014	-3587	-1001	-2826	-1386	-3233	-1087	-2617	0	-2000	-1179	-2863	-1488	-1721	-2274
		Ref (50%)	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1958	-2478	-440	-1914	-817	-2303	-534	-1787	0	-869	-778	-2165	-1292	-1352	-1598
Ref (55%)	Low (15%)	High (30%	5866	5511	2910	5013	2973	5220	3218	4680	0	-2154	2502	4174	3253	3310	2653
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	6620	6327	3266	5749	3420	5814	3721	5291	0	153	2908	4669	3111	3417	3359
	Ref (50%)	High (30%	1141	841	780	861	756	823	1012	775	0	-1683	625	434	694	628	140
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2103	1860	1272	1729	1282	1648	1547	1547	0	-162	1031	1083	784	917	834
	High (35%)	High (30%	-1040	-1306	-268	-942	-310	-1199	-50	-917	0	-1390	-218	-1140	-429	-544	-938
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	16	-196	294	-30	259	-269	503	-87	0	-260	184	-441	-233	-175	-262
High (15%)	Low (15%)	High (30%	10807	10890	4740	9844	5428	10254	5742	9230	0	-284	4936	8790	6079	6412	6167
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	11560	11706	5096	10580	5875	10849	6246	9841	0	2023	5342	9285	5937	6518	6873
	Ref (50%)	High (30%	4098	4151	1871	3729	2285	3904	2556	3466	0	-609	2099	3172	2398	2494	2261
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5060	5170	2362	4597	2812	4728	3091	4238	0	912	2505	3820	2489	2783	2956
	High (35%)	High (30%	994	1027	482	1019	783	961	1036	917	0	-677	807	725	747	742	529
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2050	2136	1043	1931	1353	1891	1589	1747	0	453	1208	1424	943	1111	1205

III.D.2. PAQ 2: 50 Year Probability Analysis Quilt with LCA Methodology for Determining Comparisons to All Gas Plan

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-431	-1228	458	-1186	-78	-956	201	-1108	0	-3384	-368	-1572	-280	-555	-1422
		Ref (50%)	72	-691	756	-695	235	-542	530	-666	0	-2196	-96	-1211	-294	-435	-1013
		Low (20%)	441	-294	913	-326	406	-231	724	-326	0	-1391	51	-940	-293	-328	-697
	Ref (50%)	High (30%	-2319	-2979	-548	-2501	-991	-2640	-690	-2332	0	-2438	-976	-2672	-1226	-1481	-2128
		Ref (50%)	-1735	-2364	-207	-1971	-647	-2136	-351	-1850	0	-1604	-712	-2266	-1150	-1296	-1731
		Low (20%)	-1303	-1907	-12	-1578	-447	-1757	-146	-1485	0	-1043	-564	-1963	-1078	-1138	-1422
	High (35%)	High (30%	-3295	-3867	-1124	-3112	-1497	-3498	-1189	-2901	0	-1915	-1274	-3130	-1662	-1906	-2424
		Ref (50%)	-2671	-3215	-758	-2569	-1136	-2950	-844	-2404	0	-1274	-1016	-2711	-1542	-1689	-2041
		Low (20%)	-2211	-2731	-539	-2171	-919	-2539	-631	-2033	0	-844	-870	-2400	-1437	-1508	-1742
Ref (55%)	Low (15%)	High (30%	3229	2877	1799	2333	1799	2741	2064	2096	0	-2207	1401	1694	1717	1652	1076
		Ref (50%)	3732	3414	2097	2824	2113	3155	2393	2537	0	-1019	1674	2055	1702	1771	1485
		Low (20%)	4101	3811	2254	3193	2283	3466	2586	2877	0	-214	1820	2326	1703	1878	1801
	Ref (50%)	High (30%	129	-170	354	-164	314	-129	578	-219	0	-1678	213	-517	102	-11	-459
		Ref (50%)	714	445	694	365	657	374	917	264	0	-845	477	-112	178	174	-62
		Low (20%)	1145	902	890	758	857	753	1122	629	0	-283	625	192	250	332	247
	High (35%)	High (30%	-1496	-1761	-457	-1403	-503	-1628	-239	-1365	0	-1374	-396	-1568	-694	-831	-1202
		Ref (50%)	-873	-1109	-91	-861	-142	-1080	106	-868	0	-733	-138	-1150	-574	-615	-820
		Low (20%)	-412	-625	128	-463	75	-669	318	-497	0	-303	8	-839	-469	-434	-520
High (15%)	Low (15%)	High (30%	7058	7144	3206	6052	3747	6716	4038	5587	0	-819	3303	5258	3943	4081	3839
		Ref (50%)	7562	7681	3504	6544	4061	7130	4367	6028	0	369	3575	5619	3928	4201	4248
		Low (20%)	7931	8078	3661	6912	4231	7441	4560	6368	0	1174	3721	5890	3929	4307	4564
	Ref (50%)	High (30%	2660	2714	1282	2278	1648	2545	1911	2067	0	-789	1482	1817	1577	1597	1375
		Ref (50%)	3245	3329	1623	2807	1992	3049	2250	2549	0	44	1747	2223	1652	1783	1772
		Low (20%)	3676	3786	1819	3200	2192	3428	2455	2914	0	605	1895	2526	1724	1941	2081
	High (35%)	High (30%	344	378	219	364	502	347	751	285	0	-745	536	113	377	337	133
		Ref (50%)	967	1030	585	906	863	895	1096	781	0	-104	794	532	497	554	516
		Low (20%)	1428	1514	804	1304	1080	1306	1309	1152	0	326	940	843	602	735	816

III.D.2. PAQ 3: 35 Year Probability Analysis Quilt with LCA Methodology for Determining Comparisons to All Gas Plan

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-2268	-3058	-155	-3032	-900	-2704	-537	-2739	0	-2816	-1150	-3327	-1469	-1693	-2619
		Ref (50%)	-1673	-2430	151	-2449	-546	-2192	-190	-2235	0	-1882	-843	-2865	-1389	-1515	-2151
		Low (20%)	-1231	-1960	317	-2005	-340	-1804	20	-1846	0	-1267	-667	-2513	-1311	-1361	-1784
	Ref (50%)	High (30%	-3283	-3939	-872	-3469	-1427	-3558	-1081	-3187	0	-2149	-1394	-3592	-1845	-2068	-2763
		Ref (50%)	-2652	-3278	-527	-2892	-1061	-3004	-732	-2674	0	-1446	-1110	-3135	-1721	-1856	-2334
		Low (20%)	-2184	-2784	-327	-2461	-843	-2586	-518	-2284	0	-983	-946	-2791	-1611	-1676	-1998
	High (35%)	High (30%	-3861	-4431	-1316	-3680	-1756	-4038	-1420	-3403	0	-1749	-1523	-3670	-2023	-2245	-2801
		Ref (50%)	-3211	-3753	-947	-3111	-1381	-3461	-1069	-2890	0	-1185	-1253	-3223	-1877	-2015	-2399
		Low (20%)	-2730	-3247	-726	-2691	-1153	-3027	-852	-2505	0	-811	-1096	-2888	-1749	-1823	-2083
Ref (55%)	Low (15%)	High (30%	326	-20	783	-580	479	-4	793	-532	0	-2058	108	-1047	-28	-113	-815
		Ref (50%)	921	608	1089	4	832	508	1140	-29	0	-1124	415	-585	53	65	-346
		Low (20%)	1364	1078	1255	448	1038	896	1349	361	0	-510	591	-234	130	219	20
	Ref (50%)	High (30%	-1397	-1693	-184	-1695	-386	-1573	-94	-1600	0	-1611	-475	-1958	-810	-929	-1460
		Ref (50%)	-766	-1032	161	-1119	-21	-1019	254	-1087	0	-908	-191	-1501	-686	-716	-1031
		Low (20%)	-298	-538	362	-688	198	-601	468	-697	0	-446	-27	-1157	-576	-537	-696
	High (35%)	High (30%	-2395	-2658	-775	-2304	-918	-2478	-637	-2178	0	-1339	-805	-2416	-1228	-1366	-1795
		Ref (50%)	-1745	-1980	-406	-1735	-543	-1902	-286	-1664	0	-775	-535	-1969	-1082	-1136	-1393
		Low (20%)	-1263	-1474	-184	-1316	-315	-1468	-68	-1279	0	-401	-378	-1634	-954	-944	-1078
High (15%)	Low (15%)	High (30%	2976	3067	1740	1960	1888	2847	2183	1835	0	-1181	1445	1401	1562	1603	1151
		Ref (50%)	3572	3696	2046	2543	2242	3359	2530	2338	0	-247	1751	1863	1642	1781	1619
		Low (20%)	4014	4165	2212	2988	2447	3747	2739	2728	0	367	1927	2215	1720	1935	1986
	Ref (50%)	High (30%	512	568	508	124	665	508	930	92	0	-991	497	-213	329	303	-47
		Ref (50%)	1143	1230	852	701	1030	1062	1279	605	0	-289	781	244	452	516	382
		Low (20%)	1611	1723	1053	1132	1249	1480	1493	995	0	174	945	588	562	695	718
	High (35%)	High (30%	-922	-887	-239	-905	-81	-854	171	-880	0	-869	-49	-1083	-356	-420	-708
		Ref (50%)	-272	-208	129	-336	294	-277	522	-366	0	-305	221	-636	-209	-190	-306
		Low (20%)	209	297	351	84	522	157	740	19	0	68	378	-301	-82	3	9

III.D.2. PAQ 4: 20 Year Probability Analysis Quilt with LCA Methodology for Determining Comparisons to All Gas Plan

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-5710	-6325	-2032	-6199	-2289	-5805	-1884	-5966	0	-1678	-2273	-6193	-3496	-3791	-4145
		Ref (50%)	-4884	-5467	-1529	-5392	-1856	-5061	-1491	-5165	0	-1178	-1947	-5502	-3218	-3414	-3654
		Low (20%)	-4256	-4812	-1201	-4769	-1584	-4486	-1240	-4536	0	-838	-1753	-4966	-2983	-3101	-3266
	Ref (50%)	High (30%	-5667	-6197	-2193	-5649	-2400	-5701	-2024	-5404	0	-1414	-2168	-5560	-3241	-3518	-3826
		Ref (50%)	-4872	-5373	-1707	-4914	-1975	-4982	-1639	-4682	0	-994	-1868	-4940	-2977	-3162	-3373
		Low (20%)	-4270	-4746	-1390	-4355	-1707	-4431	-1394	-4125	0	-708	-1689	-4464	-2755	-2868	-3016
	High (35%)	High (30%	-5633	-6107	-2311	-5292	-2487	-5628	-2129	-5038	0	-1236	-2096	-5121	-3056	-3320	-3594
		Ref (50%)	-4858	-5305	-1835	-4603	-2066	-4927	-1748	-4369	0	-871	-1813	-4550	-2803	-2980	-3169
		Low (20%)	-4276	-4699	-1525	-4086	-1799	-4392	-1506	-3859	0	-621	-1644	-4115	-2590	-2699	-2834
Ref (55%)	Low (15%)	High (30%	-4675	-4970	-1649	-5430	-1615	-4650	-1314	-5305	0	-1454	-1761	-5425	-2970	-3197	-3457
		Ref (50%)	-3850	-4113	-1146	-4624	-1182	-3906	-920	-4504	0	-954	-1435	-4734	-2692	-2820	-2965
		Low (20%)	-3221	-3458	-818	-4001	-910	-3330	-670	-3874	0	-614	-1241	-4198	-2457	-2507	-2578
	Ref (50%)	High (30%	-4825	-5084	-1873	-5009	-1832	-4755	-1545	-4856	0	-1232	-1750	-4943	-2823	-3042	-3275
		Ref (50%)	-4030	-4259	-1387	-4274	-1407	-4036	-1161	-4135	0	-812	-1450	-4323	-2559	-2687	-2822
		Low (20%)	-3428	-3633	-1070	-3715	-1138	-3485	-915	-3577	0	-526	-1271	-3847	-2337	-2392	-2465
	High (35%)	High (30%	-4919	-5155	-2033	-4738	-1989	-4821	-1712	-4566	0	-1082	-1740	-4604	-2708	-2922	-3134
		Ref (50%)	-4145	-4352	-1557	-4048	-1568	-4119	-1331	-3897	0	-716	-1457	-4033	-2455	-2582	-2709
		Low (20%)	-3562	-3746	-1246	-3531	-1302	-3584	-1089	-3387	0	-466	-1288	-3598	-2243	-2301	-2374
High (15%)	Low (15%)	High (30%	-3702	-3688	-1310	-4697	-977	-3500	-743	-4637	0	-1211	-1238	-4650	-2408	-2576	-2743
		Ref (50%)	-2877	-2831	-807	-3891	-544	-2756	-350	-3836	0	-712	-913	-3959	-2130	-2198	-2251
		Low (20%)	-2248	-2176	-479	-3268	-271	-2181	-99	-3207	0	-372	-718	-3422	-1895	-1885	-1864
	Ref (50%)	High (30%	-4037	-4036	-1591	-4403	-1298	-3817	-1069	-4305	0	-1035	-1324	-4322	-2377	-2546	-2704
		Ref (50%)	-3241	-3211	-1105	-3668	-873	-3098	-684	-3584	0	-616	-1024	-3702	-2112	-2190	-2251
		Low (20%)	-2640	-2585	-788	-3109	-604	-2546	-439	-3027	0	-330	-845	-3226	-1890	-1896	-1894
	High (35%)	High (30%	-4254	-4261	-1790	-4216	-1525	-4022	-1298	-4093	0	-916	-1378	-4084	-2337	-2508	-2657
		Ref (50%)	-3479	-3458	-1314	-3527	-1104	-3321	-918	-3424	0	-550	-1095	-3513	-2084	-2168	-2232
		Low (20%)	-2897	-2852	-1004	-3010	-837	-2786	-675	-2914	0	-300	-926	-3079	-1872	-1887	-1897

IV.B.1. PAQ 5: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology and LCA Sensitivity Discount Rates

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-971	-1665	118	-1263	-390	-1400	-110	-1128	0	-2717	-509	-1584	-476	-690	-1459
		Ref (50%)	-443	-1106	411	-783	-65	-956	216	-711	0	-1739	-245	-1227	-455	-556	-1066
		Low (20%)	-57	-693	568	-428	118	-625	411	-397	0	-1076	-100	-962	-426	-439	-761
	Ref (50%)	High (30%	-2170	-2797	-526	-2213	-963	-2476	-674	-2034	0	-2346	-907	-2371	-1081	-1312	-1961
		Ref (50%)	-1597	-2195	-199	-1705	-621	-1984	-339	-1582	0	-1533	-648	-1989	-1014	-1139	-1575
		Low (20%)	-1176	-1749	-13	-1331	-423	-1615	-136	-1242	0	-984	-503	-1704	-949	-993	-1275
	High (35%)	High (30%	-3539	-4054	-1333	-3154	-1670	-3688	-1368	-2929	0	-1665	-1336	-3092	-1720	-1945	-2408
		Ref (50%)	-2918	-3405	-968	-2628	-1307	-3139	-1027	-2450	0	-1113	-1088	-2690	-1592	-1729	-2044
		Low (20%)	-2460	-2925	-748	-2245	-1088	-2728	-816	-2096	0	-742	-946	-2392	-1481	-1549	-1759
Ref (55%)	Low (15%)	High (30%	2291	1978	1322	1879	1295	1884	1561	1734	0	-1653	1070	1321	1285	1264	750
		Ref (50%)	2818	2537	1616	2359	1620	2327	1887	2152	0	-675	1334	1678	1307	1398	1143
		Low (20%)	3204	2949	1772	2714	1804	2659	2082	2466	0	-11	1479	1943	1335	1515	1448
	Ref (50%)	High (30%	334	47	400	186	364	73	623	142	0	-1552	308	-163	268	185	-265
		Ref (50%)	906	649	728	694	706	565	958	594	0	-738	568	220	335	358	121
		Low (20%)	1327	1095	914	1068	904	934	1161	933	0	-189	712	504	399	505	421
	High (35%)	High (30%	-1984	-2227	-752	-1676	-797	-2068	-539	-1602	0	-1197	-576	-1749	-891	-1022	-1359
		Ref (50%)	-1363	-1578	-387	-1149	-434	-1519	-198	-1123	0	-645	-328	-1347	-763	-806	-995
		Low (20%)	-906	-1098	-167	-766	-215	-1108	14	-768	0	-274	-186	-1049	-652	-625	-710
High (15%)	Low (15%)	High (30%	5711	5772	2585	5205	3040	5421	3333	4859	0	-394	2768	4498	3253	3419	3199
		Ref (50%)	6239	6331	2879	5685	3365	5865	3659	5277	0	584	3032	4855	3274	3553	3592
		Low (20%)	6625	6743	3035	6040	3549	6196	3854	5591	0	1247	3177	5120	3302	3671	3896
	Ref (50%)	High (30%	2935	2981	1360	2705	1726	2800	1990	2503	0	-617	1610	2239	1769	1829	1606
		Ref (50%)	3508	3584	1687	3213	2067	3292	2325	2955	0	196	1869	2622	1836	2001	1992
		Low (20%)	3929	4030	1873	3586	2266	3661	2528	3294	0	745	2013	2906	1901	2148	2292
	High (35%)	High (30%	-397	-375	-167	-150	82	-360	325	-178	0	-653	230	-305	26	-18	-212
		Ref (50%)	224	273	198	377	444	189	666	301	0	-101	478	98	154	197	152
		Low (20%)	682	754	419	760	663	600	877	655	0	270	620	395	265	378	437

IV.B.1. PAQ 6: 50 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology and LCA Sensitivity Discount Rates

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-1798	-2490	-267	-2142	-734	-2172	-442	-1998	0	-2666	-809	-2375	-974	-1232	-1932
		Ref (50%)	-1241	-1902	58	-1627	-402	-1697	-109	-1530	0	-1747	-545	-1983	-922	-1065	-1535
		Low (20%)	-830	-1465	241	-1243	-213	-1339	90	-1174	0	-1126	-399	-1690	-869	-922	-1226
	Ref (50%)	High (30%	-2653	-3280	-744	-2711	-1161	-2932	-859	-2528	0	-2240	-1079	-2831	-1380	-1630	-2229
		Ref (50%)	-2058	-2655	-397	-2179	-813	-2415	-520	-2042	0	-1479	-817	-2422	-1289	-1434	-1838
		Low (20%)	-1619	-2190	-194	-1786	-609	-2026	-314	-1677	0	-967	-671	-2117	-1205	-1268	-1534
	High (35%)	High (30%	-3695	-4209	-1400	-3316	-1726	-3835	-1421	-3091	0	-1622	-1383	-3240	-1813	-2046	-2489
		Ref (50%)	-3065	-3552	-1027	-2780	-1361	-3276	-1078	-2599	0	-1086	-1134	-2828	-1676	-1821	-2123
		Low (20%)	-2600	-3065	-800	-2390	-1140	-2858	-865	-2235	0	-727	-992	-2523	-1558	-1633	-1837
Ref (55%)	Low (15%)	High (30%	946	635	741	483	709	628	971	382	0	-1805	521	52	518	418	-60
		Ref (50%)	1503	1224	1066	998	1041	1104	1303	849	0	-885	786	443	570	585	337
		Low (20%)	1914	1661	1249	1382	1230	1461	1503	1205	0	-265	932	736	623	728	646
	Ref (50%)	High (30%	-449	-735	70	-611	26	-662	289	-631	0	-1563	-7	-899	-187	-308	-727
		Ref (50%)	146	-110	417	-79	374	-145	627	-146	0	-802	255	-491	-95	-113	-337
		Low (20%)	586	355	619	314	578	244	834	219	0	-290	401	-185	-12	53	-32
	High (35%)	High (30%	-2242	-2484	-857	-1939	-901	-2310	-642	-1858	0	-1194	-672	-1992	-1037	-1183	-1506
		Ref (50%)	-1612	-1827	-484	-1404	-536	-1751	-299	-1367	0	-658	-423	-1580	-900	-958	-1140
		Low (20%)	-1148	-1340	-257	-1013	-315	-1333	-87	-1002	0	-299	-281	-1274	-781	-769	-853
High (15%)	Low (15%)	High (30%	3795	3857	1786	3237	2193	3621	2460	2961	0	-794	1946	2687	2177	2228	2002
		Ref (50%)	4352	4445	2111	3752	2525	4096	2792	3429	0	125	2210	3079	2229	2395	2399
		Low (20%)	4763	4882	2294	4136	2714	4453	2992	3785	0	745	2356	3372	2282	2538	2708
	Ref (50%)	High (30%	1823	1869	903	1577	1237	1750	1492	1415	0	-772	1136	1190	1136	1135	920
		Ref (50%)	2418	2494	1250	2109	1584	2267	1831	1900	0	-11	1397	1599	1228	1331	1310
		Low (20%)	2857	2959	1453	2502	1788	2655	2038	2265	0	501	1544	1904	1311	1497	1615
	High (35%)	High (30%	-767	-745	-315	-526	-74	-708	166	-542	0	-699	81	-653	-180	-247	-435
		Ref (50%)	-137	-88	58	10	291	-150	509	-50	0	-163	329	-241	-44	-22	-69
		Low (20%)	327	399	285	401	512	269	721	314	0	196	472	64	75	166	218

IV.B.1. PAQ 7: 35 Year Probability Quilt for Determining Comparisons to All Gas Plan using LCA Methodology and LCA Sensitivity Discount Rates

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-2970	-3657	-660	-3319	-1262	-3287	-915	-3038	0	-2311	-1314	-3494	-1728	-1949	-2701
		Ref (50%)	-2355	-3012	-330	-2746	-904	-2751	-571	-2532	0	-1552	-1027	-3039	-1618	-1749	-2266
		Low (20%)	-1899	-2530	-141	-2316	-692	-2345	-361	-2145	0	-1052	-861	-2695	-1518	-1578	-1924
	Ref (50%)	High (30%	-3464	-4087	-1017	-3525	-1529	-3704	-1189	-3247	0	-1999	-1432	-3606	-1900	-2121	-2764
		Ref (50%)	-2830	-3424	-666	-2954	-1163	-3145	-842	-2736	0	-1348	-1154	-3154	-1769	-1904	-2347
		Low (20%)	-2360	-2929	-460	-2529	-943	-2724	-628	-2350	0	-919	-993	-2814	-1653	-1721	-2020
	High (35%)	High (30%	-4084	-4597	-1532	-3707	-1905	-4205	-1581	-3436	0	-1510	-1556	-3612	-2060	-2277	-2749
		Ref (50%)	-3436	-3922	-1158	-3153	-1531	-3627	-1234	-2933	0	-1026	-1298	-3180	-1905	-2043	-2370
		Low (20%)	-2957	-3421	-929	-2748	-1302	-3194	-1017	-2559	0	-706	-1149	-2859	-1772	-1848	-2072
Ref (55%)	Low (15%)	High (30%	-908	-1215	90	-1377	-139	-1125	156	-1296	0	-1719	-311	-1699	-592	-700	-1274
		Ref (50%)	-293	-570	420	-804	219	-588	500	-791	0	-960	-23	-1244	-481	-499	-838
		Low (20%)	163	-87	609	-373	432	-183	710	-404	0	-460	142	-901	-381	-328	-497
	Ref (50%)	High (30%	-1734	-2017	-383	-1899	-564	-1877	-278	-1794	0	-1508	-587	-2112	-953	-1078	-1572
		Ref (50%)	-1100	-1353	-33	-1328	-198	-1318	69	-1284	0	-858	-309	-1661	-822	-861	-1154
		Low (20%)	-629	-858	174	-904	22	-897	283	-897	0	-428	-149	-1321	-707	-678	-827
	High (35%)	High (30%	-2860	-3101	-1077	-2559	-1187	-2895	-917	-2418	0	-1172	-955	-2575	-1403	-1548	-1916
		Ref (50%)	-2213	-2427	-702	-2005	-813	-2317	-570	-1915	0	-689	-697	-2144	-1248	-1315	-1536
		Low (20%)	-1734	-1925	-473	-1600	-584	-1884	-353	-1541	0	-369	-547	-1822	-1115	-1120	-1238
High (15%)	Low (15%)	High (30%	1186	1251	847	622	1000	1148	1271	564	0	-1035	752	222	660	653	278
		Ref (50%)	1800	1897	1177	1195	1358	1684	1615	1069	0	-276	1039	677	770	854	714
		Low (20%)	2257	2379	1366	1625	1571	2090	1825	1456	0	224	1205	1020	870	1025	1055
	Ref (50%)	High (30%	13	63	250	-236	407	35	666	-248	0	-945	305	-520	87	48	-279
		Ref (50%)	647	726	601	335	773	593	1013	262	0	-294	582	-68	218	265	138
		Low (20%)	1118	1221	807	760	993	1014	1227	649	0	136	743	272	333	449	466
	High (35%)	High (30%	-1639	-1616	-631	-1399	-476	-1535	-234	-1343	0	-786	-324	-1477	-683	-766	-1016
		Ref (50%)	-992	-941	-256	-846	-102	-957	113	-840	0	-303	-66	-1045	-529	-532	-637
		Low (20%)	-513	-439	-27	-440	128	-524	329	-466	0	17	83	-724	-396	-337	-339

IV.B.2. PAQ 8: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology and Eliminating Low Discount Rate Scenarios

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale &	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low	Low	High															
		Ref															
		Low															
	Ref	High	-1692	-2353	-267	-1861	-729	-2047	-448	-1699	0	-2593	-749	-2076	-834	-1068	-1780
		Ref	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low	-730	-1335	224	-993	-202	-1223	87	-926	0	-1072	-342	-1428	-744	-779	-1085
	High	High	-3014	-3587	-1001	-2826	-1386	-3233	-1087	-2617	0	-2000	-1179	-2863	-1488	-1721	-2274
		Ref	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low	-1958	-2478	-440	-1914	-817	-2303	-534	-1787	0	-869	-778	-2165	-1292	-1352	-1598
Ref	Low	High															
		Ref															
		Low															
	Ref	High	1141	841	780	861	756	823	1012	775	0	-1683	625	434	694	628	140
		Ref	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low	2103	1860	1272	1729	1282	1648	1547	1547	0	-162	1031	1083	784	917	834
	High	High	-1040	-1306	-268	-942	-310	-1199	-50	-917	0	-1390	-218	-1140	-429	-544	-938
		Ref	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low	16	-196	294	-30	259	-269	503	-87	0	-260	184	-441	-233	-175	-262
High	Low	High															
		Ref															
		Low															
	Ref	High	4098	4151	1871	3729	2285	3904	2556	3466	0	-609	2099	3172	2398	2494	2261
		Ref	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low	5060	5170	2362	4597	2812	4728	3091	4238	0	912	2505	3820	2489	2783	2956
	High	High	994	1027	482	1019	783	961	1036	917	0	-677	807	725	747	742	529
		Ref	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low	2050	2136	1043	1931	1353	1891	1589	1747	0	453	1208	1424	943	1111	1205

IV.C.1. PAQ 9: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology with Higher Probabilities of High Capital Costs

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	1202	401	1188	489	625	584	853	537	0	-3726	251	-22	734	514	-500
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	1955	1217	1544	1224	1072	1178	1356	1148	0	-1419	657	474	592	620	206
	Ref (50%)	High (30%	-1692	-2353	-267	-1861	-729	-2047	-448	-1699	0	-2593	-749	-2076	-834	-1068	-1780
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-730	-1335	224	-993	-202	-1223	87	-926	0	-1072	-342	-1428	-744	-779	-1085
	High (35%)	High (30%	-3014	-3587	-1001	-2826	-1386	-3233	-1087	-2617	0	-2000	-1179	-2863	-1488	-1721	-2274
		Ref (50%)	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1958	-2478	-440	-1914	-817	-2303	-534	-1787	0	-869	-778	-2165	-1292	-1352	-1598
Ref (55%)	Low (15%)	High (30%	5866	5511	2910	5013	2973	5220	3218	4680	0	-2154	2502	4174	3253	3310	2653
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	6620	6327	3266	5749	3420	5814	3721	5291	0	153	2908	4669	3111	3417	3359
	Ref (50%)	High (30%	1141	841	780	861	756	823	1012	775	0	-1683	625	434	694	628	140
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2103	1860	1272	1729	1282	1648	1547	1547	0	-162	1031	1083	784	917	834
	High (35%)	High (30%	-1040	-1306	-268	-942	-310	-1199	-50	-917	0	-1390	-218	-1140	-429	-544	-938
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	16	-196	294	-30	259	-269	503	-87	0	-260	184	-441	-233	-175	-262
High (15%)	Low (15%)	High (30%	10807	10890	4740	9844	5428	10254	5742	9230	0	-284	4936	8790	6079	6412	6167
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	11560	11706	5096	10580	5875	10849	6246	9841	0	2023	5342	9285	5937	6518	6873
	Ref (50%)	High (30%	4098	4151	1871	3729	2285	3904	2556	3466	0	-609	2099	3172	2398	2494	2261
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5060	5170	2362	4597	2812	4728	3091	4238	0	912	2505	3820	2489	2783	2956
	High (35%)	High (30%	994	1027	482	1019	783	961	1036	917	0	-677	807	725	747	742	529
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2050	2136	1043	1931	1353	1891	1589	1747	0	453	1208	1424	943	1111	1205

IV.C.2. PAQ 10: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology with Changing Probabilities of Energy Prices

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	1202	401	1188	489	625	584	853	537	0	-3726	251	-22	734	514	-500
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	1955	1217	1544	1224	1072	1178	1356	1148	0	-1419	657	474	592	620	206
	Ref (50%)	High (30%	-1692	-2353	-267	-1861	-729	-2047	-448	-1699	0	-2593	-749	-2076	-834	-1068	-1780
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-730	-1335	224	-993	-202	-1223	87	-926	0	-1072	-342	-1428	-744	-779	-1085
	High (35%)	High (30%	-3014	-3587	-1001	-2826	-1386	-3233	-1087	-2617	0	-2000	-1179	-2863	-1488	-1721	-2274
		Ref (50%)	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1958	-2478	-440	-1914	-817	-2303	-534	-1787	0	-869	-778	-2165	-1292	-1352	-1598
Ref (55%)	Low (15%)	High (30%	5866	5511	2910	5013	2973	5220	3218	4680	0	-2154	2502	4174	3253	3310	2653
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	6620	6327	3266	5749	3420	5814	3721	5291	0	153	2908	4669	3111	3417	3359
	Ref (50%)	High (30%	1141	841	780	861	756	823	1012	775	0	-1683	625	434	694	628	140
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2103	1860	1272	1729	1282	1648	1547	1547	0	-162	1031	1083	784	917	834
	High (35%)	High (30%	-1040	-1306	-268	-942	-310	-1199	-50	-917	0	-1390	-218	-1140	-429	-544	-938
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	16	-196	294	-30	259	-269	503	-87	0	-260	184	-441	-233	-175	-262
High (15%)	Low (15%)	High (30%	10807	10890	4740	9844	5428	10254	5742	9230	0	-284	4936	8790	6079	6412	6167
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	11560	11706	5096	10580	5875	10849	6246	9841	0	2023	5342	9285	5937	6518	6873
	Ref (50%)	High (30%	4098	4151	1871	3729	2285	3904	2556	3466	0	-609	2099	3172	2398	2494	2261
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5060	5170	2362	4597	2812	4728	3091	4238	0	912	2505	3820	2489	2783	2956
	High (35%)	High (30%	994	1027	482	1019	783	961	1036	917	0	-677	807	725	747	742	529
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2050	2136	1043	1931	1353	1891	1589	1747	0	453	1208	1424	943	1111	1205

IV.D.1. PAQ 11: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology with 10% Higher Capital Costs for Keeyask G.S. and Conawapa G.S. in the High Capital Cost Scenario

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	379	-421	860	-265	297	-239	525	-217	0	-3726	-60	-780	249	28	-985
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	1955	1217	1544	1224	1072	1178	1356	1148	0	-1419	657	474	592	620	206
	Ref (50%)	High (30%	-2459	-3120	-586	-2534	-1047	-2814	-767	-2372	0	-2593	-1037	-2748	-1269	-1502	-2215
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-730	-1335	224	-993	-202	-1223	87	-926	0	-1072	-342	-1428	-744	-779	-1085
	High (35%)	High (30%	-3744	-4317	-1315	-3444	-1699	-3962	-1400	-3235	0	-2000	-1452	-3474	-1887	-2120	-2672
		Ref (50%)	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1958	-2478	-440	-1914	-817	-2303	-534	-1787	0	-869	-778	-2165	-1292	-1352	-1598
Ref (55%)	Low (15%)	High (30%	5035	4680	2582	4252	2645	4389	2890	3918	0	-2154	2191	3407	2759	2816	2159
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	6620	6327	3266	5749	3420	5814	3721	5291	0	153	2908	4669	3111	3417	3359
	Ref (50%)	High (30%	374	74	462	188	437	56	694	102	0	-1683	337	-237	260	194	-295
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2103	1860	1272	1729	1282	1648	1547	1547	0	-162	1031	1083	784	917	834
	High (35%)	High (30%	-1770	-2036	-581	-1561	-623	-1929	-363	-1535	0	-1390	-490	-1751	-827	-943	-1336
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	16	-196	294	-30	259	-269	503	-87	0	-260	184	-441	-233	-175	-262
High (15%)	Low (15%)	High (30%	9985	10068	4412	9091	5100	9432	5414	8477	0	-284	4625	8031	5594	5926	5682
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	11560	11706	5096	10580	5875	10849	6246	9841	0	2023	5342	9285	5937	6518	6873
	Ref (50%)	High (30%	3331	3384	1552	3056	1967	3136	2237	2793	0	-609	1810	2500	1964	2060	1827
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5060	5170	2362	4597	2812	4728	3091	4238	0	912	2505	3820	2489	2783	2956
	High (35%)	High (30%	264	297	169	401	470	231	723	299	0	-677	535	114	348	343	130
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2050	2136	1043	1931	1353	1891	1589	1747	0	453	1208	1424	943	1111	1205

IV.D.2. PAQ 12: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology with 10% Higher Capital Costs for Keeyask G.S. and Conawapa G.S. in all Scenarios

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/25 0MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-473	-1274	520	-1054	-43	-1091	185	-1006	0	-3726	-382	-1571	-256	-477	-1490
		Ref (50%)	148	-618	844	-454	330	-566	584	-481	0	-2354	-36	-1106	-237	-318	-986
		Low (20%)	1276	538	1292	556	820	499	1105	479	0	-1419	405	-199	165	194	-220
	Ref (50%)	High (30%	-3226	-3888	-905	-3207	-1366	-3582	-1085	-3045	0	-2593	-1325	-3419	-1703	-1937	-2649
		Ref (50%)	-2503	-3133	-513	-2552	-955	-2942	-675	-2449	0	-1686	-991	-2891	-1567	-1690	-2166
		Low (20%)	-1360	-1965	-20	-1582	-447	-1853	-158	-1515	0	-1072	-576	-2020	-1123	-1158	-1465
	High (35%)	High (30%	-4442	-5015	-1614	-4034	-1999	-4661	-1700	-3824	0	-2000	-1713	-4057	-2268	-2501	-3053
		Ref (50%)	-3677	-4221	-1188	-3367	-1569	-3972	-1285	-3210	0	-1324	-1390	-3517	-2082	-2218	-2592
		Low (20%)	-2555	-3075	-680	-2449	-1057	-2900	-775	-2322	0	-869	-999	-2700	-1638	-1698	-1944
Ref (55%)	Low (15%)	High (30%	4192	3836	2242	3470	2305	3545	2550	3137	0	-2154	1870	2624	2263	2320	1663
		Ref (50%)	4813	4492	2566	4071	2678	4070	2949	3661	0	-782	2215	3089	2282	2478	2168
		Low (20%)	5941	5649	3014	5080	3168	5136	3470	4622	0	153	2656	3996	2685	2991	2933
	Ref (50%)	High (30%	-393	-693	143	-485	119	-711	375	-571	0	-1683	48	-909	-175	-241	-729
		Ref (50%)	330	61	535	170	529	-71	785	25	0	-775	383	-380	-39	6	-246
		Low (20%)	1473	1230	1027	1140	1038	1018	1303	958	0	-162	798	490	405	538	455
	High (35%)	High (30%	-2468	-2734	-881	-2150	-923	-2627	-663	-2124	0	-1390	-751	-2334	-1208	-1324	-1717
		Ref (50%)	-1703	-1940	-454	-1484	-493	-1939	-248	-1510	0	-714	-428	-1794	-1023	-1041	-1256
		Low (20%)	-581	-793	54	-565	19	-866	262	-622	0	-260	-37	-977	-579	-521	-608
High (15%)	Low (15%)	High (30%	9132	9215	4072	8301	4761	8579	5075	7687	0	-284	4303	7240	5089	5421	5177
		Ref (50%)	9753	9871	4396	8902	5134	9104	5473	8212	0	1087	4649	7706	5108	5580	5681
		Low (20%)	10881	11027	4844	9912	5623	10170	5994	9173	0	2023	5090	8612	5511	6092	6447
	Ref (50%)	High (30%	2564	2617	1234	2383	1648	2369	1919	2120	0	-609	1522	1829	1529	1625	1392
		Ref (50%)	3287	3371	1626	3038	2059	3009	2329	2716	0	298	1856	2357	1665	1872	1876
		Low (20%)	4430	4540	2118	4008	2567	4098	2846	3649	0	912	2272	3228	2109	2404	2577
	High (35%)	High (30%	-434	-401	-131	-189	171	-467	424	-291	0	-677	274	-469	-33	-38	-251
		Ref (50%)	331	393	295	477	600	221	839	324	0	-1	597	71	153	245	211
		Low (20%)	1453	1539	803	1396	1112	1294	1349	1212	0	453	988	888	596	765	858

IV.E.1. PAQ 13: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology with One-half the Variation in High and Low Capital Cost Uncertainty Range for Thermal and Wind Generation

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	710	-90	968	-3	408	93	735	88	0	-2845	113	-512	341	208	-578
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	2126	1388	1617	1395	1148	1349	1399	1300	0	-1799	708	644	726	723	211
	Ref (50%)	High (30%	-2038	-2699	-417	-2207	-890	-2392	-535	-2002	0	-2011	-857	-2421	-1106	-1269	-1826
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-609	-1213	274	-872	-145	-1102	118	-823	0	-1324	-302	-1307	-651	-712	-1085
	High (35%)	High (30%	-3282	-3855	-1114	-3094	-1517	-3500	-1158	-2844	0	-1566	-1271	-3130	-1695	-1865	-2301
		Ref (50%)	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1750	-2284	-358	-1719	-722	-2109	-483	-1622	0	-1181	-712	-1971	-1142	-1247	-1578
Ref (55%)	Low (15%)	High (30%	5375	5020	2690	4522	2756	4729	3100	4231	0	-1273	2365	3683	2860	3004	2575
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	6791	6498	3339	5920	3496	5985	3764	5443	0	-227	2959	4839	3245	3520	3364
	Ref (50%)	High (30%	795	495	630	515	595	478	925	471	0	-1101	517	89	422	427	93
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2225	1981	1321	1850	1339	1768	1578	1650	0	-413	1071	1203	877	985	835
	High (35%)	High (30%	-1308	-1574	-380	-1210	-441	-1466	-121	-1144	0	-956	-309	-1407	-636	-688	-965
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	111	-102	331	65	306	-175	528	-10	0	-447	217	-347	-162	-127	-265
High (15%)	Low (15%)	High (30%	10316	10399	4520	9353	5211	9764	5625	8782	0	597	4799	8300	5686	6106	6089
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	11731	11877	5169	10751	5952	11019	6288	9994	0	1643	5393	9456	6071	6621	6878
	Ref (50%)	High (30%	3752	3805	1721	3383	2124	3559	2469	3162	0	-1267	1991	2827	2126	2293	1771
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5182	5291	2412	4718	2869	4849	3122	4342	0	660	2545	3941	2581	2850	2957
	High (35%)	High (30%	726	759	369	751	653	694	966	690	0	-1159	716	458	540	598	141
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2153	2239	1087	2034	1407	1993	1620	1832	0	274	1249	1526	1021	1166	1211

IV.E.1. PAQ 14: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology Assuming NO Variation in the High and Low Capital Cost Uncertainty Range for Thermal and Wind Generation

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	474	-326	848	-239	305	-142	683	-142	0	-2676	58	-747	141	48	-693
		Ref (50%)	1639	872	1433	911	919	924	1172	883	0	-2354	517	263	648	567	-100
		Low (20%)	2537	1799	1816	1806	1326	1759	1492	1692	0	-2232	809	1055	1066	994	369
	Ref (50%)	High (30%	-2201	-2862	-499	-2370	-965	-2555	-575	-2157	0	-1901	-900	-2584	-1245	-1374	-1903
		Ref (50%)	-1137	-1768	49	-1362	-393	-1576	-114	-1258	0	-1686	-487	-1704	-790	-913	-1389
		Low (20%)	-323	-927	409	-586	-14	-817	188	-558	0	-1609	-222	-1022	-416	-532	-981
	High (35%)	High (30%	-3407	-3980	-1176	-3219	-1577	-3624	-1191	-2960	0	-1484	-1309	-3255	-1801	-1942	-2357
		Ref (50%)	-2406	-2950	-648	-2299	-1029	-2701	-744	-2141	0	-1324	-923	-2462	-1385	-1521	-1894
		Low (20%)	-1644	-2164	-300	-1600	-665	-1990	-452	-1512	0	-1268	-675	-1852	-1042	-1174	-1526
Ref (55%)	Low (15%)	High (30%	5139	4784	2570	4286	2653	4494	3048	4001	0	-1104	2310	3448	2660	2845	2460
		Ref (50%)	6304	5983	3155	5435	3267	5561	3537	5026	0	-782	2768	4458	3167	3364	3053
		Low (20%)	7201	6909	3538	6331	3674	6395	3857	5835	0	-660	3061	5250	3586	3791	3522
	Ref (50%)	High (30%	632	332	548	352	520	315	885	316	0	-990	473	-74	284	322	17
		Ref (50%)	1696	1427	1097	1360	1091	1295	1346	1215	0	-775	887	806	738	784	531
		Low (20%)	2511	2267	1457	2136	1470	2054	1649	1915	0	852	1152	1489	1113	1164	1498
	High (35%)	High (30%	-1433	-1698	-442	-1335	-501	-1591	-154	-1260	0	-875	-347	-1531	-741	-765	-1021
		Ref (50%)	-432	-669	86	-416	47	-668	292	-441	0	-714	39	-739	-325	-344	-558
		Low (20%)	330	117	433	284	411	44	585	188	0	-659	286	-128	18	4	-190
High (15%)	Low (15%)	High (30%	10080	10163	4400	9117	5109	9528	5572	8552	0	765	4744	8064	5486	5946	5974
		Ref (50%)	11244	11361	4985	10266	5723	10595	6062	9576	0	1087	5202	9074	5993	6465	6567
		Low (20%)	12142	12288	5368	11162	6129	11430	6382	10386	0	1210	5495	9866	6412	6892	7036
	Ref (50%)	High (30%	3589	3642	1639	3220	2049	3396	2429	3007	0	83	1947	2664	1988	2188	2138
		Ref (50%)	4653	4737	2187	4228	2620	4375	2890	3906	0	298	2361	3543	2442	2649	2653
		Low (20%)	5467	5577	2548	5004	3000	5134	3192	4606	0	375	2626	4226	2817	3030	3061
	High (35%)	High (30%	601	634	307	626	592	569	933	574	0	-162	678	334	434	521	445
		Ref (50%)	1602	1664	835	1546	1141	1492	1379	1392	0	-1	1064	1126	850	942	909
		Low (20%)	2364	2450	1183	2245	1505	2204	1672	2022	0	54	1311	1737	1193	1290	1277

V.E. PAQ 15: 78 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology from the Province of Manitoba Perspective by Eliminating LCA View of Intra-provincial Transfers

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	2693	1918	1837	1833	1302	2016	1508	1826	0	-3291	821	1222	1451	1276	395
		Ref (50%)	3053	2307	2042	2179	1550	2290	1782	2106	0	-2035	1049	1446	1354	1305	735
		Low (20%)	3311	2591	2131	2436	1676	2493	1939	2321	0	-1175	1166	1612	1286	1338	994
	Ref (50%)	High (30%	-670	-1315	200	-977	-250	-1067	13	-849	0	-2348	-367	-1272	-361	-564	-1203
		Ref (50%)	-175	-791	483	-532	51	-647	314	-457	0	-1506	-132	-943	-328	-428	-852
		Low (20%)	188	-405	640	-204	222	-334	495	-161	0	-935	-3	-698	-293	-312	-580
	High (35%)	High (30%	-2227	-2787	-628	-2166	-1007	-2477	-723	-1982	0	-1839	-891	-2272	-1135	-1345	-1851
		Ref (50%)	-1668	-2202	-302	-1682	-678	-1990	-407	-1545	0	-1206	-655	-1906	-1043	-1161	-1502
		Low (20%)	-1256	-1768	-111	-1328	-483	-1624	-214	-1220	0	-779	-522	-1633	-959	-1007	-1230
Ref (55%)	Low (15%)	High (30%	7360	7030	3560	6359	3650	6654	3873	5970	0	-1718	3073	5418	3971	4074	3549
		Ref (50%)	7719	7419	3765	6705	3899	6928	4147	6251	0	-461	3300	5643	3874	4103	3889
		Low (20%)	7977	7703	3854	6962	4025	7131	4304	6465	0	398	3418	5808	3807	4136	4148
	Ref (50%)	High (30%	2164	1880	1248	1745	1235	1805	1473	1625	0	-1437	1007	1240	1168	1133	717
		Ref (50%)	2659	2404	1532	2190	1536	2224	1775	2017	0	-594	1242	1568	1201	1268	1068
		Low (20%)	3022	2791	1688	2519	1707	2538	1955	2313	0	-24	1371	1813	1236	1385	1340
	High (35%)	High (30%	-253	-505	107	-282	70	-443	314	-281	0	-1228	71	-548	-75	-167	-515
		Ref (50%)	306	80	432	202	398	45	630	156	0	-596	307	-181	17	16	-165
		Low (20%)	718	514	624	556	593	410	823	481	0	-169	440	91	100	171	107
High (15%)	Low (15%)	High (30%	12301	12409	5391	11191	6106	11689	6398	10522	0	152	5508	10035	6798	7175	7063
		Ref (50%)	12661	12799	5595	11537	6355	11963	6673	10802	0	1408	5735	10260	6700	7205	7403
		Low (20%)	12919	13082	5684	11794	6481	12166	6830	11017	0	2268	5852	10425	6633	7237	7662
	Ref (50%)	High (30%	5121	5191	2338	4614	2765	4886	3018	4317	0	-363	2481	3978	2873	2999	2839
		Ref (50%)	5616	5714	2622	5059	3066	5305	3319	4709	0	479	2717	4306	2905	3135	3190
		Low (20%)	5980	6101	2779	5387	3236	5619	3500	5005	0	1050	2846	4551	2941	3252	3462
	High (35%)	High (30%	1782	1828	856	1680	1163	1717	1401	1554	0	-515	1096	1317	1100	1119	952
		Ref (50%)	2341	2414	1182	2164	1492	2205	1717	1990	0	118	1332	1684	1193	1303	1301
		Low (20%)	2752	2848	1373	2518	1687	2571	1911	2316	0	544	1465	1956	1276	1457	1574

V.E. PAQ 16: 50 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology from the Province of Manitoba Perspective by Eliminating LCA View of Intra-provincial Transfers

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	843	67	1029	-70	508	268	766	-34	0	-3069	111	-544	323	86	-688
		Ref (50%)	1275	529	1288	354	780	619	1056	348	0	-1965	351	-236	295	181	-329
		Low (20%)	1591	871	1423	673	927	883	1225	643	0	-1215	478	-6	283	267	-52
	Ref (50%)	High (30%	-1381	-2026	-111	-1705	-547	-1740	-263	-1565	0	-2238	-630	-1950	-796	-1024	-1613
		Ref (50%)	-854	-1470	198	-1226	-235	-1286	45	-1129	0	-1458	-389	-1584	-733	-858	-1252
		Low (20%)	-465	-1057	375	-871	-55	-945	231	-798	0	-931	-256	-1312	-672	-717	-971
	High (35%)	High (30%	-2546	-3106	-764	-2491	-1134	-2779	-841	-2303	0	-1775	-1001	-2576	-1329	-1550	-2030
		Ref (50%)	-1970	-2504	-426	-1991	-800	-2274	-521	-1844	0	-1171	-763	-2191	-1221	-1351	-1675
		Low (20%)	-1546	-2057	-223	-1623	-600	-1895	-325	-1502	0	-766	-628	-1904	-1125	-1184	-1399
Ref (55%)	Low (15%)	High (30%	4504	4173	2371	3450	2386	3966	2629	3171	0	-1891	1881	2723	2320	2293	1812
		Ref (50%)	4936	4636	2630	3875	2659	4317	2919	3553	0	-787	2121	3030	2292	2388	2171
		Low (20%)	5252	4977	2765	4193	2805	4581	3088	3847	0	-38	2248	3261	2280	2475	2448
	Ref (50%)	High (30%	1068	784	791	633	758	772	1005	549	0	-1478	559	205	533	447	57
		Ref (50%)	1596	1340	1100	1112	1069	1226	1313	986	0	-698	800	571	596	612	417
		Low (20%)	1985	1753	1277	1467	1249	1566	1499	1316	0	-172	933	843	657	753	698
	High (35%)	High (30%	-746	-999	-96	-782	-139	-909	109	-766	0	-1234	-124	-1014	-360	-475	-807
		Ref (50%)	-171	-397	242	-282	195	-404	428	-308	0	-630	115	-629	-252	-277	-453
		Low (20%)	254	50	444	86	394	-24	625	35	0	-224	250	-342	-156	-110	-176
High (15%)	Low (15%)	High (30%	8334	8441	3777	7170	4334	7942	4604	6663	0	-503	3783	6288	4546	4722	4575
		Ref (50%)	8766	8903	4037	7595	4607	8293	4894	7045	0	601	4023	6595	4518	4818	4934
		Low (20%)	9082	9244	4172	7914	4753	8557	5063	7339	0	1351	4150	6826	4507	4904	5211
	Ref (50%)	High (30%	3600	3669	1720	3075	2093	3447	2338	2836	0	-589	1830	2540	2007	2056	1891
		Ref (50%)	4127	4225	2028	3554	2404	3900	2646	3272	0	191	2070	2906	2070	2221	2252
		Low (20%)	4516	4637	2205	3909	2584	4241	2832	3602	0	717	2204	3178	2131	2362	2532
	High (35%)	High (30%	1094	1140	580	985	866	1067	1100	884	0	-605	809	668	711	694	529
		Ref (50%)	1669	1742	918	1486	1200	1572	1420	1342	0	-1	1047	1053	819	892	883
		Low (20%)	2094	2189	1120	1853	1400	1951	1616	1685	0	405	1182	1340	915	1059	1160

V.E. PAQ 17: 35 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology from the Province of Manitoba Perspective by Eliminating LCA View of Intra-provincial Transfers

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-1225	-1998	333	-2159	-410	-1703	-67	-1893	0	-2629	-767	-2528	-988	-1182	-2054
		Ref (50%)	-694	-1437	602	-1632	-92	-1248	247	-1443	0	-1745	-487	-2112	-923	-1028	-1625
		Low (20%)	-300	-1018	746	-1230	92	-904	436	-1093	0	-1163	-326	-1796	-860	-895	-1290
	Ref (50%)	High (30%	-2467	-3110	-479	-2800	-1034	-2775	-705	-2541	0	-2017	-1099	-2991	-1479	-1679	-2337
		Ref (50%)	-1889	-2504	-165	-2270	-698	-2269	-383	-2070	0	-1350	-835	-2571	-1369	-1487	-1939
		Low (20%)	-1460	-2052	17	-1872	-497	-1887	-187	-1712	0	-910	-683	-2254	-1271	-1324	-1627
	High (35%)	High (30%	-3184	-3743	-982	-3135	-1422	-3388	-1102	-2877	0	-1649	-1281	-3189	-1728	-1930	-2459
		Ref (50%)	-2580	-3113	-640	-2605	-1074	-2853	-775	-2399	0	-1111	-1028	-2772	-1594	-1718	-2082
		Low (20%)	-2133	-2643	-435	-2214	-862	-2450	-572	-2041	0	-756	-882	-2460	-1477	-1539	-1787
Ref (55%)	Low (15%)	High (30%	1370	1042	1271	295	969	998	1263	315	0	-1871	491	-247	454	399	-249
		Ref (50%)	1901	1602	1540	821	1287	1452	1577	765	0	-987	771	168	518	552	179
		Low (20%)	2295	2021	1684	1223	1471	1797	1766	1114	0	-405	932	484	582	686	515
	Ref (50%)	High (30%	-580	-863	209	-1026	7	-789	282	-953	0	-1478	-180	-1357	-444	-539	-1034
		Ref (50%)	-3	-257	524	-495	343	-283	603	-482	0	-811	84	-937	-334	-347	-636
		Low (20%)	426	195	706	-98	544	99	800	-124	0	-372	236	-620	-236	-184	-325
	High (35%)	High (30%	-1717	-1969	-440	-1759	-584	-1828	-318	-1651	0	-1239	-562	-1934	-933	-1051	-1453
		Ref (50%)	-1113	-1339	-99	-1229	-235	-1293	9	-1173	0	-701	-310	-1517	-798	-838	-1077
		Low (20%)	-666	-869	106	-837	-23	-890	212	-815	0	-345	-163	-1205	-681	-660	-781
High (15%)	Low (15%)	High (30%	4022	4130	2228	2835	2379	3850	2654	2683	0	-994	1829	2201	2044	2115	1717
		Ref (50%)	4552	4690	2497	3362	2697	4304	2967	3133	0	-109	2109	2617	2108	2269	2146
		Low (20%)	4946	5109	2642	3763	2881	4649	3156	3482	0	472	2269	2933	2172	2403	2481
	Ref (50%)	High (30%	1329	1399	901	794	1058	1292	1307	740	0	-859	793	389	695	693	379
		Ref (50%)	1907	2005	1215	1325	1394	1798	1628	1211	0	-192	1056	809	805	886	777
		Low (20%)	2335	2457	1397	1722	1595	2180	1825	1569	0	248	1208	1126	903	1048	1089
	High (35%)	High (30%	-244	-198	95	-359	254	-203	491	-352	0	-769	194	-600	-60	-104	-366
		Ref (50%)	359	432	437	171	602	332	818	126	0	-231	447	-184	74	108	11
		Low (20%)	807	902	642	563	814	735	1021	485	0	125	593	128	191	287	306

V.E. PAQ 18: 20 Year Probability Analysis Quilt for Determining Comparisons to All Gas Plan using LCA Methodology from the Province of Manitoba Perspective by Eliminating LCA View of Intra-provincial Transfers

Energy Prices	Discount Rates	Capital Costs	K19/C25/750MW (WPS Sale &Inv)	K19/C25/750MW	K19/Gas25/750MW (WPS Sale & INV)	K19/C31/750MW	K19/Gas31/750MW	K19/C25/250MW	K19/Gas24/250MW	K19/C31/250MW	All Gas	Wind/Gas	K22/Gas	K22/C29	SCGT/C26	CCGT/C26	Wind/C26
Low (30%)	Low (15%)	High (30%	-4901	-5506	-1599	-5641	-1866	-5028	-1475	-5422	0	-1624	-1987	-5697	-3168	-3440	-3793
		Ref (50%)	-4126	-4700	-1126	-4873	-1459	-4330	-1106	-4656	0	-1140	-1677	-5038	-2907	-3085	-3328
		Low (20%)	-3534	-4084	-818	-4277	-1204	-3789	-871	-4052	0	-810	-1492	-4525	-2686	-2790	-2962
	Ref (50%)	High (30%	-4984	-5505	-1821	-5177	-2035	-5045	-1672	-4944	0	-1370	-1929	-5152	-2972	-3229	-3537
		Ref (50%)	-4232	-4725	-1361	-4475	-1633	-4366	-1308	-4253	0	-963	-1642	-4558	-2722	-2892	-3106
		Low (20%)	-3662	-4133	-1062	-3939	-1380	-3844	-1077	-3717	0	-685	-1472	-4102	-2512	-2613	-2766
	High (35%)	High (30%	-5034	-5501	-1979	-4878	-2161	-5053	-1815	-4634	0	-1199	-1888	-4771	-2825	-3072	-3347
		Ref (50%)	-4298	-4738	-1527	-4217	-1761	-4387	-1454	-3992	0	-844	-1617	-4223	-2585	-2748	-2941
		Low (20%)	-3744	-4162	-1232	-3721	-1509	-3878	-1224	-3501	0	-601	-1455	-3805	-2383	-2481	-2621
Ref (55%)	Low (15%)	High (30%	-3401	-3675	-981	-4533	-965	-3428	-696	-4437	0	-1342	-1322	-4621	-2440	-2626	-2867
		Ref (50%)	-2676	-2922	-539	-3802	-586	-2775	-351	-3707	0	-873	-1029	-3994	-2195	-2293	-2428
		Low (20%)	-2122	-2344	-251	-3233	-347	-2269	-132	-3129	0	-554	-853	-3504	-1988	-2016	-2082
	Ref (50%)	High (30%	-4141	-4392	-1500	-4537	-1466	-4099	-1193	-4395	0	-1188	-1510	-4535	-2553	-2753	-2986
		Ref (50%)	-3389	-3612	-1040	-3834	-1065	-3419	-829	-3704	0	-781	-1223	-3941	-2303	-2415	-2555
		Low (20%)	-2820	-3019	-741	-3298	-812	-2897	-598	-3169	0	-503	-1053	-3485	-2093	-2136	-2215
	High (35%)	High (30%	-4320	-4548	-1701	-4323	-1663	-4245	-1397	-4161	0	-1045	-1531	-4254	-2477	-2673	-2887
		Ref (50%)	-3584	-3785	-1248	-3662	-1263	-3579	-1037	-3519	0	-690	-1260	-3706	-2237	-2350	-2481
		Low (20%)	-3030	-3209	-954	-3166	-1011	-3070	-806	-3028	0	-447	-1098	-3288	-2035	-2083	-2161
High (15%)	Low (15%)	High (30%	-2892	-2868	-876	-4138	-553	-2722	-333	-4091	0	-1157	-951	-4153	-2079	-2223	-2390
		Ref (50%)	-2117	-2063	-404	-3370	-146	-2024	36	-3325	0	-673	-642	-3494	-1817	-1868	-1925
		Low (20%)	-1526	-1446	-96	-2774	109	-1483	271	-2721	0	-343	-457	-2981	-1596	-1573	-1558
	Ref (50%)	High (30%	-3352	-3343	-1218	-3930	-932	-3160	-715	-3844	0	-991	-1083	-3913	-2107	-2256	-2415
		Ref (50%)	-2601	-2563	-758	-3227	-530	-2480	-352	-3153	0	-584	-797	-3320	-1857	-1919	-1984
		Low (20%)	-2031	-1970	-459	-2692	-277	-1958	-121	-2617	0	-307	-626	-2863	-1646	-1640	-1644
	High (35%)	High (30%	-3654	-3654	-1458	-3801	-1199	-3446	-983	-3688	0	-878	-1169	-3733	-2106	-2259	-2409
		Ref (50%)	-2918	-2891	-1006	-3140	-799	-2780	-622	-3046	0	-523	-898	-3185	-1866	-1936	-2003
		Low (20%)	-2364	-2315	-711	-2644	-546	-2271	-392	-2555	0	-281	-736	-2768	-1664	-1669	-1684

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NEEDS FOR AND ALTERNATIVES TO (NFAT) REVIEW OF MANITOBA HYDRO'S PROPOSAL FOR THE KEEYASK AND CONAWAPA GENERATING STATIONS

Supplemental Report A Updated Figures

La Capra Associates

CONFIDENTIAL

This report contains information that has been deemed Commercially Sensitive Information and is, therefore, subject to a protective order.

PREPARED FOR

The Manitoba Public Utilities Board

May 16, 2014

PREPARED BY

La Capra Associates, Inc.
One Washington Mall, 9th Floor
Boston, MA 02108

Supplemental Report A – Updated Figures from TA 9A, TA 9B and TA 10A

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I. Introduction

La Capra Associates filed its main report for the NFAT review in two parts, Part A on January 24, 2014 and Part B on February 28, 2014. The La Capra Associates reports were supported by the filing of ten Technical Appendices, including Technical Appendix 9 – Review of Economic Analysis and Technical Appendix 10 – Review of Financial Analysis, which were also filed in two parts, A and B. In addition, as new information emerged on the capital cost estimates for the Keeyask and Conawapa Hydroelectric Stations, La Capra Associates filed an Addendum to TA 9A and TA9B to capture the higher capital costs impacts.

Manitoba Hydro simultaneously conducted an analysis of DSM program potential and economics during the NFAT review process. Manitoba Hydro has endorsed a substantial increase in its DSM Program spending and comprehensiveness. Manitoba Hydro refers to this new DSM initiative as DSM Level 2. The Manitoba Hydro economic analysis of DSM Level 2 concluded that it would be an economic benefit to add DSM Level 2 resources to all potential resource development plans. As a result, Manitoba Hydro provided significant information on several resource development plans in order to capture how these plans would change with DSM Level 2. In this modeling, Manitoba Hydro included the updated capital cost estimates for Keeyask and Conawapa for the reference scenario assumptions used in the 2013 Update section that was part of the NFAT Application filed in August, 2013. The Plans updated include 4, 5, 6, 12 and 14.

In response to these updates, the NFAT Review Panel has requested that La Capra Associates update specific figures from the figures shown in TA 9A and 10A. This Supplemental Filing Part A provides the updated figures.

La Capra Associates is also preparing a Part B which will summarize and observations and recommendations made in the La Capra Associates' main report Part A and Part B, discussed above. Part B is expected to be available during the week of May 26th.

II. Information Sources

In order to update the requested figures, La Capra Associates relied on Manitoba Hydro's detailed annual costs for Plans 4, 5, 6, 12, and 14 included in their economic analysis. Some of the financial TA 10 Figures below include original information from our reports as well as new information labeled "Main Submission", a designation used by Manitoba Hydro in their updated spreadsheets.

The figures below are derived from data and analysis provided in MH exhibits 104-4, 104-6, 104-4-3, 104-4-4, including Plan 4 and Plan 12 information filed on May 1, 2014. Our understanding is that these plans incorporate the following scenario:

- Reference Scenario Only - 2013 modeling assumptions for discount, energy prices, load forecast (prior to DSM adjustment) as used by MH in their 2013 Update Analysis within the August 16, 2013 NFAT Application.
- The Plans all include the cost and load reduction effects of DSM Level 2 as modeled by Manitoba Hydro.
- The Plans have the new March, 2014 vintage updated capital cost estimates for Keeyask and Conawapa.
- The timing of resource additions may have been changed by Manitoba Hydro in the some Plans due to lower Peak Load and Dependable Energy requirements from DSM Level 2.

III. Updated Figures from Technical Appendices 9A and 9B

The first figures shown below are updated versions of Figure 9-15 and Figure 9-21 from the original TA 9A, now labeled Figure 9-15S and Figure 9-21S respectively below. La Capra associates uses the letter designation "S" for all the figures in this supplemental report. The economic analysis is shown on a year by year basis from a cumulative present value perspective. Figure 9-21S shows in tabular form information that could be read off of Figure 9-15S. The updated analysis for these plans shows a significantly lower 78-year NPV, especially for Plan 14 MH's Preferred Development Plan.

The next two figures requested by the PUB NFAT Review Panel are Figure 9-98S and Figure 9-99S, which are also shown below. These figures were focused on showing the economics of adding each of the components of the Plan 14 (PDP) in a building block approach. The first item to point out is that not all the comparisons shown in the original Figures 9-98 and 9-99 were updated. These omitted comparisons would require additional information from Manitoba Hydro; Manitoba Hydro did not update all plans for Level 2 DSM and the new capital cost estimates for Keeyask and Conawapa.

The change in value of the PDP component blocks is quite substantial. The addition of Keeyask to the All Gas Plan is negative over the 78 year NPV period, meaning adding Keeyask would increase costs on a cumulative present value basis, where it had been a positive $634 million. The value of then adding the 250 MW transmission line and the MP250 sale of energy is $641 million. The steps of moving to the 750 MW transmission line and then Conawapa increase costs from MH's updated analysis to $218 million and $404 million respectively. Finally, the addition of the WPS contract and investment lowers costs by $63 million, resulting in a final 78-year NPV benefit of Plan 14 of $45 million as compared with the 2012 Reference Analysis of $1,696 million.

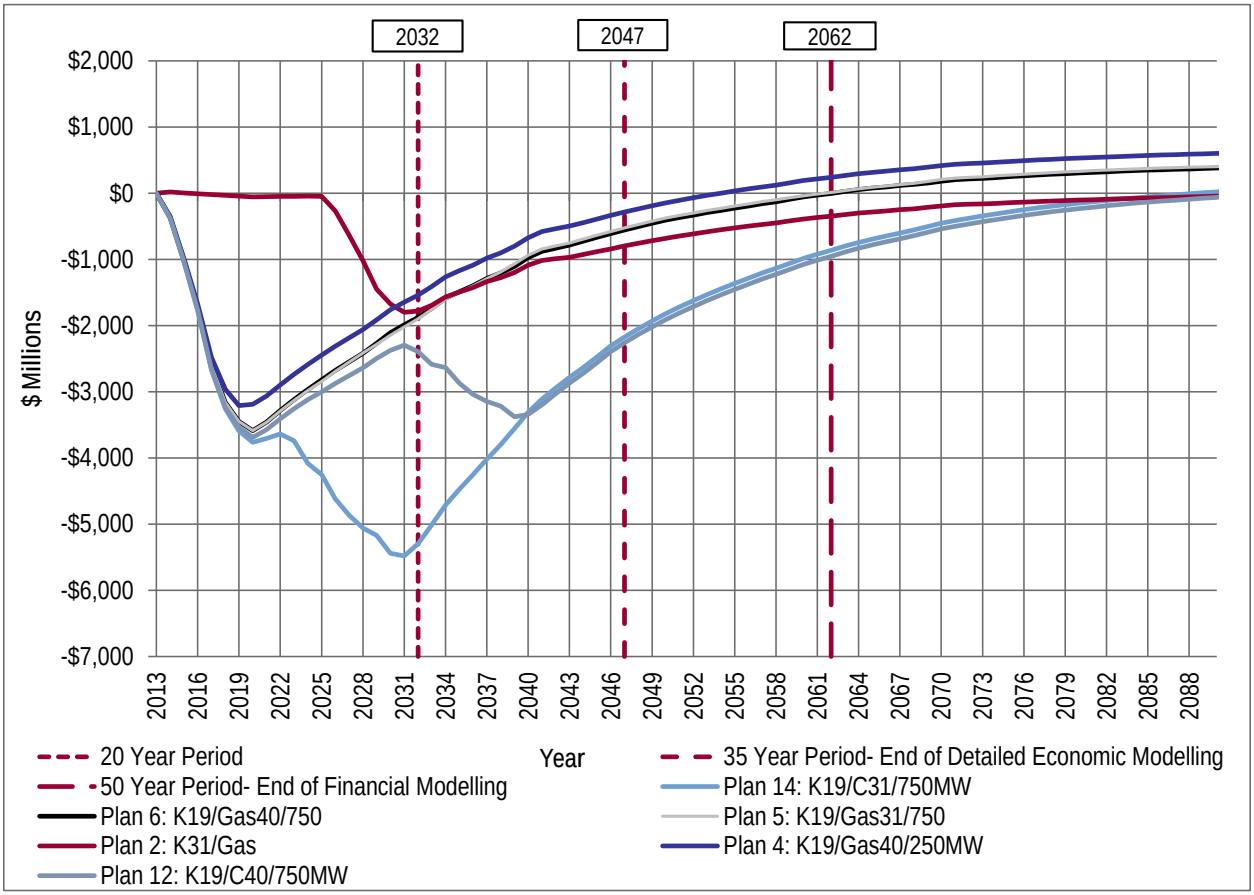


Figure 9-15S: Cumulative Incremental Cash Flow Difference for Plans 2, 4, 5, 6, 12 and 14 as Compared to the All Gas Case – Millions of 2014 Present Value Dollars

Plans	78 Year CPV of Total Capital	78 NPV	50 CPV	35 CPV	20 CPV	78 Year IRR	Break Even Year (All Gas) Base Case
1 All Gas	$2,764	$0	$0	$0	$0	N/A	N/A
2 K31/Gas29	$4,429	($38)	($349)	($798)	($1,781)	5.28%	N/A
4 K19/Gas40/250MW	$5,774	$604	$239	($284)	($1,541)	6.26%	2055
5 K19/Gas31/750MW (WPS	$6,215	$410	$10	($523)	($1,899)	5.92%	2062
6 K19/Gas40/750MW	$6,175	$386	($5)	($555)	($1,876)	5.90%	2063
12 K19/C40/750MW	$8,421	($18)	($954)	($2,261)	($2,395)	5.36%	N/A
14 K19/C31/750 (WPS)	$9,528	$45	($863)	($2,173)	($5,298)	5.42%	2089

Figure 9-21S: Summary- CPVs as Compared to All Gas Plan at the end of Various Periods, Break-Even Year, 78 year IRR and 78 Year CPV of Total Capital – Millions of 2014 Present Value Dollars

		35 Years	50 Years	78 Years
Change Case	Base Plan	All Reference	Reference	All Reference
Economics of Adding Keeyask G.S.				
2 K31/Gas29	1 All Gas	($798)	($349)	($38)
Economics of Adding 250 MW Transmission Line and MP 250				
4 K19/Gas40/250MW	2 K31/Gas29	$514	$588	$641
Economics of Adding 750 MW Transmission Line				
6 K19/Gas40/750MW	4 K19/Gas40/250MW	($271)	($243)	($217)
Economics of Adding Conawapa G.S.				
12-K19/C40/750	6 K19/Gas40/750MW	($1,706)	($949)	($404)
Economics of Adding WPS				
14 K19/C31/750 (WPS)	12-K19/C40/750	$88	$90	$63

Figure 9-98S: Summary of economic analysis results of components of the Preferred Development Plan

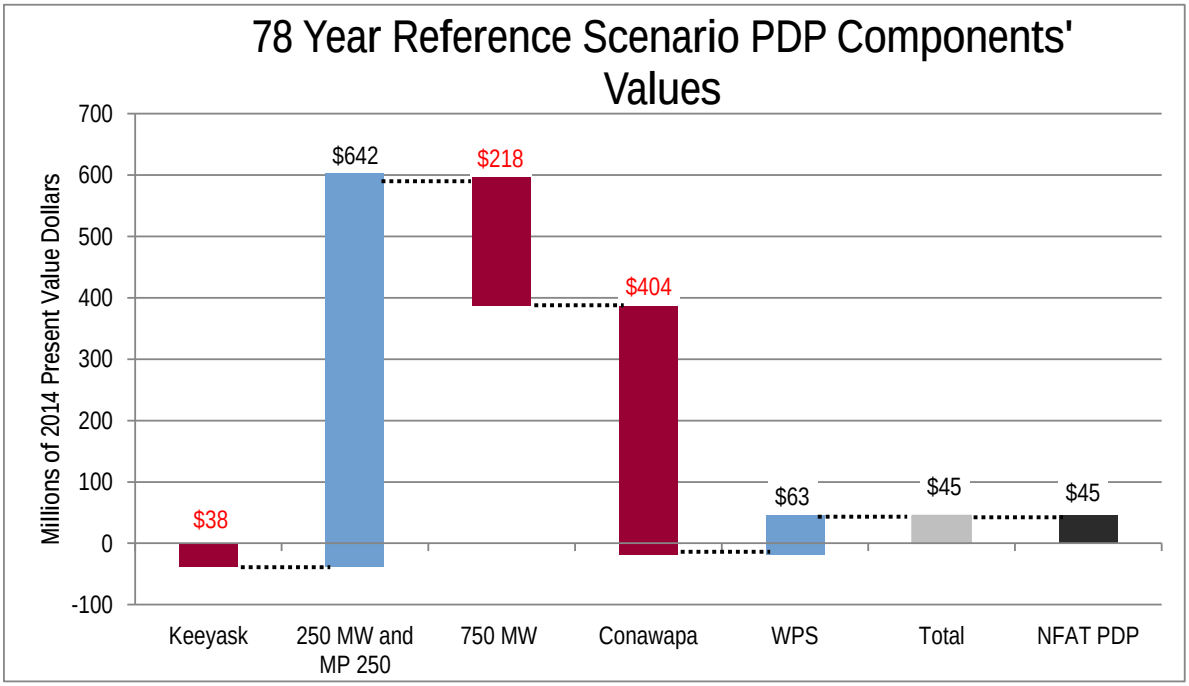


Figure 9-99S: Value of PDP Components – 78 Year NPV vs. All Gas

IV. Updated Figures from Technical Appendix 10A

The PUB NFAT Review Panel also requested that three figures be updated from the LCA TA 10A – Review of Financial Analysis. These figures are provided below showing the values from the original TA 10A figures as well as the updated cases available. The first figure, Figure 10-10S shows the NPV of the annual rate increases modeled by MH over four time periods. The biggest change occurred in Plan 1, the All Gas Plan. All plans have shown a lower level of NPV increases when DSM Level 2 is added and then that benefit is negated if higher capital cost estimates for Keeyask and Conawapa are included. This is shown in the Plan labeled High Capital (DSM 2) Main Submission.

The second figure, Figure 10-12S shows that the addition of DSM Level 2 provides strong reductions in typical monthly bills for residential customers consuming 750 kWh.

Similarly Figure 10-42S shows lower Even-Annual Rate Increases when DSM Level 2 is used in the resource development plans.

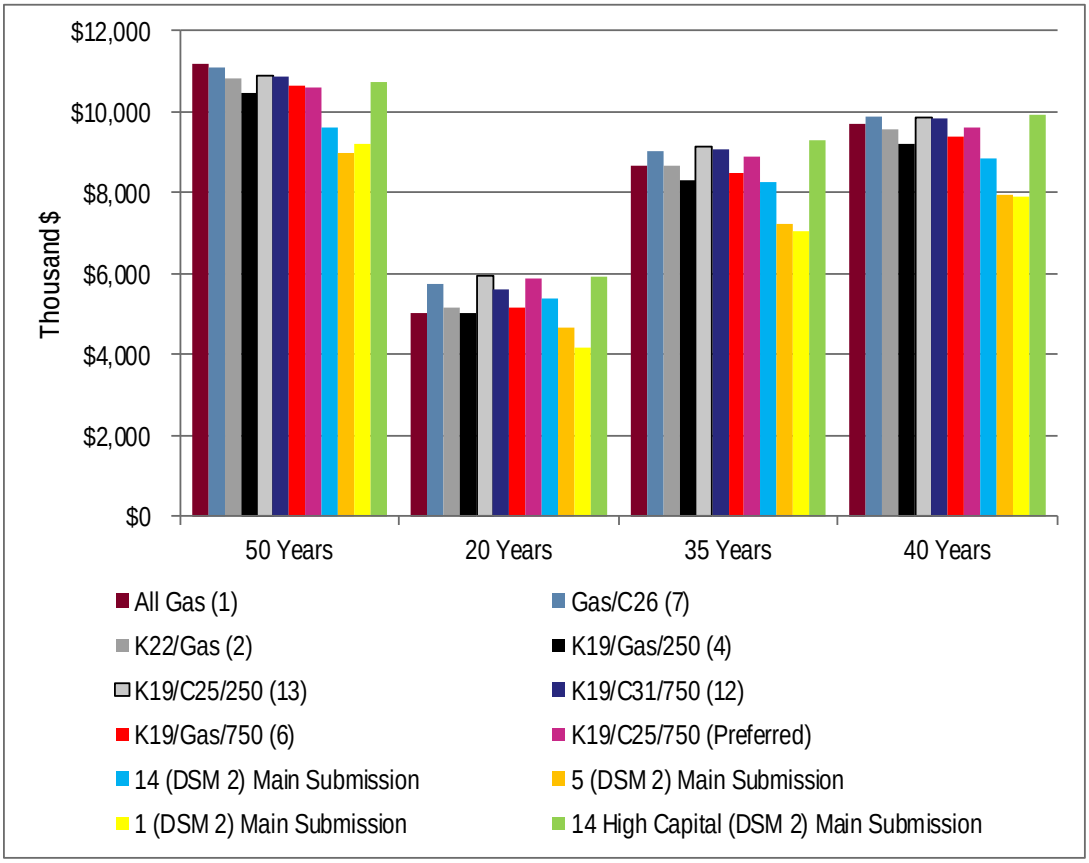


Figure 10-10S: NPV of Rate Increases by Development Plan

Development Plan	2013	2032	2042	2052	2062	NPV 2013-2062
All Gas (1)	$60.96	$115.72	$119.21	$143.32	$168.50	$1,218
Gas/C26 (7)	$60.96	$124.69	$109.96	$128.65	$142.89	$1,222
K22/Gas (2)	$60.96	$117.05	$115.46	$134.58	$146.44	$1,209
K19/Gas/250 (4)	$60.96	$115.58	$112.42	$131.55	$148.33	$1,196
K19/C25/250 (13)	$60.96	$127.28	$106.89	$120.03	$128.65	$1,217
K19/C31/750 (12)	$60.96	$123.43	$110.55	$121.69	$128.94	$1,214
K19/Gas/750 (6)	$60.96	$117.16	$112.24	$131.86	$148.10	$1,202
K19/C25/750 (14)	$60.96	$126.65	$104.92	$118.28	$125.59	$1,208
14 (DSM 2) Main Submission	$60.96	$129.00	$104.93	$110.16	$113.28	$1,196
5 (DSM 2) Main Submission	$60.96	$118.31	$104.61	$123.35	$137.80	$1,168
1 (DSM 2) Main Submission	$60.96	$111.11	$110.78	$137.97	$158.89	$1,171
14 High Capital (DSM 2) Main Submission	$60.96	$136.88	$111.89	$114.52	$116.21	$1,237

Figure 10-12S: Monthly Bills for 750 kWh Residential Customer

Plan #	Development Plan Short Name	Even-Annual Rate Increases (2012/13 to 2032)	Even-Annual Rate Increases (2012/13 to 2061/62)	Cumulative Nominal Rate Increases at 2031/32	Cumulative Nominal Rate Increases at 2061/62
1	All Gas	3.43%	2.07%	90%	176%
7	Gas/C26	3.86%	1.72%	105%	134%
2	K22/Gas	3.49%	1.77%	92%	140%
4	K19/Gas/250	3.42%	1.80%	90%	143%
13	K19/C25/250	3.98%	1.50%	109%	111%
12	K19/C31/750	3.80%	1.50%	102%	111%
6	K19/Gas/750	3.50%	1.79%	92%	143%
14	K19/C25/750 Preferred Plan	3.95%	1.44%	108%	106%
--	LCA No New Generation	3.35%	1.87%	87%	148%
14 (DSM 2)	Main Submission	4.27%	1.27%	112%	86%
5 (DSM 2)	Main Submission	3.74%	1.68%	94%	126%
1 (DSM 2)	Main Submission	3.36%	1.97%	82%	161%
14 High Keeyask and Conawapa (DSM 2)	Main Submission	4.63%	1.33%	125%	91%

Figure 10-42S: Rate Increases by Development Plan under Reference Conditions

V. Observations

Overall, the updates provided by Manitoba Hydro provide significant information in time to be incorporated into La Capra Associates overall review of the NFAT filing. There are several observations that can be made.

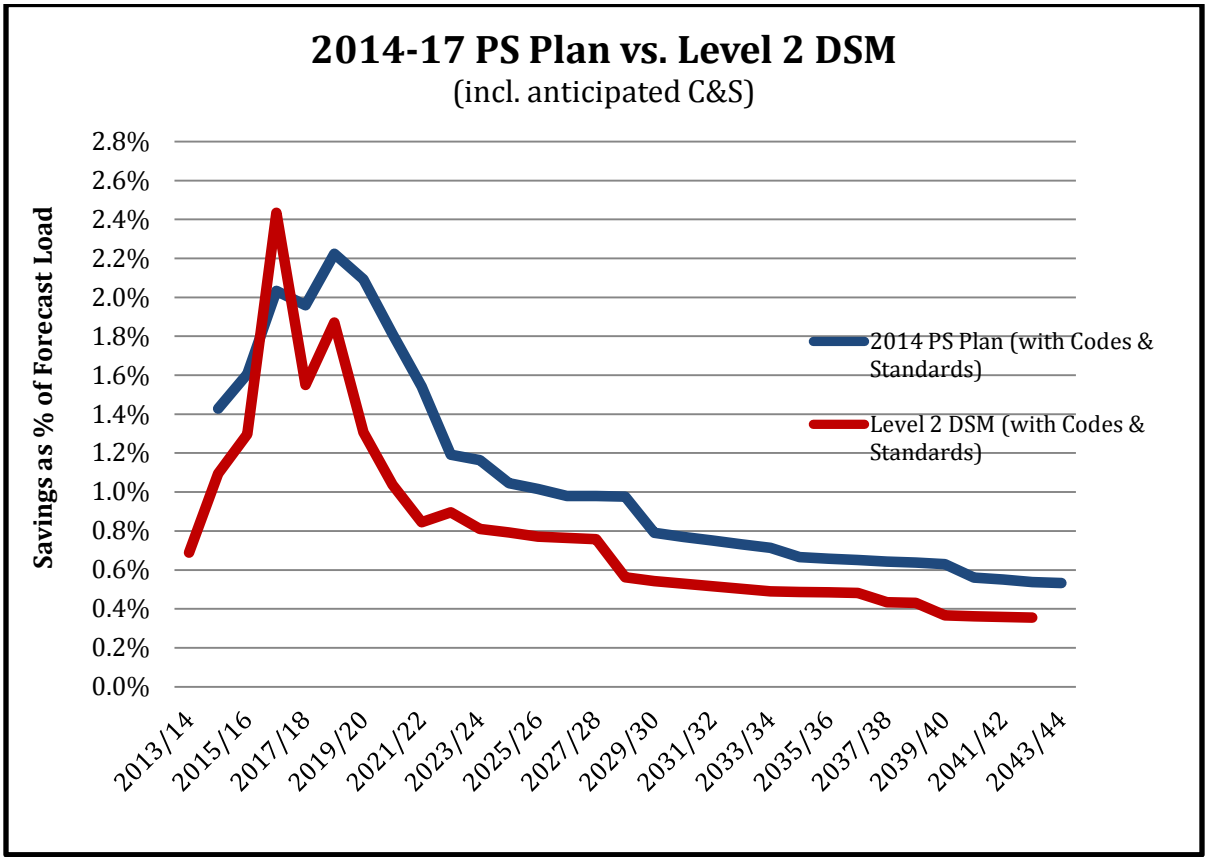
1. The substantial increase of DSM program expenditures and activities will provide positive economic benefits to MHs customers.
2. The Preferred Development Plan (Plan 14) economics have eroded to essentially break-even with the All-Gas Plan, even over the 78 year study period.
3. Several resource development plans, Plans 4, 5 and 6) that do not include Conawapa have economic benefits over 78-year NPV basis of about $400 to $600 million as compared to the Preferred Development Plan.

Tab 103

NEEDS FOR AND ALTERNATIVES TO (NFAT)

Manitoba Hydro Undertaking #137

The following graph outlines the incremental savings (from programs and codes and standards) from Level 2 of the scenario analysis and from the 2014-17 Power Smart Plan as a percentage of the 2013 Load Forecast.



Tab 104

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MANITOBA PUBLIC UTILITIES BOARD

Re: MANITOBA HYDRO
NEEDS FOR AND ALTERNATIVES TO
REVIEW OF MANITOBA HYDRO'S
PREFERRED DEVELOPMENT PLAN

Regis Gosselin - Chairperson
Marilyn Kapitany - Board Member
Larry Soldier - Board Member
Richard Bel - Board Member
Hugh Grant - Board Member

HELD AT:

Public Utilities Board
400, 330 Portage Avenue
Winnipeg, Manitoba
May 1, 2014
Pages 9603 to 9991

APPEARANCES

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Sven Hombach	)
Patti Ramage	)Manitoba Hydro
Marla Boyd (np)	)
Douglas Bedford (np)	)
Helga Van Iderstine (np)	)
Jennifer Moroz (np)	)
Odette Fernandes (np)	)
Janet Mayor (np)	)
Jack London (np)	)
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Aimee Craft (np)	)
William Gange	)GAC
Peter Miller	)
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Corey Shefman (np)	)
Christian Monnin	)IEC
Michael Weinstein (np)	)

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141	Manitoba Hydro to indicate if it's feasible to have the 750 megawatt line constructed before Keeyask is placed in service	9890
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--- Upon commencing at 9:01 a.m.

THE CHAIRPERSON: Good morning. I believe that we're in a position to begin today's proceedings. And Mr. Hombach, please.

MR. SVEN HOMBACH: Yes, good morning, Mr. Chairman, and good morning, members of the panel. Today is reserved for the evidence of Paul Chernick and Wesley Stevens. Both of them are expert witnesses for the Green Action Centre.

I'd also remind the parties in the room that following the evidence of Mr. Chernick and Mr. Stevens, Manitoba Hydro's DSM panel will be recalled later in the afternoon to address some additional questions.

I am not sure if Manitoba Hydro needs to speak to any undertakings this morning. If not, I suggest we turn it over to Mr. Gange to have his witnesses sworn and qualified.

THE CHAIRPERSON: Thank you, Mr. Hombach. Mr. Williams, please -- Mr. Gange, please, sorry. I apologize. Aren't you in some ways?

MR. WILLIAM GANGE: Thank you. I'm not sure who's going to take more offence at that, Mr. Chair. It's probably a 50/50 split. But, yes, thank

you. Today is the evidence of -- of the Green Action Centre. And we have the -- the Green Action Centre retained two (2) expert firms: Resource Insight Inc., which is represented this morning by Mr. Chernick; and Power Advisory, which is represented by Mr. Stevens.

As -- as the Board members may recall, there -- there also was a suggestion that we might bring Mr. Dalton in to -- to assist in the presentation of the evidence by Mr. Stevens, but the logistics of this worked out that he's someplace else on -- on May 1st rather than Winnipeg.

So I'm going to -- I -- I can advise that we have two (2) PowerPoint presentations for -- that -- that will be relied upon. And I would ask that Mr. Chernick's presentation be marked as GAC number 22.

--- EXHIBIT NO. GAC-22: Paul Chernick's PowerPoint presentation

MR. WILLIAM GANGE: And that Mr. Stevens's PowerPoint presentation be marked as GAC number 32.

--- EXHIBIT NO. GAC-23: Wesley Stevens's PowerPoint presentation

MR. WILLIAM GANGE: For people that -- well, I sent those out this morning. And apparently I attached the wrong document to GAC number 22, but we now have the correct one. And I will remedy that situation later in the day so that the -- the proper one has been sent out to all the parties. But I believe that Mr. Simonsen has the correct documents.

So, Mr. Simonsen, we may want to swear the witnesses.

GAC LOAD FORECASTING, FUEL SWITCHING, WIND PANEL:

PAUL CHERNICK, Affirmed (Qual.)

WESLEY STEVENS, Affirmed (Qual.)

QUALIFICATION OF WITNESSES:

MR. WILLIAM GANGE: Thank you. I'm going to start with Mr. Stevens in terms of the qualifications. Mr. Stevens, first of all, you're a native of Winnipeg.

Is that correct?

MR. WESLEY STEVENS: I am.

MR. WILLIAM GANGE: We like to get that on the record on this --

MR. WESLEY STEVENS: Okay.

MR. WILLIAM GANGE: -- this process.

And, sir, you are an economist by trade, is -- by training.

Is that correct?

MR. WESLEY STEVENS: I am.

MR. WILLIAM GANGE: Could you advise the Board of your educational background, sir?

MR. WESLEY STEVENS: I attended University of Winnipeg and Manitoba for a period, but I got my degree -- my bachelor's degree from Carleton College in -- in Minnesota. I then went to University of Toronto, where I got a master's degree in economics. And after that, I studied for and passed the chartered financial analyst exam with the Chartered Financial Analyst Institute.

MR. WILLIAM GANGE: And -- and can you advise the Board what a chartered financial analyst does?

MR. WESLEY STEVENS: You would most often find them as stock analysts, for example, or working for a pension fund, advising on -- on investments.

MR. WILLIAM GANGE: And in essence your job as a financial analyst -- analyst is crunching numbers.

Is that correct?

MR. WESLEY STEVENS: I am a number cruncher, and essentially what I'm doing here today is advising on investments.

MR. WILLIAM GANGE: Thank you. You have been involved with -- as an economist and financial analys -- analysts for Acres International Limited, is that correct, sir?

MR. WESLEY STEVENS: That's correct.

MR. WILLIAM GANGE: And you were also with Navigant Consulting LTD.

Where is that based?

MR. WESLEY STEVENS: The head office is in Chicago. It's spread across North America with offices in Europe and Asia. My office was in Toronto.

MR. WILLIAM GANGE: And your position with Navigant?

MR. WESLEY STEVENS: My last position was associate director.

MR. WILLIAM GANGE: Thank you. You also were the CFO of Solar Power Network.

Is that correct, sir?

MR. WESLEY STEVENS: Yes. That's a small company in Ontario that -- that builds solar plants.

MR. WILLIAM GANGE: You -- presently

you are the president of TeraTrends Consulting.

Is that correct?

MR. WESLEY STEVENS: Yes. I -- I am technically a subconsultant to Power Advisory. However, we have, you might call it, a very close relationship. I am a -- I'm -- I essentially work almost full time for Power Advisory.

MR. WILLIAM GANGE: And so with Power Advisory, your relationship -- that -- you -- you've done a number of projects with Power Advisory.

Is that correct, sir?

MR. WESLEY STEVENS: Yes. I work for them all -- as I said, almost full time.

MR. WILLIAM GANGE: Okay. And -- and I understand that you're about to change that so that you have -- actually have a formal position with Power Advisory?

MR. WESLEY STEVENS: I believe the press release went out this morning announcing their association with four (4) individuals. I am one of them. My title is, as of I guess this morning, manager of quantitative analysis.

MR. WILLIAM GANGE: And as the manager of quantitative analysis, can you advise the Board what you would be doing?

MR. WESLEY STEVENS: Financial analysis like -- like this, financial projections, electricity price forecasting, some demand forecasting, anything involving electricity that also involves number crunching.

MR. WILLIAM GANGE: Okay. Thank you. And with Power Advisory, I understand that you took part in hearings before the Nova Scotia Energy Board.

Is that correct?

MR. WESLEY STEVENS: Yes, the Utilities (sic) and Review Board. I was there with John Dalton. This was regarding the -- the Nova Scotia's participation in the Maritime Link. John and I wrote the report together. It was about 50/50, and I attended the Board with him. I did not -- I was not on the stand but consulted with him before and after.

MR. WILLIAM GANGE: You have undertaken the analysis of electrical projects, including nuclear, wind, and other renewable technologies.

Is that correct, sir?

MR. WESLEY STEVENS: That's correct.

MR. WILLIAM GANGE: And -- and again, that would be doing the number crunching?

MR. WESLEY STEVENS: Yes. I am not an engineer, but I -- I dig deeply into the engineering

analysis and then carry that through to financial analysis.

MR. WILLIAM GANGE: I understand, sir, that you reviewed the Ontario and New Brunswick electricity markets in support of a proposed new hydroelectric plant in Eastern Canada.

And that would have included an analysis of costs with respect to nuclear, wind, and other renewable technologies, correct, sir?

MR. WESLEY STEVENS: Yes. I reviewed the cost of all of those, and also looked at markets in Ontario and just south of the border.

MR. WILLIAM GANGE: I understand that you also have undertaken an estimation of the capital and operating costs of developing new generation capacity in Ontario based on a wide range of technologies, which would include gas, hydro, wind, combined heat and power, and solar -- and solar on behalf of the Ontario Power Authority?

MR. WESLEY STEVENS: That's correct. That was used as input to Ontario's Integrated Power System Plan.

MR. WILLIAM GANGE: And -- and this is your first appearance on your own in front of --

MR. WESLEY STEVENS: Yes.

MR. WILLIAM GANGE: -- a -- a board such as the Manitoba Public Utilities Board?

MR. WESLEY STEVENS: It is, yes.

MR. WILLIAM GANGE: With that, Mr. Chair, I'm going to ask that Mr. Stevens be qualified as an expert with respect to the analysis of the cost of electrical -- the construction of electrical projects, including wind.

I will then move to Mr. Chernick.

(BRIEF PAUSE)

MR. WILLIAM GANGE: Mr. Chernick, your slightly out of date CV is attached as part of Exhibit 14 that's been filed before the Board. And I say it's slightly out of date, because it ends in -- number 277 of your presentations as an expert witness before various boards took place in January 2013?

MR. PAUL CHERNICK: That's correct. I -- I haven't updated it since then.

MR. WILLIAM GANGE: Since January of 2013 you've been involved in -- in a number of other hearings, qualify -- been -- have been qualified as an expert in front of other boards.

Is that correct, sir?

MR. PAUL CHERNICK: Yes, I have.

MR. WILLIAM GANGE: And you have appeared with us on behalf of Green Action Centre, or -- or its predecessor, Resource Conservation Manitoba and Time to Respect Earth's Ecosystem, in hearings in February 2008, November 2008, and December 2010.

Is that correct, sir?

MR. PAUL CHERNICK: Yes.

MR. WILLIAM GANGE: You were qualified as an expert on each of those occasions and gave evidence on behalf of the Green Action Centre?

MR. PAUL CHERNICK: I was.

MR. WILLIAM GANGE: And your educational background, if you could go through that briefly, sir?

MR. PAUL CHERNICK: I hold a bachelor's Degree from the Civil Engineering Department of the Massachusetts Institute of Technology and a master's in Technology and Policy, also from MIT.

MR. WILLIAM GANGE: I'm going to try to shorten this process somewhat by -- sir, by advising the Board that I'm going to ask that you be qualified as an expert in a number of areas, and I'm going to go through them and review previous times when you've been qualified as an expert in each of those areas.

So we're going to ask that you be qualified as an expert with respect to load forecasting regarding power systems. And I understand, sir, that you've been qualified as an expert with respect to load forecasting in the Manitoba hearing -- Manitoba Hydro hearing before the Public Utilities Board in November 2012, and in front of the Massachusetts board in June 2011.

Is that correct, sir?

MR. PAUL CHERNICK: Yes, among other --

MR. WILLIAM GANGE: And -- and, Mr. Chair, just so that you know, I haven't gone through, and I don't intend to go through, all two hundred and seventy-seven (277) things that are on the CV. I'm just going to take the most recent for each of these topics, but there are other qualifications.

THE CHAIRPERSON: Could you give me the reference to the exhibit again, please?

MR. WILLIAM GANGE: It's Exhibit number 14 -- GAC-14.

THE CHAIRPERSON: Thank you.

MR. WILLIAM GANGE: Which has the combined -- and -- and thank you, Diana. You'll see that that's the ending, number 277. I'm also going to ask, Mr. Chair, that Mr. Chernick be -- be qualified as

an expert to give expert testimony with respect to fuel switching.

And, Mr. Chernick, again, you've given evidence before this Board previously in -- in hearings with respect to fuel switching. You've also given a report amongst others before the Arkansas board in March of 2010.

Is that correct, sir?

MR. PAUL CHERNICK: Yes.

MR. WILLIAM GANGE: You've also -- I'm going to ask that you be accepted as an expert with respect to DSM programming. You've given evidence before this Board with respect to DSM programming. You've given evidence, amongst others, before the Kansas board in December 2012, before the Oklahoma board November 2011, before the Nova Scotia board May 2009.

MR. PAUL CHERNICK: Yes, and many others.

MR. WILLIAM GANGE: You've -- I'm going to ask, Mr. Chair, that Mr. Chernick be qualified as an expert with respect to commentary on integrated resource planning.

And, Mr. Chernick, amongst others, you've testified and been acc -- accepted as an expert

in front of the Arkansas board in September 2012, the Kentu -- Kentucky board December 2011, the City of New Orleans December 2010, and Connecticut September 2008.

MR. PAUL CHERNICK: Yes.

MR. WILLIAM GANGE: And I'm also going to ask, Mr. Chair, that Mr. Chernick be accepted as an -- as an expert with respect to rate design.

And, Mr. Chernick, you've testified before this Board in December 2010 and November 2008 on rate design. You've also testified with respect to rate design in front of the Nova Scotia board August 2011, the Ontario Board August 2010, the Arkansas board March 2010, and the Maryland Board January 2009.

Is that correct, sir?

MR. PAUL CHERNICK: Yes.

MR. WILLIAM GANGE: So, Mr. Chair, those are the areas that I'm going to ask that Mr. Chernick be qualified to give commentary with respect to load forecasting, with respect to fuel switching, with respect to DSM programming, with respect to integrated resource planning, and with respect to rate design.

THE CHAIRPERSON: Thank you, Mr. Gange.

Me. Hacault, s'il vous plait.

MR. ANTOINE HACAULT: Bonjour, M.

President. MIPUG has no objection to the qualifications of these witnesses as experts in the fields outlined by Mr. Gange.

THE CHAIRPERSON: Merci, Me. Hacault. Ms. Saunders, please.

MS. JESSICA SAUNDERS: The MMF has no objections as well. Thank you.

THE CHAIRPERSON: Thank you, Ms. Saunders. Me. Monnin, s'il vous plait.

MR. CHRISTIAN MONNIN: Merci, M. President. We have no objections.

THE CHAIRPERSON: Merci, Me. Monnin. I'm sorry I -- I overlooked you, Ms. Menzies.

MS. MEGHAN MENZIES: No worries. Good morning. CAC (Manitoba) has no objections to the qualifications -- to these experts being qualified in the areas that were outlined by Mr. Gange.

THE CHAIRPERSON: Thank you, Ms. Menzies. And, Manitoba Hydro, please. Ms. Ramage, good morning.

MS. PATTI RAMAGE: Good morning. Manitoba Hydro just have a few questions of the clarification. I -- I would say by way of general comment with respect to Mr. Chernick, while I would

normally be cautious simply accepting that someone was qualified in another jurisdiction as proof of their expertise because we don't know what basis that was or whether it was subject to weight, as often happens here.

Mr. Chernick has appeared here a number of times and we've crossed swords before and I have no -- no questions for Mr. Chernick. And -- and we do accept his qualifications as identified because we've -- we've seen them here in prior hearings.

I have not, however, had the pleasure of meeting Mr. Stevens before, so I just had a few questions. You mentioned you have been doing work with Power Advisory.

What type of projects would that be? Is that primarily wind projects?

MR. WESLEY STEVENS: No -- no, it's a -- a range of projects. They include some wind. There was a pro -- a project recently in Ontario that looked at -- it was a detailed look at some of the contracts that the -- that wind projects there have, and in particular the -- the frequency of very low prices. So it was a co -- it was looking at wind, but also looking at price forecasting.

I've been involved in some -- some other

regulatory work. The -- the Nova Scotia work was -- was mentioned by -- by Mr. Gange. Currently involved in -- in some rate work in Alberta. If you give me a minute, I'll pull up another dozen or so projects that I've been...

MS. PATTI RAMAGE: I -- I can maybe shorten.

Have any of those projects dealt with the construction of large hydro?

MR. WESLEY STEVENS: No, they have not.

MS. PATTI RAMAGE: Okay. And I heard Mr. Gange mention --

MR. WESLEY STEVENS: Oh, sor -- sorry. The Nova Scotia project, the Maritime Link, the -- that did relate to Muskrat Falls. I certainly did not advise on the cost of Muskrat Falls. I did -- I did have -- have something to -- to say about the value of hydro power being exported.

MS. PATTI RAMAGE: And this is the point I - I'm trying to clarify. And I think it may be just being loose with language as opposed to an objection, but I -- my note says Mr. Gange requested you be qualified in the cost of construction of electrical projects.

And I just want to clarify that the

construction cost isn't the construction of the nature -- we had parties, like Knight Piesold, dealing with construction costs in terms of -- of the large hydro. That is not the intention?

MR. WILLIAM GANGE: That is not the intention, Ms. Ramage, no. Mr. Stevens's analysis is with respect to the -- to the financial analysis of construct -- of -- of doing wind power construction.

MS. PATTI RAMAGE: Okay. And with that clarification, we accept the -- the qualifications as -- as restated by Mr. Gange, but the part we were concerned with was the construction as it related to large hydro. So I think with that qualification, Manitoba Hydro does not have an objection.

THE CHAIRPERSON: Mr. Gange, that's not quite what you asked initially. My -- according to my notes, you had asked that he be qualified with respect to the analysis and construction of electrical projects, including wind. And now I think you revised that a little.

MR. WILLIAM GANGE: I've -- I've narrowed that, Mr. -- Mr. Chair, because the -- the report does deal with -- with the cost of wind, and that's what Mr. Stevens is here to talk about. So I -- I have narrowed it. And -- and I think that the

narrowing is satisfactory to Ms. Ramage. And it's certainly satisfactory to GAC.

THE CHAIRPERSON: So with that, Mr. Gange, Mr. Hombach, please.

MR. SVEN HOMBACH: If I could just ask a few follow-up questions to Mr. Stevens, as well. I understand from your resume that -- that you don't work as a construction estimator, per se?

MR. WESLEY STEVENS: I do not --

MR. SVEN HOMBACH: So when -- when you're analyzing the cost of wind, what sources do you base on to conduct those analyses?

MR. WESLEY STEVENS: I do what a financial analyst would do, which -- which is I look as deeply as I can into engineering reports. I -- I compare them to other sources. I exercise some judgment about balancing information from different sources.

MR. SVEN HOMBACH: So you look at different sources and you base your analysis based on the inputs that you gather from those other sources?

MR. WESLEY STEVENS: Exactly.

MR. SVEN HOMBACH: Okay. Thank you.

THE CHAIRPERSON: Thank you, Mr. Hombach. Just a second, please.

(BRIEF PAUSE)

THE CHAIRPERSON: Thank you. We've had the opportunity to caucus. And we will -- the panel has agreed that we'll accept both Mr. Stevens and Mr. Chernick as experts for the areas that have been outlined by Mr. Gange. So welcome to these proceedings.

EXAMINATION-IN-CHIEF BY MR. WILLIAM GANGE:

MR. WILLIAM GANGE: Thank you, Mr. Chair. Mr. Chernick, I'm going to start with you. And, Diana, if...

(BRIEF PAUSE)

MR. WILLIAM GANGE: If -- your evidence has been filed. And I can advise that it is part of number -- GAC number 13 was the combined evidence of Resource Insight Inc. and Power Advisory. And you have a presentation today that we've marked as GAC number 22, and it's now on the screen.

And so, Mr. Chernick, go ahead.

MR. PAUL CHERNICK: Thank you. The -- the subjects that I'll be discussing are the fuel

switching and -- and the DSM issues in our evidence. And just to give you an outline of -- of what I'll be talking about, the fuel choice, fuel switching issues that -- that I deal with are just the electric versus gas choices. There are, of course, other options available, such as biomass for space heating and so on, that I'm -- I don't look at here.

And while we often refer to this area as -- as fuel switching -- and by 'we', I mean myself and -- and Manitoba Hydro and other parties -- that it -- well, this is switching from gas uses to electric and from electric to gas that are worthy of consideration -- can be important, there's also the issue of choosing the fuel for new buildings, which is not really switching anything. It's just making a decision as you build the building.

And then I'll be talking appropriate DSM targets very briefly based on comparisons with other jurisdictions and the effect of DSM on the need for -- for new facilities for retail load.

So for end-use fuel choice, the -- the basic question is: Which is the preferable fuel in various situations? And I'll talk about Hydro's projections of future fuel switching, the drivers of -- of uneconomic fuel choices, and then how Manitoba Hydro

can respond to the market failures.

So first, which fuel is preferable? Basically, every analysis that's been done, including Hydro's own fuel switching study and my own analyses, indicate that gas reduces costs, it reduces emissions, it reduces -- excuse me, it improves the cashflow that, in terms of the efficiency at which gas -- gas is used, it's better to use gas at the burner tip in a home or business in Manitoba and free up the electricity to turn down a -- a gas-fired plant in -- in the US because the end-use efficiency of -- say, for heating is over 90 percent for -- for the gas used directly. And the gas generator that's turned down, including the line losses, is less than 50 percent efficient in delivering heat to the -- the homes in -- in Minnesota, for example, and perhaps, as little as 25 percent efficient.

So any way that anybody's looked at this, gas is preferable.

THE CHAIRPERSON: Mr. Chernick --

MR. PAUL CHERNICK: And I -- I summarize --

THE CHAIRPERSON: Can I interrupt you for a second. I just want to, you know, just make -- make sure we frame this one adequately because this is

very much a North American view, isn't it? I mean, for example, gas reduces emissions. That's appropriate to a -- a North America view of the world, as opposed to a Manitoba view of the world, where electricity is actually less pollute -- polluting then gas.

MR. PAUL CHERNICK: Yes. The -- the emission of concern here is carbon dioxide. And in terms of the effect on Manitoba, it doesn't matter whether the carbon dioxide is released from a -- a furnace flue in Manitoba, or a -- a stack for a combined cycle plant, or a peaker in -- in Minnesota or Wisconsin or Iowa or anywhere else.

If you -- if you posit some kind of -- of isolated greenhouse gas -- a cap or requirements that only affect Manitoba and gives no credit for or charges for -- for cross-border flows, then you might want to think just about Manitoba emissions, the ones that occur within the borders of Manitoba.

But that would be -- that would not represent any environmental benefit, in terms of -- of global warming. It simply would be a matter of Manitoba saying, Well, we're clean, but you're still going to be dealing with a climate change as a result of the gas and, for that matter, the coal plants operating south of the border.

CONTINUED BY MR. WILLIAM GANGE:

MR. WILLIAM GANGE: And, Mr. Chernick, you're now going to move to slide number 6, "Results from the Hydro Study"?

MR. PAUL CHERNICK: Right. I'm not going to go through these numbers. I just want to point out that in each case a positive number is a benefit for gas, a cost for moving to electricity. And you see only one (1) negative number, which would be a net benefit from the electric. And that's with a very high efficiency ground-source heat pump, and low equipment costs.

Every other measure -- global carbon emissions, the TRC, the customers' bills, the utility test -- they all come out to be better with -- with gas than with electricity for an electric furnace, for ground-source heat pumps, and for hot water.

And the -- the question has -- has been raised in a number of places about whether the current advantage of gas, economically and environmentally, could reverse over time. And the -- the things that people think about are, Well, could gas prices rise fast enough that what's now less expensive could become more expensive? And as I'll explain, that's not really

likely.

Could lower renewables costs have a dramatic effect on what's at the margin in the US and therefore the -- the value and benefit of exporting? And that's possible, and I'll talk about that in a moment also. And what happens if the US, or at least the -- the MISO portion of it, adopts some kind of CO2 pricing?

Well, first of all, on slide...

MR. WILLIAM GANGE: Slide 8.

MR. PAUL CHERNICK: Thank you. I'm not sure where it...

(BRIEF PAUSE)

MR. PAUL CHERNICK: The print is very small on my screen. On slide 8, the effect of higher gas prices, higher gas prices would raise the cost of gas heating, for example, but also is going to increase the prices in the electric energy markets, making exports more valuable.

So, yes, it costs more to run the -- the gas heater furnace in -- in Manitoba, but it also makes the electricity freed up more valuable. And because of the difference in efficiency, the higher gas prices

rise, the greater the -- the net benefit of being able to export and save 2 or 3 or 4 cubic metres of gas for every cubic metre you're using for the furnace.

Lower -- moving onto slide 9, lower renewables costs, and -- and this is something that's likely to happen because both wind and solar costs have -- have fallen substantially in the past and are likely to continue falling, while hydro's -- hydroelectric project costs have tended to rise over time.

More renewables could gradually push out the MISO coal and peakers, leaving mostly efficient gas plants at the margin, which will reduce the -- the global warming benefit and possibly the -- the economic benefit of exporting the electricity.

But it may also have the effect of pushing the coal up in the loading order, so coal is at the margin more often and the gas in the US is being used less often, which would mean that environmentally it was even a better deal to burn the gas at the end use in -- in Manitoba and trim down a coal plant more often in -- in the US.

And a very large price decline would be necessary in the renewables to make them so inexpensive that they would be -- it would be cheaper to serve ele -- electric load with renewables in the US than to

serve them with Manitoba energy freed up by using gas at the end use in Manitoba.

Moving on to slide 10, if CO2 is -- is priced in MISO, this is also a sort of ambiguous effect. It would increase the cost of burning coal. So the effect might be that some coal plants would shut down and be replaced by more gas plants. And so therefore the emissions that the -- the burning gas in -- in Manitoba is voiding in the US would conceivably decline, although there's still a big difference between even the best gas fired generation and the efficiency of a -- an end-use gas appliance.

But it could also have the effect, as -- as has actually occurred in some places in these periods of very low gas prices, where some of the efficient gas plants, the combined cycle plants, are dispatched before the coal plants.

So the coal plants are actually the marginal units much of the time. And therefore any electricity they free up by using gas for heating and water heating, for example, would be backing out those marginal coal plants, making them even less cost effective, making them more -- more likely to retire, and would have even larger global warming benefits.

And certainly, however the details of

dispatch in MISO work out and in terms of retirement of -- of plants, pricing of CO2 would raise the export prices that Manitoba Hydro would receive for the electricity that's freed up and therefore make conversion to gas or selection of gas more attractive economically.

Slide 11, since I filed my evidence, Hydro has filed a -- a study by the Brattle Group of CO2 displacement in the US as a result of -- of exports of hydro. And the -- they find that the -- in the early period mostly coal is avoided, because that's the dominant fuel on the -- on the system in -- in the US part of MISO, and that later, at some point about twenty (20) years out, the retirement of -- they -- they peg it to the retirement of -- of -- excuse me -- to nuclear plants results in more gas plants being built and gas being out on the margin more of the time. And that would bring down the avoided emission rates considerably, although still above the incremental emissions from the -- the use of gas in Manitoba directly.

So based on -- on their -- on the Brattle analysis, I asked the question: Well, at -- at what emission rate -- or for comparison with that, I'd asked: What emission rate would the various end uses

that Hydro looked at break even for global warming purposes?

So as -- as we saw in -- in an earlier slide, the efficient ground source heat pump has -- replacing efficient ground source heat pump has a -- reduces carbon emissions only a little bit currently. And if it falls very much, it's -- it's assuming emission rates of about point eight-five (.85).

Now, it would not have to fall very much before -- on an environmental basis; those high efficiency heat pumps would be producing less carbon than -- than the gas. But with a standard efficiency ground source heat pump, it would have to fall to -- to levels that Brattle is not expecting until after 2030, about 2035, and with a -- the water heater and the furnace it would have to fall much, much lower below the emission rates of a gas plant.

Oh, and my next slide ,I -- it says exactly what I just said, describing the -- the previous ones -- the previous slide.

On slide 14, I -- I look at the policy implications just with regard to greenhouse gasses and without looking at the other cost effectiveness tests for the moment. At this point, it makes sense to encourage gas for space and water heating and to keep

an eye on what's happening with MISO marginal emissions. And if the emission rate falls and -- it would be appropriate to assess whether a -- high efficiency heat pumps would not be preferable to gas and then to look at the cost of those high efficiency heat pumps and see whether it's a -- a cost of -- of reducing carbon emission makes sense and whether Manitoba wants to bear that cost for the -- the benefit of the -- of the global environment.

With larger declines in emission rates, standard ground source heat pumps should be reexamined. But for -- the -- the competing choice is an electric furnace. Baseboard heating or a -- a gas water heater, gas is -- is likely -- excuse me, gas versus an electric water heater, gas is likely to be preferable for many decades beyond the -- the Brattle analysis.

Interestingly, despite the fact that Hydro found that -- that gas is preferable to electricity in almost every situation and by any measure it could come up with, both the fuel switching report and the 2012 load forecast projected conversion to electricity to a very significant extent, with electricity dominating a new construction even where gas is available and with many buildings converting from gas to electricity.

The 2013 load forecast reduces that trend but still has hundreds of gig -- gigawatt hours a year of load growth due to the -- due to the fuel choice moving from gas to electric. And the 2013 forecast explained the change from 2012 in terms of a Manitoba Hydro initiative on -- on fuel choice.

And when asked about why the -- electricity was being used to replace gas in so many situations despite the advantages of gas, Hydro's explanation was basically that developers for new buildings choose a fuel source and they prefer to minimize their first costs. That they -- they think they can sell the -- the building for the same price regardless of whether it's electrically heated or gas heated, and they have to -- they put less investment into it. That contractors who are brought in to replace a gas water heater that's failing prefer the electric water heater because they don't have to check the status of chimney flue or whatever.

Customers, even when they're making their own decisions, may have a short time horizon. And they may be worried about their cashflow. They may be concerned that they won't be in the house long enough to get back the benefits that this whole -- this -- that gas would provide over many years, and so they

go with the -- the alternative that's cheaper up front.

And then there's a direct quote from -- from Hydro, that -- that,

> "Customers do not consider the total cost of ownership."

And another issue that -- that Manitoba Hydro at least alludes to in various places is that customers assume that electricity is environmentally benign.

On slide 17, I go into a little detail about the -- the choice of how developers choose their fuel source. Another point that I didn't mention previously was that Manitoba Hydro says that developers are reluctant to -- to use gas because they have to bring in yet another crew to do the gas piping and installation, and that's additional coordination.

Slide 18, the -- the chimney condition and getting involved with that causes contractors to say, Why don't we just put in an electric water heater and not -- not fool around with whether we can continue using gas in this house.

And then the -- slide 19 lists again the -- the reasons that customers may choose electricity over gas.

So that brings us to how one might

respond to these market failures in fuel choice. We can measure what the alternatives cost to customers. We can measure what they cost to the province. We can measure what they cost to the utility system. We can measure what they cost to the environment.

Electricity fails all those tests, and yet Manitoba Hydro sees a substantial amount of electricity being chosen over gas applications. And Manitoba Hydro has announced an initiative to discourage electric use where gas is an alternative. And there are more robust alternatives to what Manitoba Hydro has in place.

This Manitoba Hydro initiative, I'm not really clear on when the Company thinks it started the -- the initiative. It's on slide 21. One of their exhibits indicates that it started in about 2010, but the 2012 forecast apparently didn't incorporate it because that was the rationale for the big drop in -- in fuel switching; from the 2012 forecast to 2013 forecast was that the initiative was going to cut into that trend.

And I'm not entirely clear on what -- what this initiative consists of, but it seems to be mostly or entirely information based. And some of the -- the materials relating to the -- the information

program are -- are in the record. But there doesn't seem to be any -- anything else, any technical assistance or -- or incentives. And it's only in the transcript of the -- of the hearing that we learned that -- that Hydro is considering now going beyond the education approach, but is still thinking about it. And this is after many years of -- of fuel switching being on the agenda for Hydro to -- to deal with.

Now, on slide 22, I -- I list the -- the mechanisms that would be useful as an -- or useful as an addition to or in consort with the information program. And there's nothing wrong with information, and it helps prepare customers, get them interested in, make them more willing to go along with some of these other programs. But information by itself does not have a good track record, in terms of changing customer behaviour.

So one alternative is to provide cash incentives. If you've got an electric water heater and you put in a gas water heater, to act -- to give the -- the customer some money to help pay for the difference in -- between just replacing the electric with electric when it fails, and putting in a gas water heater.

Another alternative would be inclining block rates for -- for customers so that the electric

heat and hot water that they're choosing are more expensive, and they can -- they see even more clearly that gas is beneficial. And to give the signal that Manitoba Hydro and the Board believe that the high users in -- certainly in the winter, the heating users in areas where there are gas -- there's gas available, are imposing a cost on the system. And they should be looking at alternatives.

For large customers, inclining block rates are more difficult to design, but reducing demand charges and imposing higher time-of-use energy charges may help discourage gas use -- excuse -- discourage electric use and encourage gas use for -- for those customers.

And -- oops, I just lost control of my slides here.

And now I come to the problem of the developers, and -- and new housing in particular, and the fact that they tend to think about how much it's going to cost them to build the house and not how much it's going to cost to run the house. And that could be -- that problem could be diminished and the developers' interests could be brought to coincide more closely with the interests of their buyers or renters, and with the -- the province, and with the utility systems by

increasing the initial cost of putting in electric heat with higher hook-up charges and decreasing the initial cost for gas heat with lower extension and hook-up charges.

Moving on now to the DSM targets on page 23. Again I -- I just list the -- the three (3) topics that I'll be discussing. Page 24, I just point out that the -- Hydro's current DSM plans are very modest. They average, in terms of the program savings, about .3 percent a year over the next fifteen (15) years. And if you include some part of the fuel switching initiative, which may eventually include program components beyond the educational portions, then perhaps we're talking about 0.4 percent a year.

And other jurisdictions have achieved much greater savings than that. There are several states that have -- and -- and provinces, for that matter -- that have achieved over 1.3 percent of -- of energy saved per year, and some are planning for over 2 percent in coming years.

And on slide 25, I lay out what we had in the evidence, in terms of reasonable goals for ramping up from the rather modest levels of efficiency that the Company is pursuing now, in terms of the efficiency programs, to about 1 1/2 percent a year by

2018/'19, and then keeping it there.

Page 26, which is my last slide, I just briefly discuss the effect of a vigorous energy efficiency program on need for new facilities. With the 1 1/2 percent efficiency program, you'd have net load -- net retail load declining slightly over time, the existing resources would meet all of the retail load, all of the contracted exports, and the proposed exports through the Wisconsin Public Service 308 megawatt sale, another additional proposed sales in the works. But this is about far as you could go just with the existing resources.

And additional resources may well be justified by the benefit of exports, but they'd have to analyzed as export projects. And it may well be worth while, in terms of dollars and in terms of -- of environmental benefits, for Manitoba Hydro to continue developing Keeyask and beyond and wind to increase the -- their level exports.

And that concludes my summary.

MS. MARILYN KAPITANY: Mr. Chernick, could you go back to slide 25 for a minute, please?

MR. PAUL CHERNICK: Yes.

MS. MARILYN KAPITANY: You talk about ramping up DSM and then annually, post-2018/'19, you

say maintain it. And we've quite a bit about DSM and how there's only so many furnaces you can replace and so many insulation improvements that you can make.

What is it that you see as the possibilities for not only the ramping up, but for the maintaining DSM into the future?

MR. PAUL CHERNICK: Well, there -- there a number of -- of utilities and jurisdictions that have been pursuing energy efficiency fairly vigorously for decades now. And they still find that there are large opportunities. And some of that is because there are opportunities that we didn't have twenty (20) years ago. You could -- didn't have LED lighting, for example.

And the efficiency of equipment continues to rise, the cost falls. So that's one aspect that -- that allows you to keep going beyond the -- the narrow window of -- of what you could get if you ran out today and did everything immediately that you could.

The other thing is that over time, buildings are renovated. An office building, for example, will go through a -- a gut rehab or a major renovation. And you can do things that you couldn't do as a simple retrofit. You can go through and just take

out the -- out the fluorescent lights in -- in this room, for example, and put in more efficient ballasts, and you can put in occupancy sensors and a few other things.

But if you're talking about an office space where you could bring in more of the natural daylight into the interior of the -- the building, that usually would require ripping everything out, putting in appropriate kinds of louvres and -- and reflectors and so on to -- to bring the light in, rearranging the entire space. And you're not going to do that as an energy conservation measure.

But on the other hand, when it's time to clear out the 1970s vintage space and make it into more of whatever is useful for the next tenant coming into that building or the new use of the -- the owner wants to put to -- it to -- you have an opportunity to do things you haven't had before.

So that gives you something like twenty (20) years of sort of natural opportunities. And by the time you've gone through those twenty (20) years, you may have another set of options open when the -- the building that was renovated in 2015 is renovated again in 2035 that give you even more savings.

And, of course, you have your continuing

new construction. You have turnover in -- in appliances. Every -- every time your refrigerator dies, you can replace it with a more efficient one. And that's been true for the last thirty (30) some years and will probably continue to be true into the future.

So I don't think we're anywhere close to peak conservation, if you will, any -- any more than -- than it turned out we were close to peak oil because you keep finding new ways to do things and new places to -- to get savings. And, for example, now, you know, there is gradually a trend towards higher efficiency in devices that consumers have little control over, such as the transformers that -- that charge their -- their cell phones and -- and many other devices, the set-top boxes on their cable TVs and...

So programs that shift the efficiency of those devices upwards will also keep arising as the manufacturers and government and the utilities and other program administrators look harder at ways to -- to squeeze savings out.

(BRIEF PAUSE)

THE CHAIRPERSON: Could you explain to

me or tell me about fuel switching programs that apply in other jurisdictions specifically targeting shifting consumers from electricity to gas?

MR. PAUL CHERNICK: Well, interestingly, I've just started a program to -- to do that, gather those examples for another client. But it might be most efficient for me to -- to respond to that as an undertaking, rather than my trying to retrieve the -- the details from -- from memory. I mean, I could give you a couple, but then I start to get fuzzy about which -- which utility does what.

THE CHAIRPERSON: Well, I think that would be useful if you could frame it as an undertaking. And what I'm particularly looking for is, and I don't know if you can with a limited sample set, what works and what doesn't work in a fuel switching initiative. I think that would be useful for the panel to understand that.

MR. PAUL CHERNICK: I'll -- I'll do what I can in however much time I -- I have to -- to respond to this.

MR. WILLIAM GANGE: I think that the undertaking -- and, Mr. Chernick, if -- if you disagree with this -- but as I understand it Mr. Chernick will give examples of initiatives of fuel switching measures

that have been used in other jurisdictions and provide examples as best he can of initiatives that have worked well and initiatives that have worked less well.

Is that -- is that fair, Mr. Chair?

THE CHAIRPERSON: Yes, that's exactly what I think would be useful.

MS. PATTI RAMAGE: Mr. Chairman, if I could jump in, in a hope to make this -- to improve the undertaking. I think likely everyone in the room has been educated onto initiatives. It would be helpful if Mr. Chernick could provide programs where utilities have put together the various initiatives. That's what I'm hearing from Ms. Morrison that would be -- probably enhance the record.

MR. PAUL CHERNICK: I'll -- I'll provide whatever level of detail I can on -- on each of the programs

--- UNDERTAKING NO. 134: Paul Chernick to give examples of initiatives of fuel switching measures that have been used in other jurisdictions and provide examples as best he can of initiatives that

have worked well and initiatives that have worked less well

MR. RICHARD BEL: Mr. Chernick, the conclusion that net domestic load slightly declines is based on your assumption -- or your target of 1.5 percent a year --

MR. PAUL CHERNICK: Yes.

MR. RICHARD BEL: -- over the next twenty (20) years?

MR. PAUL CHERNICK: Yes.

MS. MARILYN KAPITANY: When you're looking at that, I'm looking at your slide 26 where you say, All Manitoba load and all contracted exports could be met with existing resources, what consideration...

(BRIEF PAUSE)

MS. MARILYN KAPITANY: When you're looking at slide 26 and you're looking at your assertion that all Manitoba load and all contracted exports can be met with existing resources, what consideration have you taken of potential increases? For example, pipeline growth or large industry coming

in, or we've got a huge small business industry in Manitoba. It's a real driver of our economy.

So that part of the economy increasing?

MR. PAUL CHERNICK: I -- I was referring here to the -- to Manitoba Hydro's current domestic load forecast. There would be room for some additional retail load, both in terms of energy and capacity, but I haven't looked at exactly how much that would be.

Actually you can determine that by looking at the tables at the end of our evidence, but I haven't tried to assess how large any of the factors you -- you've discussed might be or how much lead time Manitoba Hydro would have for adding wind, for example, to fill in small shortages of -- of energy.

DR. HUGH GRANT: I was just curious about this uneconomical fuel choice use. We had an expert witness from the Consumers' Association of Canada that came in the other day and said that all consumers were stupid and couldn't make rational choices if they tried, including the panel apparently but, so...

(BRIEF PAUSE)

MR. PAUL CHERNICK: You -- you may wonder about your -- the rationality of your choices as you sit there on this project.

DR. HUGH GRANT: Just between me and you, yeah. Anyway, about a couple months ago I carried home the Manitoba Hydro little brochure that says, You should be switching your hot water tank over. And I was thinking about this. And it's like, Well, wait a minute, you know, I -- I'm old enough now to live through the volatility of natural gas prices, and -- and I'm not sure that consumers are all that irrational in their -- in their switch between natural gas and electricity.

You live through a period of very low and stable electricity prices, and you see this high beta in what's going on with natural gas. And then if it comes to me making a large -- not a large, but a capital purchase that may last ten (10), fifteen (15), twenty (20) years, I'm not sure it is all that foolish, depending on how people formulate their expectations.

Now, is there -- are there programs then that essentially shift the risk, share the burdens? So in other words, if -- if the electricity supplier had different forecasts about relative prices in the future than I do that somehow they, you know, share the risk

with me, if you like.

Is there...

MR. PAUL CHERNICK: I'm not aware of any, but as you were describing that particular problem I -- I was thinking, Well, yes, your gas bill could go up if gas prices spiked again. But then so would export revenues. So taken as a whole the gas and electric customers of -- of Manitoba would be better off with you using gas.

But -- but you might be worse off because you'd be paying for expensive gas and the valuable electricity that you've freed up, which is now more valuable, that would -- the benefits of that would be spread out over all electric customers.

So if that is, in fact, a major deterrent in -- in this env -- environment, then I -- I certainly can see how between them, which is very convenient that they're owned by the same entity, Centra and -- and Manitoba Hydro could -- could, essentially, guarantee a gas price or -- or put a cap on the gas price and say, If our -- if the purchased gas cost goes above so much per cubic metre then we'll give you a rebate of this amount for every dollar per cubic metre it goes above that.

And that would then be funded out of the

additional economy purchases that the -- or sales that the -- that Hydro would be able to make at higher prices because, of course, the Americans would be paying for that higher gas for their generation.

So I think you could do that. I don't know of anybody else who has done it, but then I -- there aren't many jurisdictions that are in your situation of looking at that fuel choice and saying, It's good for us because if gas prices go up somebody else's prices are -- are going to go up even more and our -- we'd be able to get more for our electricity.

So I don't know that this issue has ever really arisen. And I -- I also don't know what percentage of customers would react the way that -- that you have. Some of them would probably just say, Well, it's such a nuisance. I have to find this contractor, I have to find somebody to in -- inspect the chimney and I'm going to have to -- to figure out whether the contractor's any good and can I trust him. And will -- and if the utility has a program that pre-screens the contractors and -- and gives you sort of one (1) stop shopping that might overcome a lot of people's issues.

But if there are a fair number who are saying, Well, I would do it. I have no problem with

gas, but I'm just concerned about what if it goes back up to the prices from 2007 and stays there for five (5) years or ten (10) years, then you could certainly institute that kind of a -- a guarantee.

DR. HUGH GRANT: I think, too, where there's a large initial capital outlay to switching -- and I know there's programs where the -- particularly targeting lower income groups where the capital cost can be spread out over the life of your -- your bill and such. But you'd feel pretty stupid, or I would feel -- well, as the consultant mentioned, you'd feel pretty stupid switching over and then a year later finding natural gas prices have spiked up and now you want to switch back. And so...

MR. PAUL CHERNICK: Well, again, if the -- if -- if that's a concern that's holding people back then the kind of -- of guarantee of hedge that you're talking about would -- could be appropriate. The other thing is that if you -- you have an on-bill financing sort of scheme you could say, And in any year where the -- the price of -- of ga -- of gas is more than this much above electricity, we'll -- we'll just write off your -- your payment.

And so there's a -- a specific dollar amount that you're not going to be paying for; that

might also help with -- with those concerns. So you could structure it various ways and I think this is the kind of thing where people use focus groups and -- and interviews with -- with consumers to get a better sense of what exactly would work in terms of program design.

The -- you know, I think we're still a couple steps away from that in that I don't get the feeling that Hydro has been pushing customers to do this and getting push-back like you've suggested, and they're scratching their heads about, well, what do we do about this issue.

And, you know, if -- first we have to get to the point where we have a commitment to a vigorous direct intervention kind of program, not just information. And I don't think consumers are stupid, but they have a bunch of issues that are not the same kinds of issues that -- that we're looking at here. They're the -- the nitty-gritty kinds of -- of concerns about how much time is this going to take me to figure out how to get it done.

And -- and if I do this and it doesn't work right, is my wife going to be yelling at me. And overcoming those barriers requires more than just telling people about the -- the advantages.

DR. HUGH GRANT: Have you heard of the

term 'paternalistic libertarianism'? Well, you want people to have choices and yet some -- perhaps you think they're not making the correct ones. I guess the example is you're in charge of cafeteria and you want people to eat healthy. You put the healthy food first and then the desserts later. So you're still letting them make the choice, but you're trying to guide their choice in it.

So I guess we wouldn't even portray Hydro's decision making at -- even at that stage yet, right? It's -- it's very passive as opposed to trying to do --

MR. PAUL CHERNICK: Yes, I -- I think it's -- it's more that there's a -- there's one (1) line that has the desserts right up front and there's another line that has the green beans up front. And they're saying, Well, let people choose whichever one (1) they want. And funny thing, people are going over to the cupcakes.

DR. HUGH GRANT: Okay. Thanks.

THE CHAIRPERSON: I have a few questions in relation to some of the things that we heard from Philippe Dunsky. And -- and I'll try to paraphrase what I understood he said.

And fundamentally he suggested to us -- he posited to us that with a -- with a sound DSM program extended over time, we could actually flatten the load forecast curve. Actually, even suggested you could actually turn into a negative slope on that curve.

Do you agree with that? I mean, do you -- do you agree --

MR. PAUL CHERNICK: Yes.

THE CHAIRPERSON: -- do you -- you are prepared to say that in -- in the Manitoba jurisdiction aggressive DSM would actually address all of the needs of Manitobans for the next generation?

MR. PAUL CHERNICK: I think that's very likely. Now, if you have some massive new industrial loads coming in then that -- you might need additional resources to meet those. But for sort of the normal growth and the -- and -- of the existing population and businesses and the kinds of things that -- that arise over time, yes, that should be possible.

We've seen -- I -- I don't think we've seen any -- any load growth in New England in -- in the last several years as a result of a couple of the States being very aggressive in their energy efficiency programs and all of them having at least middle of the

road programs, sort of, Manitoba Hydro kind of -- what -- what Power Smart has done historically. And that's held the New England load flat or declining for a decade or more, I believe.

THE CHAIRPERSON: You did preface your statement by saying that with the arrival of a large industrial load that throws that projection out of -- out of kilter, doesn't it?

I mean, if it's a brand new industry that comes to Manitoba and you didn't encompass that as part of your load forecast, you could be unable to supply the -- the electricity needs of that -- of that load?

MR. PAUL CHERNICK: Yes. If -- if somebody wants to move in or -- or a couple of things happen, a pipeline compressor loads and the -- an additional some kind of mining operations or something and it's going to increase your load 10 percent, then finding ways of -- of accommodating that would -- would be very challenging.

And, you know, fifteen (15), twenty (20) years from now you may have saved enough to -- to fit them in with your existing resources, but you're going to have some period where you can build load faster than you can conserve, and so you may need some

additional resources.

THE CHAIRPERSON: Thank you. Ms. Menzies, do you have any questions for these witnesses, please?

MR. WILLIAM GANGE: Mr. Chair, I'm just wondering, do you -- would you -- would you rather go and we'll -- we'll do Mr. Stevens's evid -- evidence, as well? And then both panel members could be cross-examined at -- at one time. That -- that was what I was expecting.

THE CHAIRPERSON: Okay, let me just check with my panel mates to see if they have any questions for Mr. Stevens immediately. Yeah, it was my view as well that we would expect the Intervenors to cross-examine both individuals at the same time.

MR. WILLIAM GANGE: Okay.

THE CHAIRPERSON: Now, I'm just wondering, looking at the clock, whether it would be best if we took a ten (10) minute break. I think it might be better if we took a ten (10) minute break. And -- and then we could start with you, Ms. Menzies, if you have any questions.

MR. WILLIAM GANGE: Mr. Chair, wouldn't we then come back and have Mr. Stevens give his presentation?

THE CHAIRPERSON: Oh, I'm sorry. Yes, you're right. I'm sorry. I apologize.

MR. WILLIAM GANGE: That's what I was thinking.

THE CHAIRPERSON: But I'm -- I apologize for that. Let's do that.

MR. WILLIAM GANGE: And I think your timing is right for a break. We could break now. And Mr. Stevens would -- would give his presentation after the break. Thank you, sir.

--- Upon recessing at 10:24 a.m.

--- Upon resuming at 10:44 a.m.

THE CHAIRPERSON: I believe that everyone's in position. So I'll turn the microphone over to you, Mr. Gange.

CONTINUED BY MR. WILLIAM GANGE:

MR. WILLIAM GANGE: Thank you, Mr. Chair. The second part of the Green Action Centre evidence is being presented by Wesley Stevens, of Power Advisory. And Mr. Stevens will make reference to his PowerPoint presentation, as well.

MR. WESLEY STEVENS: Okay, can you go

to the next slide, so slide 2. As you -- members of the panel, as you well know, Power Advisory's mandate in this was strictly limited to wind. Our findings in this respect, two (2) main ones, that Manitoba Hydro's application significantly overestimated the cost of wind generation in several ways.

And secondly, that the potential for wind generation was not adequately explored in the fifteen (15) development plans considered in the application.

Go to slide 3. First of all, we found that Manitoba Hydro has significantly overestimated the cost of wind in several ways. Their assumptions included an overnight capital cost of twenty-one hundred dollars ($2,100) per kilowatt. The schedule -- the construction schedule is pessimistic. Their assumptions about how wind prices will change over time is pessimistic. Their -- the project life is pessimistic and their wind integration cost is -- is pessimistic.

I should mention that all of these assumptions are taken from one (1) source. There was a spreadsheet which was in response to Round 1 IR from -- from La Capra, number 38 -- no, sorry, 308. Manihoba -- Manitoba Hydro provided a spreadsheet as an

attachment to their response to that IR. And that contains the best source I found of their -- the wind assumptions used.

There was some confusion at first in the application itself. There was a correction issued about capital costs. It turns out that the operating and maintenance cost listed in the application was not what was actually used in the analysis. So I have relied on this -- this spreadsheet as -- as a source. I call -- I refer to that as the LCOE spreadsheet, the levelized cost of energy spreadsheet.

Slide 4, please. So, first of all, the -- the capital cost of wind, Manitoba Hydro has used an assumption of twenty-one hundred dollars ($2,100) a kilowatt specifically excluding transmission costs, which they add in separately.

Various sources they've -- they've cited supported this, specifically in their rebuttal evidence, they cited two (2) -- two (2) reports: one (1) from the US Environmental Information Agency, one (1) from the National Renewable Energies Lab.

Digging into to these, both of these reports turn out to be overviews of many kinds of generation: one (1) covering twenty-two (22) kinds of generation ranging from coal to solar, another eighteen

(18) kinds of generation in which wind only accounts for a few pages each. The -- these are not in-depth studies for -- of wind. One of them is also dated -- is -- provides an estimate of 2009 costs, so we're talking about costs which are already four (4) year -- five (5) years out of date.

So digging into that, I did not consider those to be particularly reliable sources, whereas there is an excellent source on what a wind actually costs. It's issued by the -- the US Department of Energy. It's called, "The 2012 Wind Technologies Market Report." They survey most of the wind capacity completed in each year. In -- in this particular one, that covers something like 9,000 megawatts, 72 percent of the capac -- of the wind capacity completed in the United States. So it's not a sample survey. It's -- it -- it covers a large majority of projects act -- actually completed.

And they found that the cost -- the average cost of wind across all of these projects was not twenty-one hundred dollars ($2,100) a kilowatt; it was nineteen hundred and forty dollars ($1,940) per kilowatt, including transmission interconnection costs.

So to make that comparable to Manitoba Hydro -- Hydro's number, you either have to take

twenty-one hundred (2,100) and add fifty dollars ($50) or some number, or you take the nineteen forty (1,940) and subtract fifty dollars ($50) or some other numbers to make -- so you're talking -- talking apples and oranges.

I thought it was simpler to simply take the nineteen forty (1,940),, accept Manitoba Hydro's assumption of fifty dollars ($50) per kilowatt for connection costs and say -- and -- and come up with a plant cost eighteen ninety (1,890).

Now, if you've -- for those of you who bothered to read our report, this is -- this is a different number than we put in our report. There is evidence in the -- in this -- in the 2012 Wind Technologies Market Report that costs in the Midwest are significantly lower then are elsewhere in -- in the US.

And for our report we -- we used that number, the lower number for -- on reflection, I can't say that I know that -- I can't say with confidence that I understand why costs are lower in the Midwest. So we thought it was certainly more conservative to use the average for all of the US rather than the -- the average specifically for -- for the Midwest. I am considering doing some more digging on that and I'll --

we'll report back if I find -- find anything.

Slide 5, please. Manitoba Hydro also made some interesting assumptions about their construction schedule. They assumed a three (3) year construction schedule, which is reasonable. They assumed a small amount of costs in the first year for monitoring, permitting, you know, putting up a wind tower and mea -- measuring wind speed, you know, things like that, which is very reasonable.

However, they assumed that almost all of the work, the actual work of putting up the project -- the full costs of the turbines, the civil work, you know, site prep, roads, buildings, everything, even commissioning -- would happen in the second year, which is, you know, between twenty (20) -- twenty-four (24) and thirteen (13) months before commercial operation date. And then almost nothing would happen in the -- in the last twelve (12) months.

That seemed odd to me, so we, Power Advisory, we went back and talked to some of our -- our developer clients and asked them what do they actually do. And they said -- and this is an average of -- of across about three (3) responses -- that, yes, first year reasonable. They actually said a bit more spending in the first year, 5 -- 5 percent.

In the next year, the only major expense was turbine deposits, which came down to about 35 percent of the total. Maybe a bit of site, but in total 35 percent. And that the bulk of the cost, the remaining 60 percent, was in the last twelve (12) months before COD.

MR. WILLIAM GANGE: Mr. Stevens, before you go on, why is that important to you?

MR. WESLEY STEVENS: This is important because we are comparing costs on net present value basis. So when costs are incurred earlier, that increases the levelized cost of energy. That increases the net present value in the economic analysis. In this case, these costs increase the cost of wind by about 3 percent, which is not that much. But if you -- but if you're talking about a -- say a 10 percent difference between two (2) kinds of generation 3 precent is a third of the difference.

So can you go to slide 6, please? So what about -- and this is probably the biggest issue. What about project life? Manitoba Hydro has been -- has -- has assumed twenty (20) years, and they -- they have cited a number of studies in support of that: BC Hydro, three (3) different ones by National Renewable Energy Lab, something called Irena, and also Vestas.

They referred to the warranty period on one -- one of Vestas's wind turbines. Vestas is a wind turbine manufacturer.

Digging into these, again what I found is that with one (1) exception they simply give the statement of, We assume twenty (20) years, without justification. And that one (1) exception was one of the NREL studies where they said, There is actual evidence on this; we've looked -- there -- there -- we've accumulated evidence over -- over the years, and the evidence says the expected life of a turbine is twenty (20) to thirty (30) years. They went on to use twenty (20) years as project life but never explained why they chose the -- the lower number.

Manitoba Hydro also made an interesting statement in their rebuttal evidence that they are not aware of any wind turbines greater than 1 megawatt in nameplate capacity that have operated for more than twenty (20) years, seeming to imply that, you know, we just don't know how long they'll last.

There were no 1 megawatt turbines twenty (20) years ago. The first one was introduced a few -- few years after that, about seventeen (17), eighteen (18) years ago, and would have gone into service about seventeen (17) years ago. So we're looking at a

technology that is not that old. And you can -- and for a new technology, it's reasonable to be -- to be conservative about expected life. And it seems to me that that's what -- that's what -- what has happened.

Earlier on in -- when wind was first being put into service in the -- in large quantities, people didn't really know how long it would last. They assumed twenty (20) years. That went into studies, which were cited by other studies, which were cited by other studies, which -- which were cited by Manitoba -- Manitoba Hydro.

Now, after a few large wind turbines have been in service for fifteen (15), sixteen (16), seventeen (17) years, and many of them -- and quite a few for -- for somewhat shorter periods, we have some evidence. And what does that evidence actually say?

Well, the first piece of evidence is in Manitoba. There are two (2) -- two (2) wind farms in service. They have terms of twenty-five (25) and twenty-seven (27) years. Just one point of reference.

The second one, one of the -- I mentioned this already. One of the reports cited by Manitoba Hydro actually refers to research on wind projects and says, The wind turbines have a useful life of twenty (20) to thirty (30) years.

The third piece of evidence, while Manitoba Hydro was correct that Vestas, the wind turbine manufacture, that some of its wind turbines come with warranties of twenty (20) years, others, the newer -- some newer larger ones come with warranties of twenty-five (25) years.

Now, warranties is not the same thing as useful life. But it is indicative that the -- the turbine manufacturers, who are in a place to know and are in a place to, you know, they're putting their money where their mouth is, that they are becoming more confident that wind turbines are lasting for a longer time.

And finally, we went and asked some of the same developers that we asked earlier about construction schedule. We asked them: What do you use? And they said, without exceptions, We -- we do our financial analysis based on twenty-five (25) years.

We do it, the developers do it, the investors do it. Investors are not known to be particularly flighty when it comes to financial analysis. In fact some investors also look at thirty (30) years, though that's not the -- not -- that's not their primary focus. Their primary focus is on twenty-five (25) years. And none of them mentioned twenty

(20) years.

So our conclusion is that while twenty (20) years has been somewhat of a tradition, that the evidence actually points to a useful life of twenty-five (25) years.

So can you go to slide 7, please? Manitoba Hydro also assumed that there would be no -- no improvement in wind costs over time, either wind capital costs or in -- or in wind capacity factor. That makes them a distinct outlier among experts.

Another excellent study by NREL focussing entirely on wind looked at -- did a survey of eighteen (18) different scenarios by an -- by -- I'm not sure, thirteen (13) or so -- from thirteen (13) or so different sources and graphed them. That graph actually appears in Manitoba Hydro's application. It's -- it appears in one (1) of the -- one (1) of the appendices of the Brattle report, I believe. So Manitoba Hydro must have been aware of it in -- in developing their application.

The midpoint of expert opinions is a -- a decline of something like 25 percent by 2030. This is a combination, by the way. The improvements and costs are on a dollars per megawatt hour basis. A combination of lower costs, much of it linked to larger

tower sizes. So a lower -- lower unit. A larger tower costs more than a smaller tower, but on a unit cost basis it's less expensive.

As well, larger towers, if they're higher, and there's a move to go from the current 80 mega -- 80 metre standard to a hundred metres, larger towers have access to stronger and steadier winds. So that -- that improves the amount of wind -- that -- that improves the capacity factor and the capacity of the wind plants.

This can be modelled. I guess, perhaps ideally, you would have different projections of capital costs: capital costs going down over time and capacity factors going up over time. It's actually simpler to simply model this as a decline in capital cost, to take this -- this improvement in -- in wind cost per megawatt hour and simply model it as -- as an improvement in capital cost. But I want to acknowledge that it is in fact a combination of capital cost declines and capacity factor improvements.

Next slide, please. Now, we come to wind integration costs. And this, I've got to say, was a difficult one because there's such little information available in the application. Manitoba Hydro started with a study done -- done in 2005, so it's nine (9)

years ago, that said that wind integration will vary with electricity price and with how much wind is already on the system.

Those are reasonable statements, and they gave numbers -- the -- the report gave numbers: four dollars and twenty-two cents ($4.22) per megawatt hour for -- at the five hundred (500) -- if -- if you have 500 megawatts on your system and four-ninety-nine (4.99) if you have a thousand megawatts on your system.

Manitoba Hydro then made a number of assumptions about electricity prices and how much wind capacity would be ins -- installed. And one (1) of their assumptions is that this nine (9) year old study is the best and most current source of information on wind integration costs.

Manitoba Hydro applied these assumptions, did some kind -- some kind of calculation, and came out with a number. The number they came out with was eight (8) -- eight dollars and forty-five cents ($8.45) a megawatt hour, which is twice what the 2005 study came up with. I thought that was odd, because one (1) of the prime drivers of wind integration costs, according to this study, is electricity -- electricity prices. Electricity prices are lower now than they were in 2005. They are

significantly lower, and it will be many years before they will be higher.

But if there's anything that can be taken from the 2005 study it's that wind integration costs really cannot be brought down to a single number. If you're looking at adding a couple of hundred megawatts of wind in 2022, that is taking your total install capacity from two-sixty (260) not even -- but taking it up to the five hundred (500) level, that's different from talking about what's going to happen in 2040 if somehow you have -- already have 2,000 megawatts on -- on your system and you're going to add another -- add additional capacity on that. You can't really bring it down to one (1) number. But that's -- that's the approach taken.

Manitoba Hydro was asked, as an undertaking, to explain the difference between the wind integration costs shown in Appendix 9.3 -- that is, the four twenty-two (422) -- and the wind integration cost as taken from LCA/MH I-308. That is the eight forty-five (845). That was Undertaking number 40. The response, which is Exhibit 136, while it consisted almost entirely of information already available in the application, did not really provide much explanation.

It did -- did include one (1)

interesting phrase, that their wind integration costs are for a sign -- significant wind build-out. In other words, buried in this number appears to be the assumption that there's already a lot of wind on the system. How much? We don't know.

I would suggest that, particularly for a screening exercise, which is what the levelized cost of energy calculations are about, it's more appropriate to look at wind integration costs applicable to the next few projects -- what's going to be happening in 2022 when you go from two-sixty (260) to five hundred (500) or something like that -- than it is to be talking about what happens if you already have 2,000 megawatts on the system.

That's particularly relevant if you're talking about -- hold on. I lost my train of thought. It also matters whether we're talking about adding wind to the system as is or if we're talking about additional capa -- hydro capacity. Wind and hydro are a good match in many ways. One (1) of them is that the more hydro you have, the lower your wind integration costs.

Also, are we talking about a system with more transition -- transmission, interties with -- with neighbouring systems? Again, that's a factor which

tends to decrease wind integration costs. So are we talking about the system as is, adding wind to it without interties in hydro, or are we talking about a system with more hydro and more wind, or more transmission and more wind? All that makes a difference.

But the biggest problem that I have with the eight forty-five (8.45) number is we just don't know what Hydro did. It's a black box, and a black box that came out with what seems to be a very high number. We do know, however, because they say so in their report, that Manitoba Hydro's wind integration experience is generally consistent with the 2005 study results. I mean, what does that mean?

We're in a situation with very little wind. We're in a situation with low power costs. So 'consistent with the 2005 study' would imply that Manitoba Hydro has some experience with actual wind integrations costs and they're pretty low.

Ideally, I would have liked to have seen Manitoba Hydro provide information on actual costs, not a -- not a nine (9) year old study, but actual costs. In the absence of -- of that, I'd like to know how the numbers were derived, the assumption of the analysis behind them, and whether -- whether they're -- those

assumptions and analysis are -- are reasonable.

However, in the absence of that, I have to say that the only number we have, the only actual number we have is the four twenty-two (4.22) to four ninety-nine (4.99) number in the 2005 study. The four twenty-two (4.22) number is -- is at a 500 megawatt level. We're below that. We don't have 500 megawatts. We have something less than that. So it would have to be the -- the lower end. And I choose that regret -- regretfully but only because it's the only number we have.

The next slide, please. So where does that put us? If you do all these things, if you take a capital cost that's based on what it actually cost to -- - to build wind in 2012, if you apply to that reasonable assumptions about the expert consensus about how wind costs will change between now and, let's say, 2022, 2020, 2022, around there, if you go -- if you ask developers about how money will be spent during construction and if you put in the only number -- the only evidence-based number we have wind integration costs, where do you end up?

You end up at about sixty-five dollars ($65) a megawatt -- a megawatt hour, which is a lot lower than Manitoba Hydro's number from IR Response --

the -- the response to IR 308, which was eighty-four dollars ($84). And it actually makes it lower than the cost -- cost of energy from either Keeyask or Conawapa.

I don't want to make a big deal about the fact that it's lower. I want to make a big deal about the fact that it's in the ballpark. What that means is that it's too -- if it's too close to call, it deserves to be looked at in some detail.

The next slide, please. That will be slide 10. Looking -- in looking at the development plans, Wind was not technically screened out. It does appear in some of the plans. It appears in two (2). There's a Wind/Gas Plan and a Wind/Conawapa Plan.

However, even there, as La Capra noted, these plans were not optimized, so. And it's -- these are not my words. These are La Capra words, but they're -- they're worth repeating, so I'm going to read them.

> "Rather than abandoned wind as a resource option, it would have been reasonable for Manitoba Hydro to evaluate alternative plans with different sequencing and timing of the wind and gas generation, plans with alternative capacity resources,

such as CCGTs and in demand response measures and plans that varied the amount of wind developed."

So to -- if you're going to include, at least optimize the plan. Optimize it in combination with -- optimize the timing of wind. Optimize how it's combined with gas. That's for those two (2) plans.

There were no other plans that included wind. In particular, there are no plans that considered combining wind with new transmission interties or combining it with new export contracts or combining it with -- with -- well, they did consider combining with -- with Conawapa, but perhaps combining with Keeyask; smaller amounts, larger amounts. They just -- the -- the range of -- of plans they looked at was just very, very narrow.

The next slide, please. That's slide 11. One (1) of the things -- one (1) of the questions raised that -- that I raised is: Could wind, in fact, be paired with hydro to serve export markets? If export prices are so high and if the export potential is so great, what about wind plus hydro? What about either wind plus the existing system or wind plus a new system?

I'm not talking about using wind for

firming. Well, you could consider it a bit -- a bit of firming. I'm talking about looking at it on an -- really on a integrated basis where when -- when there is wind, when the wind is high, there is wind generation, you cut back on the hydro. The reservoirs stay higher. When -- when export prices are high you have that much more hydro to export.

So you're not so much generating -- you're not -- not so much exporting wind as you're using wind to enable the export of hydro. Is this feasible or not? We don't know. Manitoba Hydro was asked about this in Information Request from the Board, 26A. Their response was a list of reasons why they didn't want to consider it, and particularly because they seemed to be looking at wind in Manitoba as competing head to head with wind in -- in the US states, rather than looking at wind plus hydro together in Manitoba competing with wind in -- in the US.

Next slide, please, which is number 12. Actually, can you go back for just -- I seem to have -- can you go back one more? No, okay. I'm on track.

One other thing that should be considered with respect to wind relates to what Mr. -- Mr. Chernick just said, that -- that Manitoba Hydro -- that Manitoba's needs for electricity can be met

through -- through conservation. There are always errors in load forecasts. Conservation programs may be more or less effective. A new industry could come along. It could be argued that we need to build these large hydro plants just in case demand increases later.

You can look at wind as a form of risk management. Going back to the wind schedule, once you've invested the first 3 percent, 5 percent in project development, 95 percent of the costs don't happen until one (1) and two (2) years before the project is put in -- in service. So if -- if demand is tracking higher than expected, if there is a large mining development happening in Northern Manitoba and you know you will need more energy, you don't need eight (8) years' notice of that. You need two (2) years. You can put wind projects in.

If you need capacity, you can also put in gas projects on -- on the same sort of notice. So you can look at wind not -- not just from the long-term development plan perspective, but you can look at wind as a -- as a risk -- as a form of risk management. That's also something that -- I think that should be considered.

Now, the last slide, which is number 13. So my conclusion, just to summarize is, wind should be

considered more seriously in any long-term plan of Manitoba's electricity system. It is the lowest -- lowest cost type of generation on an energy basis; less expensive, as I calculate it, than Keeyask, Conawapa, gas, solar, geothermal, anything else. It is the lowest cost of energy.

As such, it should be conspired in a wide range of development plan -- plans, with the timing of -- of wind and other types of generation fully optimized. It may be possible to pair wind with either existing or new -- new hydro to serve -- to serve export markets. That should be explored. And it may be possible to use it as risk management, to hold it in reserve to deal with unexpected changes in demand with a -- with a two (2) year construction period rather than a six (6) to twelve (12) year construction period.

That concludes my -- my presentation. Thank you.

THE CHAIRPERSON: I have a few questions, I guess, in relation to the costs that you have proposed for the cost of wind. And I guess one of the concerns I have is around the blend of US costs/Canadian costs.

Could you talk about that, please?

Have you attempted to compensate for the fact that some of these costs are -- are based on US dollars and -- and we are in a Canadian jurisdiction?

MR. WESLEY STEVENS: I actually haven't done that. It's true that the -- the costs I -- I gave were in US dollars. I have not convert -- converted those Canadian dollars, either current prices or whatever the exchange rate is.

Bill, do you happen to remember the exchange rate assumed application?

So it -- it would -- it would actually be reasonable to -- to convert those numbers using whatever exchange rate -- what -- whatever long-term exchange rate --

THE CHAIRPERSON: Yeah, I mean --

MR. WESLEY STEVENS: -- not necessarily the point nine (.9) that -- you know, the ninety (90) cents on the dollar that it is now -- it is now.

THE CHAIRPERSON: So that would address the exchange rate, but it wouldn't address the issue of whe -- whether costs for constructing wind in the US is different than the cost in Manitoba. In other words, my intuition tells me that it probably would be more expensive in Manitoba than it is in the US, but I don't know that for a fact.

And I -- I -- can you comment?

MR. WESLEY STEVENS: I don't have any solid information on that. I have thought about that. And my thought was actually the -- the opposite, that you have -- in Manitoba, you would largely be -- be developing wind in the southern part on -- and you're not in the -- in the Canadian Shield, so -- so you -- so you're looking at fairly easy foundation construction compared to what you see in many places in the United States.

That may be one (1) reason why wind costs in -- in the Midwest were lower than they were elsewhere in the -- in the -- US, although there are other -- other reasons. There could be other reasons for that as well. It might be that you would have higher costs to deal with harsher winters, but winters get pretty harsh and snowy in -- in many parts of the US.

So I've looked at that. I don't have any -- any basis for saying that they would be higher in Manitoba. And that was part of -- actually part of my reason for going with the US national price rather than the Midwestern -- the US Midwestern price, is to kind of allow some -- some fudge factor in there.

THE CHAIRPERSON: I didn't understand

the suggestion you made that you create wind sites in reserve.

Could you explain that a little bit more? Are you suggestion you -- you pour a pad and...

MR. WESLEY STEVENS: No, no, no. You -- you choose a site, acquire the land, put up a wind -- a -- a wind -- like a monitoring tower to confirm that the wind is there. You can even go so far as permitting. And then you sit on it.

If -- if a big mining complex comes in that's going to need energy -- and something like that would typically need energy around the clock. It needs -- it needs more than capacity. Then, you know, call up the, you know, call up the wind turbine manufacturer. I need -- I need turbines. And two (2) years later, you can have a site commissioned.

But you have to do the prep work. Prep work costs -- essentially you have to do the year 1 work, the -- what -- what we estimate to be about 5 percent of the cost. And there would be some small costs of just sitting on the land rather than developing it. But it's pretty low cost risk management.

THE CHAIRPERSON: Now, part -- part of what Manitoba Hydro has suggested and -- and obviously

included in their plans is, you know, the fact they -- they would be importing US wind, storing water, and -- and shipping back the power at -- at an alternative time. So in effect, instead of having wind in Manitoba, you'd be using wind US and -- and enjoying the increased reliability that stems from two (2) different systems that are intertied and so on.

So you examined wind purely as a resource that might be available in Manitoba and didn't consider the broader gains that might be yielded by an intertied system.

MR. WESLEY STEVENS: I think that that is something that should be looked at. That would -- that would fall under the category of taking a much more serious look at wind, including importing wind from -- from the US. My -- this is a gut feel, I have to say.

My gut feel is it's -- it's likely to be more efficient to generate the wind in Manitoba and then -- then export it, rather than import it from the US and export again. It's -- it's more complicated. You have -- if -- if it's in with -- if it's in Manitoba, it's easier to -- to integrate more closely, integrate on a one (1) minute basis rather than scheduling -- schedule imports thirty (30) minutes or

an hour ahead.

So I -- I think there are benefits, but again that's something that I think should be worked -- looked at.

MS. MARILYN KAPITANY: My question is more mundane than the Chair's, but I've done some reading about wind. And one (1) of the things that I saw is that it doesn't do very well at really cold temperatures.

Is that information out of date, or could you comment on that at all?

MR. WESLEY STEVENS: That's -- that's getting into information -- I'm not an engineer. I -- but I have educated myself about this, because that's my responsibility. There are issues with icing, and that relates back to M. Gosselin's question about additional costs in Manitoba.

There -- for an additional cost -- I think it's small, but I'm -- I -- I don't know what it is -- you can get wind turbines at -- that are particularly good at dealing with icy conditions.

On the other hand, basic physics, cold air is more dense. So they're -- the colder it is, the more wind power you have.

MS. MARILYN KAPITANY: Even if it's a

dry cold?

MR. WESLEY STEVENS: That's actually an interesting question -- an interesting phy -- physics question: Does wet cold air weigh more than dry cold air? I don't know.

(BRIEF PAUSE)

THE CHAIRPERSON: I think that's all the questions the panel has for the time being. So, Ms. Menzies, please, on behalf of CAC.

CROSS-EXAMINATION BY MS. MEGHAN MENZIES:

MS. MEGHAN MENZIES: Good morning. Thank you. Good morning, Mr. Chernick and Mr. Stevens. I'm just back here. Mr. Chernick, I met you this morning at break, but I don't believe that I met you, Mr. Stevens. So by way of introduction, my name is Meghan Menzies, and I represent the Consumers' Association of Canada, Manitoba branch.

And I don't have many questions for today, but the ones that I do have are primarily targeted at Mr. -- at Mr. Chernick. But as I think we've always been aware, we're definitely open to responses from both of you where -- where appropriate.

Mr. Chernick, this morning you were qualified in a number of areas, and one (1) of those area was integrated resource planning.

Is that correct?

MR. PAUL CHERNICK: Yes.

MS. MEGHAN MENZIES: And I believe that Mr. Gange explained that you had previously been qualified as an expert in integrated resource planning in a number of jurisdictions. And my understanding was the jurisdictions that Mr. Gange spoke to were Arkansas, Kentucky, Contentic -- Connecticut, and the City of New Orleans.

Am I recalling that correctly?

MR. PAUL CHERNICK: Yes, and there are several others I've been appearing as a -- a witness on integrated resource planning since the 1980s.

MS. MEGHAN MENZIES: So before I was born. Maybe I shouldn't have said that. Moving on from that. Although, your presentation this morning was not largely focussed on integrated resource planning, because you've been qualified in the area and clearly have a lot of experience speaking to it, I would like to explore the topic with you a little bit this morning.

To begin with, could you provide the

Board and myself with some insight on what good integrated resource planning consists of?

MR. PAUL CHERNICK: Well, that -- that's a question sort of better suited for a -- a research paper or a primer on -- on integrated resource planning. And I -- I think some of those have been developed.

But basically the idea is to look at all of the tools at the disposal of the electric utilities system or the electric and gas utilities system, and to search for the best plans going forward, including, in the case of an electric utility, adding generation, retiring generation, switching fuels, purchases from other utilities -- non-utility generators, sales -- in this case of Manitoba, it would be exports -- energy efficiency, fuel choice issues, and -- and the whole range of potential solutions to your future supply problems or conditions that may arise, including both the -- the expected cost and the risk involved in the various alternatives.

MS. MEGHAN MENZIES: And to use some language of -- of Mr. Stevens this morning, my understanding would then be is that you -- you take all these different resources that you've looked at and -- and try to create an optimized plan? Is that -- sound

appropriate, or -- or am I --

MR. PAUL CHERNICK: Yes, that's your -- your objective, and -- and the -- the point is not so much to lay out a blueprint that you'll follow faithfully for the next twenty (20) years as to lay out what you're going to be doing in the foreseeable future and how that will -- relates to what you expect in the longer term.

In the -- so you -- there are things that you need to do now in order to bring resources online over the next three (3), four (4), five (5) years. But as you're making those decisions, you want to be thinking about a much longer time frame and what you expect to have happen, and how you will change your plans if your expectations change.

MS. MEGHAN MENZIES: Thank you. And -- and when you -- when I first posed this very general question to -- to you, you provided that -- that you look at a number of different resources. And something that we've been discussing here at the hearing within the last two (2) months has been portfolio analysis; so not just individual plans, but -- but also portfolio analysis within integrated resource planning.

Is -- is that something that's familiar to you or something that you can expand on?

MR. PAUL CHERNICK: Yes, I -- I think what you're alluding to is, while it's often helpful to focus on a particular resource, and how adding that would change the rest of your -- your plans and change the economics of the system, integrated resource planning doesn't just look at one (1) or two (2) decisions normally. It looks at your overall mix of -- of resources and -- and how that -- 'portfolio' is a good word for it -- how that set of resources and the policies that may be developed to complement your resources, how those perform under a variety of conditions.

Just as with a financial portfolio you look at balancing stocks and bonds and domestic and -- and foreign holdings, and so on, so that you aren't excessively vulnerable to any particular shift in the market.

(BRIEF PAUSE)

MS. MEGHAN MENZIES: And so something that was brought up this morning to some degree was energy efficiency. And -- and our understanding, or the understanding that I've been able to glean from the presentations thus far is that at the heart of

integrated resource planning is that optimized energy efficiency is just as important to consider as optimized generation.

Is -- is that -- is that statement correct, in your opinion?

MR. PAUL CHERNICK: Yes. One of the major resources available to both gas and electric utilities is energy efficiency for providing the energy services to their consumers at the lowest possible cost, and reducing the risk.

MS. MEGHAN MENZIES: Thank you. And I just have one (1) last question for you, and it's just -- because of the number of places that you've worked and that you've provided expert evidence on regarding integrated resource planning, it would be helpful if you could provide some direction or examples of jurisdictions that have undertaken what you would consider to be good integrated resource planning, if they're out there.

MR. PAUL CHERNICK: Oh, there -- there are, and there -- there may be -- if you're looking for models for Manitoba, you might take different pieces from -- from different jurisdictions.

And while -- say the treatment of -- of demand-side options, efficiency, in particular, for

that you might look to say Connecticut, which has a -- I think a fairly clear and straightforward development of -- of that side of the IRP. But Connecticut is a restructured state, so the utilities aren't making decisions about purchasing resources, for the most part. They -- they make some exceptions to resolve problems that the market's not taking care of, but for the most part for the supply side you'd have to look to another model.

I -- I think I'd prefer to respond to this in -- in detail in a -- in an undertaking, if that would work for you?

MS. MEGHAN MENZIES: I would be glad to -- to have an undertaking on that.

MR. PAUL CHERNICK: So this would be a few examples of integrated resource planning that I think work fairly well. And I'll get you the links to the specific documents that lay out the -- the plan and perhaps the Regulatory Board's order on the subject.

MS. MEGHAN MENZIES: That would be great. And for -- for the benefit of the court reporter, would you like me to repeat that undertaking?

(BRIEF PAUSE)

MS. MEGHAN MENZIES: So my understanding, and please interject if I'm restating this incorrectly, but Mr. Chernick will provide -- will provide an undertaking to provide the Board with a number -- or a number of good examples of jurisdictions that have done good integrated resource planning and will provide links to both those plans and the Board orders relating to those plans, if available.

Does that sound satisfactory to you, Mr. Chernick?

MR. PAUL CHERNICK: Yes.

MS. MEGHAN MENZIES: Thank you.

--- UNDERTAKING NO. 135: Paul Chernick to provide Board with a number of good examples of jurisdictions that have done good integrated resource planning; will provide links to both those plans and the Board orders relating to those plans if available

MS. MEGHAN MENZIES: And that concludes

my questioning for this morning.

THE CHAIRPERSON: Thank you, Ms. Menzies. I'm going to call upon Me. Hacault. Just to let you know, Me. Hacault, that our intention is to recess at approximately five (5) to 12:00. So I hope that helps you a bit.

MR. ANTOINE HACAULT: That should be okay. I expect that the questions I have will have been dealt with before that time.

CROSS-EXAMINATION BY MR. ANTOINE HACAULT:

MR. ANTOINE HACAULT: I'd like to cover one (1) area with Mr. Chernick and just provide a little bit of background before I get into the questioning. One (1) issue that has been raised in this hearing is when you build new generation for hydro you'll know the cost of that. And I want to explore how that -- your views on that and how that compares to DSM and whether in twenty (20) years we'll know the cost of the saving plans that you're talking about at the 1.5 percent. So that's the subject area.

Let's try and break that down a little bit. Sir, with respect to economic DSM, can you identify the most common cost components of those DSM programs? For example, labour might be one (1) of them

and physical components of different things might be others, but I'm just giving you that as an idea before you answer, sir?

MR. PAUL CHERNICK: Well, that varies a lot from one (1) program to another. Sometimes the program expenditures are almost entirely for technical assistance. For example, in new construction for large buildings, there's a tendency for there to be a market failure where the -- the owner doesn't ask the architect or the lighting engineer, or the -- the HVAC engineer for a -- a lowest total cost system. And the -- the charge is more to minimize first costs, because that's something that the owner can understand and -- and monitor more closely.

Even if the various professionals would like to do something more with efficiency, they have to do that work on their own time, and then explain to the owner why they should spend more, or, in some cases, why it saves them money because if you improve the lighting efficiency and the use of date lighting you can reduce the size of the cooling equipment, for example, in a high-rise building. But that means that the -- the architects and the -- the lighting engineers have to talk to the -- to the HVAC engineers across connections that are -- that -- that may not be made

normally.

So sometimes you're mostly paying to bring in an outside expert to work with the various parties and come up with a proposal for how to build a building that does what the owner wants to do and does it with a lot less energy use. And then there's a small cost perhaps for a plaque to put on the front of the building to let everybody know how amazingly efficient the building is when it's actually built as -- as designed. So --

MR. ANTOINE HACAULT: And I'll let you continue.

MR. PAUL CHERNICK: Yeah.

MR. ANTOINE HACAULT: But I just want to break -- break -- the first component that you've -- identify then is the nature of labour, either professional engineers, architects, or the people that are installing it.

And would it be fair to suggest that we could expect that people over the years, if we're projecting twenty (20) years, that cost will not stay fixed over a twenty (20) year time period; all things being normal, labour costs will increase in each year over the twenty (20) year time period?

Is that a fair assumption, sir?

MR. PAUL CHERNICK: Yes. You'd -- you'd expect it to rise roughly with inflation. Although as -- as you get some -- some buildings built and as the architects get familiar with the techniques, that they're able to research because you're either paying for their time or bringing in somebody else to -- to help them through the process, it may be much easier to do the -- the second one or the third on and the forth, one and so on. But there would some -- certainly be some escalation in fees.

And for both that kind of project and -- and ones where you're blowing in insulation or replacing windows, or that kind of thing, there would also be escalation in -- in labour costs. And there -- there would be escalation in -- in material's costs in general where you're replacing one (1) kind of equipment with -- either putting in new equipment early, for example, taking out a refrigerator that's still working but is using way too much energy and putting in a more efficient one.

On the other hand, the -- the premiums for an efficient refrigerator over the standard refrigerator may also decline over time as those efficient models become more commonly used. They're not special order anymore. They're now stocked

locally. They're easy to get a hold of. The manufacturers are producing more of them. They've spread their development costs out over more units. They're competing with one another to -- to capture this growing market.

So the incremental costs of some kinds of capital investments will go down. The incremental costs of others may go up with inflation, but you would expect some -- some upward trend in many of those activities. And in -- in terms of the costs of the measures, whether you're talking about costs that are being expended directly by the utility or being expe -- expended by customers, and then the utility provides a rebate, an incentive, or whatever, that, in general, costs will tend to rise with inflation. Although, there are other factors, as I've outlined, that would push back against that.

MR. ANTOINE HACAULT: Okay. And thank you for that answer, sir. I appreciate with respect to materials, which is kind of second area that you covered, that there can be a wide range as to whether or not there might be actual increases that match inflation, depending, as you say, on the competitive nature of the market and whether new things come out. But is it fair to say that, in general -- I think I

understood you to say that there probably would be some measure of increase for materials overall? For example, insulation -- is insulation -- probably you won't pay the same price for insulation in twenty (20) years from now as you do today.

(BRIEF PAUSE)

MR. PAUL CHERNICK: There are prob -- there are probably some specific materials that you use in -- in energy efficiency programs that you continue to use that would rise with the -- the cost of -- of other commodities. I -- I'm thinking about -- in the insulation case, at one (1) point the -- the cost of adding a layer of -- of foam insulation on the outside of the wood framing before you put on the siding, that was just an additional cost. Now, there are -- there's insulation integrated with the sheathing so that the -- the cost -- the incremental cost of doing that has gone down considerably.

So as the technology improves, as the foam insulation replaces blown in cellulose or -- or fibreglass, you may have lower costs to get the same efficiency levels. You may also be pushing for higher efficiency levels.

I guess my answer is it's complicated, but there certainly are areas in which -- in -- general inflation will tend to push up costs. And while you may get a little more efficient in how you -- you do the -- the blowing of the foam, you're going to have somebody there controlling the -- the equipment. And he's certainly going to hope that his -- his wages rise with inflation.

MR. ANTOINE HACAULT: And you had an exchange with Board member Kapitany on new technology, and you said while we can't necessarily predict what it will be. Does it follow that you also can't predict the price of that new technology with any measure of certainty?

Is -- like, in twenty (20) years from now, what is the technology that we're speculating about and what's going to be the cost of that technology to maintain that level of efficiency, or increased efficiency, of the one-point-five (1.5) that you have -- you have identified, sir?

MR. PAUL CHERNICK: Yes. And you may have new technologies that allow you to squeeze additional savings out at about the cost that you've -- we've been doing it in the past, or about that cost plus inflation, or at a lower price, or potentially at

a higher price. But in my conversation with the Chairman I was speaking about the technologies that would be cost effective. But they may be -- instead of costing two (2) cents a kilowatt hour, they may cost four (4) cents a kilowatt hour, or -- it's true that we -- we don't know exactly what will happen in the future with a lot of these things.

MR. ANTOINE HACAULT And, sir, I'm going to suggest to you that once you've built a major generating station and associated transmission such as Keeyask that once that construction is finished your costs are pretty well fixed except for ongoing maintenance and some support. And that's actually been a criticism that there's very little ongoing permanent jobs related to a generating station.

With respect to the statement I made, sir, that most of your costs will be fixed once that generating stations has been built, do you agree with that?

MR. PAUL CHERNICK: Yes. Although, there -- there are situations in which hydroelectric systems and major transmission systems require large investments. There's situations in which the dams are -- experience some kind of -- of problem, or you can have a generator fire which can knock out a big piece

of equipment for quite a while until you get it repaired, and it can be an expensive business.

So it's -- it's not necessarily the case that you don't have to spend any money on the facilities after you've built them, but there may be many years in which you're spending very little.

MR. ANTOINE HACAULT: And all things being equal, sir, I would suggest to you that if you spend say $6 billion in today's dollars, in twenty (20) years -- we don't know that the inflation will be, but in -- the dollars that'll be used to pay down that $6 billion, in twenty (20) years from now, if we use a time -- twenty (20) year metric, it'll be easier to pay that $6 billion because of the natural effect of inflation.

So you get an inflation hedge when you build a generating station, correct?

(BRIEF PAUSE)

MR. PAUL CHERNICK: I'm just making sure that I understand what -- what you're asking. If -- if you -- you borrow a certain amount of money this year and you pay it off with straight-line depreciation then you're going to be paying less in the future, and

people -- the bills will be getting paid in inflated dollars. And so it -- the repayment goes down in real terms, if --

MR. ANTOINE HACAULT: Yes --

MR. PAUL CHERNICK: -- I think that's the point you were trying --

MR. ANTOINE HACAULT: -- that's a point. For example, and I -- I don't want to show my age, but the first hearing I did before this Board was the Limestone Project, and a lot of people were complaining about the cost at that time. And when we consider the cost and -- and the amount of rates needed to pay -- and -- and out of my pocket in today's dollars, people are starting to think it's a pretty good deal. And they say, Well, it's a legacy that's been left to us by the people who had the foresight of doing that Limestone Generating Station.

So getting back to my question, sir, all things being equal a big generating station would have inherent in it some kind of an inflation hedge because a big part of the fixed costs are put there and don't change over time.

MR. PAUL CHERNICK: Yes. And -- and any capital investment that you make now has that -- that -- with a long life has that kind of advantage.

If you spend money on energy efficiency today, then -- and it saves energy in that building for forty (40) years, then, you know, thirty (30), forty (40) years from now you're getting those benefits. You probably aren't paying anything for it out of that end of the -- of the period, and -- but even if you borrowed money to do it with it's -- it's a very good deal.

So energy efficiency, hydro, wind, solar, all have very high -- or, you know, a high percentage of their costs are front-loaded, and therefore they look particularly good over time.

MR. ANTOINE HACAULT: Sir, I'd like to understand better your last statement, that energy efficiency has a lot of front-load costs. As I understood the evidence that you lead, in each year if we're going to get incremental savings of 1.5 percent in each year we need to spend money. And that money, we've talked about --

MR. PAUL CHERNICK: Right.

MR. ANTOINE HACAULT: -- will be increased labour costs, and -- and perhaps depending on the type of DSM --

MR. PAUL CHERNICK: M-hm.

MR. ANTOINE HACAULT: -- increase material costs. So I'm trying to understand why you're

saying that we spend a lot of up-front costs. Maybe in any given year, but that expense has to be repeated in each year to achieve those targets, correct?

MR. PAUL CHERNICK: Yes. To continue getting savings you have to continue spending money. It's sort of as if you could take Keeyask and split it into a thousand little pieces and -- and add just as many as you needed each year. As time went by, those additional little pieces of Keeyask would -- would be costing you more.

And the DSM, which you don't have to -- to spend your -- all of your money on today, you can -- you can put it in over time, it does inflate. But on the other hand, you don't pay anything until you actually start getting some benefits from it.

MR. ANTOINE HACAULT: And I'll finish with that. The difference is life -- we're talking about life of a generating station somewhere between sixty-five (65) and seventy-eight (78) years on average with the components, correct?

MR. PAUL CHERNICK: Yeah, the life of hydro electric facilities is -- can -- can be very long.

MR. ANTOINE HACAULT: Thank you. The next set of questions are to Mr. Stevens with respect

to the life of the wind towers.

Are you aware, sir, and you may not be, whether the assessment department in this province or other provinces, for purposes of valuation and then depreciation, as to what life they attribute to wind towers?

MR. WESLEY STEVENS: I don't know that.

MR. ANTOINE HACAULT: Okay. So if I suggested to you that in this province they use an eighty (80) year life, you wouldn't know whether in fact the valuation and depreciation is based on that length of time?

MR. WESLEY STEVENS: I wouldn't -- I wouldn't know that. That eighty (80) years would surprise me, but I -- I don't know anything about that.

MR. ANTOINE HACAULT: Well, sir, with respect to the life that you've attributed, you know, for example, the cement on which the pedestal is put. What's the life of -- of that component of the construction?

MR. WESLEY STEVENS: That's an engineering question which I'm certainly not qualified to answer. I -- I look at things more from a top down view.

MR. ANTOINE HACAULT: And the hundred

met -- metre tower on which the generating unit is put, do you know what the life of that component is, sir?

MR. WESLEY STEVENS: I don't know about the -- the difference between an 80 metre and a hundred metre tower. My understanding is that the -- that it's the turbine that's more likely to be the limiting factor than the -- than the tower itself. The tower is concrete and steel, which buildings are made out of.

MR. ANTOINE HACAULT: Okay.

MR. WESLEY STEVENS: But here again I'm -- I'm speaking from common knowledge, not from an engineering expertise.

MR. ANTOINE HACAULT: I was trying to understand the component issue because a generating station will have certain components that need to be replaced; like the turbines will have to be replaced, and it's shorter than the concrete structure itself.

MR. WESLEY STEVENS: Typically, after some point, twenty (20) -- twenty-five (25) years, thirty (30) years, something -- something like that, you would take down the -- take down the tower -- the towers and the turbines and replace them with new towers and turbines potentially of a different size, potentially a hundred or, who knows, perhaps, by that time, higher towers. But usually the -- my -- my

understanding is that the towers and the turbines go together. That if you're -- you wouldn't use the same towers to put new turbines on.

MR. ANTOINE HACAULT: Than you, sir. And the last question: Did you make any inquiries, sir, as to how much land has in fact been blocked off, so to speak, by Manitoba Hydro and investors in this province for wind farms?

MR. WESLEY STEVENS: I don't know anything about that.

MR. ANTOINE HACAULT: Okay. Thank you.

THE CHAIRPERSON: I do have a question in relation to what Me. Hacault was asking. It's in relation to, you know, once the life of the windmill is done, your levelized cost does not include taking down that windmill?

MR. WESLEY STEVENS: That's actually an interesting question. The -- in my -- my levelized cost calculations, and to explain, I took Manitoba Hydro's spreadsheet and I adjusted it for my calculations, including a longer life. One (1) of the changes I made was to -- to look at things -- look at a sixty-eight (68) year study period after COD. So that's time for -- to replace the wind plant, and then replace it again. It's also time to replace the -- the

transmission equipment.

So the question of what does it cost to replace a -- a wind plant does come up, and I have inquired about that. There's a cost of taking down the towers. There is a -- a salvage value to the metal and the turbines in the towers. And in talking with developers, those more or less balance out. They -- they're not concerned about having significant disposal costs at the end. The cost of replacement -- sorry?

THE CHAIRPERSON: Sorry, Mr. Stevens. Perhaps we can come back to this after -- after recess --

MR. WESLEY STEVENS: Sure.

THE CHAIRPERSON: -- if you don't mind. We have a commitment that we have to fulfill. So let's -- let's agree that we'll talk about this after -- after lunch.

So for the benefit of those are still here, you know, we would -- we would resume the proceedings at ten (10) after 1:00 this afternoon. Thank you.

MR. SVEN HOMBACH: And, Mr. Chairman, if I -- if I can remind the parties there's currently a plan to have a presentation by Mr. David Barber at 12:45 today. It may be possible to push him back, but

we're certainly at the panel's guidance.

THE CHAIRPERSON: We'll -- we'll think about that over lunch and -- and I'll let you know as quickly as possible.

(PANEL RETIRES)

--- Upon recessing at 11:57 a.m.

--- Upon resuming at 1:01 p.m.

THE CHAIRPERSON: Good afternoon. I believe that everyone is in position, so we can commence the proceedings. I'd like to welcome Professor Barber. And are you coming to address the panel on behalf of yourself or on behalf of the Centre for Earth Observation?

PRESENTATION BY DR. DAVID BARBER:

DR. DAVID BARBER: I'm a professor at the University of Manitoba, so my comments are as an academic at that institution. Okay.

So I've got a presentation that I wanted to present to the Public Utilities Board about the aspects of climate change, and how they're affecting Manitoba. To advance the slide I'll just go like this

maybe? There we go.

So as you know, the intergovernmental panel on climate change is one of the authoritative voices on the planet that looks at what's going on with climate change at a global scale. And the fourth assessment report just came out a few -- actually just a few weeks ago.

And four (4) of the main pieces of evidence for a changing global climate are indicated here on this slide in front of you. There's Northern Hemisphere snow cover. There's change in global average upper ocean heat content. There's global average sea level change. And there's change in the Arctic summer sea ice extent. I'm a specialist in sea ice. I've been working on sea ice for about thirty (30) years in the high Arctic. There was even a rumour going around that I was phoning in today from the Arctic, but I'm actually here in Manitoba.

And I wanted to present on what we're finding in the Arctic and how it connects to the climate here in Manitoba, and generally to the more tempered parts of the planet -- of our planet. I'll talk a lot about sea ice to begin my presentation. Then I'll move very quickly into what the impacts are to be expected in places like the Manitoba, the

prairies, that kind of thing.

So if we go to the next slide. This didn't come out right, but it's suppose to be animated. The reason the fifty dollar ($50) bill is there is it's over top of a whole bunch of people's names. The whole bunch of people's names are my lab at the University of Manitoba. There's about a hundred and fifteen (115) of us there that work on sea ice and climate change related aspects of the high Arctic.

And also teleconnections, or these are the connections between the Arctic climate and what's happening more temperately. A lot of our research work is quite high viability. That's the fifty dollar ($50) bill that was just announced about a year ago that has the Amundsen, which is our research icebreaker on the back of the fifty dollar ($50) bill.

Next slide. This is an indication as to what's going on with global temperatures on our planet. These are measured temperatures. So it starts in 1880 and goes through to 2012. And you can see the variability in the global temperatures over that period. And you'll see the temperature are normally in degrees 'C' indicated on the left side on the axis.

We basically come to a point in our global climate temperatures where we've increased the

global temperature by about .6 degrees Celsius. And this is increased from a period towards the end of the second World War quite significantly, and we're now in a stable situation, in the sense that we're not seeing a rapid increase or decrease over the last several years at a global level.

If I take a look at the one (1) circle that's there, that's 2005. I'll have a look -- I'll show you next -- in the next slide what the average temperature looks like across the planet that created that single box that's indicated by that round circle.

So next slide. This is the average conditions for 2005. And I put this slide up to illustrate a couple of things for you. One of them is you'll see the red temperatures towards the high latitudes of the planet in the Arctic where I work, this is called the Arctic amplification of climate change. So we basically see that a -- a signal of a warming global climate increases by about a factor of three (3) in the polar regions of the planet relative to the rest of the globe.

And what you see there also across the planet is variability. So you see some areas are cooling, some areas are warming; there's lots of variability across that system. I'm going to return to

these two (2) ideas later on in my presentation. To remind you, one of them is polar amplification, which means the Arctic is warmer than the rest of the planet, and increased variability in the temperature across the planet surface.

Next slide. As you all know, we use a lot of fossil fuels to drive our economies. In 1990, we were using about 20 billion tonnes; well, that's what we emitted in 1990. It's going up; we're about 32 billion tonnes in 2013. The important parts of this are the rate at which we're liberating greenhouse gases into the atmosphere through our reliance on fossil fuels.

The natural increase is about 0.0001 parts per million per year. Now we're somewhere around 2 1/2 parts per million per year, and we're increasing the rate at which we liberate carbon and increase greenhouse gases into the atmosphere towards a peak of around 5 parts per million somewhere by 2030, unless we get things under control.

Next slide. This idea of a warming planet is something that people pay a lot of attention to when they're sitting underneath one these cells, it's very warm. If you're sitting underneath a cell that's very cold you think: What's happened to global

warming? It's disappeared. It's now global cooling.

Well, in fact, it's all part of the same thing. And when you look at the record of our industrial activity on the planet, the simplest thing I think of is over the last thirty (30) years, each of those decades has been the warmest on record, and each of them has been warmer then the subsequent one. So we're moving forward into a warming climate with variability that's associated with that.

Next slide. When I look at the sea ice in the Arctic and what's been going on, when I started my career in the Arctic in the early '80s, there was not much variability in the minimum extent of sea ice. That went through the decade of the '80s, the decade of the '90s; we started to see quite an increase in things. Once we got into the decade of the 2000s and the 2010, we started to see a very precipitous drop off in the amount of sea ice that exists in the Northern Hemisphere.

That red line is the scientifically appropriate relationship in a decline like this. And it's basically caused by the fact you have an ice cover there, or used to have an ice cover there. You now have open ocean, and all the sunlight that enters into that system is now being absorbed by the ocean, instead

of reflected by the sea ice.

Next slide. These kind of changes are extremely significant in the Arctic to such an extent that we really talk now about the industrialization of a new ocean for our planet. We never used to think of how to develop the Arctic because it was inaccessible to us. It is no longer inaccessible to us.

In 2010 you could have taken an ice reinforced vessel right across the pole on that blue transit that you see there, which is across the pole. The Northeast Passage route has been open for the last seven (7) years or so. I've been personally through the Northwest Passage route seven (7) times myself, and one (1) of those times I could have went through in a rubber dinghy.

Of course, the Murmansk Manitoba Bridge is the red one (1), and that is of particular interest here in Manitoba with our desires and aspirations for the Port of Churchill and what may happen in the future with that.

Next slide. One (1) of the other things that's going on in the Arctic is this very pretty looking blue graphic. It represents the polar vortex. People that went through the cold of Manitoba here this

year will have heard the term a lot, the polar vortex and what's going on with the polar vortex.

The polar vortex is something we've known about for about thirty (30) years now scientifically. We've been studying it very intensively for the last ten (10) or fifteen (15) years. And what is happening is because the sea ice in the Northern Hemisphere is being reduced, we're getting a lot more heat from the ocean into the atmosphere. That is causing the gradient between the Arctic and the temperate parts of our planet to become more -- less steep.

If you go to the next slide. This has led to a hypothesis called a warm ocean/cold continent hypothesis. You can see on that graphic that is in front of you there a representation of the -- the Rossby waves that move around the Northern Hemisphere. Those Rossby waves are steeper now. They are more loopy, is how we call them, a very technical term for what the structure of them is.

But they move much more slowly around the planet. So there -- there's a tendency to get persistence in the climate now. And that persistence leads to persistence in precipitation. It leads to persistence in temperature, and the variability that

are associated with those.

The hypothesis we're working on right now, and it is a hypothesis; it's not a scientific fact yet, but there seems to be a lot of evidence for it -- is that a lot of our climate and the variability we're seeing in the climate system is driven by what's happening in the Arctic and the relationship between the Arctic and more temperate parts of the planet.

Next slide. Here's just a -- a graph that I pulled off of my computer at 7:32 in the morning on April 25th, which was when I was preparing the presentation for this Public Utilities Board hearing. And it shows you the surface temperature actually measured from the pole down over North America.

And I put this up just to illustrate what a lot of people don't appreciate on first instinct. And that is that the climate we have here in Canada is driven by what happens in the Arctic. You can see it in this graphic very clearly.

If you look over on the Russian side, the depth of the cold water over the Russian continent is not nearly as large it -- as it is over the North American continent, and that's largely because of Hudson Bay. Hudson Bay is frozen at this time of year, and it continues to propagate that cold weather and

cold air down from the Arctic, down over top of what happens with us here in North America.

Next slide. One (1) of the research staff in my lab has been looking at the cold winter we've had this past year, and the results are just about to be published in a paper that she's submitted to one (1) of our academic journals. And it shows that because of the reduction in the ice cover in the high Arctic, this caused a change in pressure patterns, which is very consistent with this warm ocean/cold continent hypothesis.

The breaking down of the polar vortex that occurred over the winter allowed this cold air to spill out over North America and kept the persistence of this cold air over North America for a very long period of time. Long enough for us to say we should get winter over with here in Manitoba. It's been too long; let's get on with spring and summer already.

If you're slightly to the west or slightly to the east of that, on the western seaboard of North America, they were outside of this Rossby wave that created this persistence over North America, and they had a very hot, and very dry summer in places in Southern California.

Next slide please. This variability in

the climate system has to do with two (2) things: both change and variability. That's why you'll hear scientists quite often talk about climate change versus climate variability.

The climate change is represented by the top graph. It's a shift in the mean. And if you just had a shift in the mean, you would expect more hot weather, more record hot weather, less cold weather, with changes in the temperature. So, for instance, that's the situation we have with .6 degrees Celsius.

But the problem is the variability in the climate system changes at the same time. So if you take that distribution and you squish it down, you increase the variability in that second graph. Therefore, you get more extremes at both ends of that situation: more extreme cold weather, more extreme warm weather. You could make the same arguments for precipitation as well.

The problem is the reality of our changing climate is really 'C' -- the 'C' graph, which is a change in variance and a change in mean. And this leads to increases in extreme weather, in particular an extreme variability in the climate system, which is something I'll return to later on in the presentation.

Next slide. Of course, Manitoba is not

immune to this. Manitoba sits right in the middle of it. We're right in the middle of the prairies in Canada. We're very much part of a continental climate system. Our climate system is driven by the Arctic, to a large extent, and to an even greater extent by Hudson Bay, and then the -- the westerlies that are associated with the Coriolis force across the interior of North America.

Manitoba can affect -- can expect a number of different impacts, from rising permafrost temperatures, thinning ice, forest fires, ecological change, extreme weather, less soil moisture, and, of course, flooding and drought.

The next slide. One (1) of the key things in Manitoba and one (1) of the key connections between climate change and what's going on here in Manitoba is represented by the water cycle. The hydrological cycle is increasing in variability. It's increasing in power. So as the temperature of the planet goes up, there's a nonlinear relationship to how much moisture the atmosphere can hold. And that leads to increases in extremes in precipitation and drought and aspects of the hydrological cycle.

Of course, we interface as a society with this as well, complicating how that water cycle

manifests itself with us and our societies and our economies.

The next slide. Just to give you one (1) example, here's a situation in Southern Manitoba where you can take a small increase in precipitation. But depending on when that precipitation occurs and where it occurs, it can translate into a very large change in runoff. So the runoff is a function of the landscape in which the precipitation is received, how that's been manipulated and managed, and what time of year that moisture makes itself available to that surface.

The next slide. Of course, Manitoba Hydro is directly involved with this because it is affected by aspects of a change in climate, both from the perspective of variability and change. One (1) of the key benefits of our hydroelectric system in Manitoba is the large watershed over which it derives its water so that you can average out some of the variability in space and in time.

But, of course, it's also susceptible to a number of other things that are associated with this; in particular, extreme weather events and the impacts it would have on built infrastructure that's associated with the hydroelectric infrastructure that we have here

in the Province.

The next slide. Of course, agriculture is also not immune to such a thing. You can imagine, given a number of presentations over the years to farmers and farm groups here in Southern Manitoba -- and they are a group of people that I find are actually quite tuned into climate because their livelihood relies on it. They pay attention to what goes on with the water cycle. They pay attention to what goes on with the temperature cycle.

And the idea that agriculture is going to be affected positively or negatively is very much up in the air scientifically. There's a number of potential impacts on the negative side, with increased insect infestations, crop damages, problems with reliable weather forecasts, soil erosion, weed growth, things like that.

There are also positive impacts. With more CO2 in the atmosphere, you're seeing a potential for increased productivity, longer growing seasons, the idea that warmer temperatures are going to be of assistance to that, and potentially decreased soil moisture stress depending on what kind of soils you talk about in our Manitoba landscape.

The next slide. Another key thing

that's happening with disasters, of course, is what's happening with the frequency of natural disasters and the cost of these natural disasters. There was just a conference recently held by the Centre for Catastrophic Loss Reduction and the University of Waterloo, where they were looking at the impacts of climate-induced disasters on our economy. And all signs are pointing to the same thing. We're getting an increase in the number of natural disasters worldwide, and we're getting an increase in the cost of those disasters.

So if you go to the next slide, that shows the accumulated cost of these natural disasters. Now, these natural disasters are associated with our inability to predict what's happening with the variability in the climate system and how that superimposes itself upon the built infrastructure that we live in and how that translates into economic costs for us as a society.

The next slide. So one (1) of the things that bothers me a little bit is that this is the fifth intergovernmental panel on climate change assessment report. There is now overwhelming evidence that our climate is warming. We're seeing increased variability. There are some organizations that are starting to pay attention to this and start to plan for

the future for it, and there are other organizations that are not. And by 'organizations', I mean everything from public companies to private companies to governments.

When you look at this graph that came of the IPCC assessment report, the different colours are interpreted this way. So if you look at the Arctic, that blue band that's there, that's what should be going on in the Arctic in terms of sea ice if there was no anthropogenic influence, if there was no influence by increased CO2 in the atmosphere.

The kind of orange-pinkish colour is one where it's been modelled with those effects in place. And then the red line is what we're actually seeing.

So if you go to the North American one to the left, this is a terrestrial response now. So if the terrestrial environment was not being impacted by human-induced CO2, that blue shaded area would be what we would expect to find. The sort of pink/orange shaded area is with CO2 accounted for. And then the actual observations of temperature change in black.

You just need to let your eyes wander over those for the entire planet and you'll see a very consistent story being told by those small, little graphs. Those small little graphs tell us that if we

don't account for human-induced CO2 in the atmosphere and we just have our environments move forward unaffected by our own human activities, we would expect those blue shaded areas.

All of our observations though show that all of these areas are changing and they're all changing by what we see with those black lines. Those black lines overlap with all of the pink areas, which are model projections of what should be happening to our climate system given a CO2 enhanced atmosphere.

So with that, I would take the last slide, which is basically just close this off. And I just wanted to come to reenforce the fact that I'm a scientist who's at the front edge of climate change. I'm at the front edge in the sense I'm in the Arctic working on sea ice and I see these impacts every day. The connections between what we're seeing in the Arctic and what we're seeing at the temperate parts of the planet are not an esoteric exercise. They're very real.

They are going to make, and they will continue to make, a change in how we unfold the society that we have in front of us and the economic decisions we have to make for the next ten (10) years, twenty (20) years, thirty (30) years, fifty (50) years.

My job is an easy one. I have to understand the physics of how the natural system works. Your job is the complex one. You've got to decide how we're going to move forward as a society when we make investments and how we're going to deal with these kind of things. So that was my purpose in coming here today. Thank you very much.

MR. RICHARD BEL: So the take away from the climate change with respect to the dams is --

DR. DAVID BARBER: Well, I think from my perspective the -- oh, not too close to the microphone she says. My perspective is that people talk a lot about the cost of energy to drive our societies. One (1) of the things we don't put a cost onto is how much greenhouse gasses we're putting into the atmosphere.

If you were to put a coal powered plant here in Manitoba instead of use hydroelectric power, you'd be making a very serious mistake. If you were to put a natural gas plant here instead of a hydroelectric plant, you'd be making a very serious mistake, because these have real costs into the future and what the contributions of these greenhouse gasses are to the atmosphere. We happen to have one (1) of the more green forms of energy in our province.

And from my perspective, this is an extremely important thing as we look about to move forward, because we're going to have to get ourselves off these fossil fuels. We cannot keep this rate going. We're going to be -- well, we're already starting to see the impacts, but those impacts are going to get larger, and larger, and larger. So what I'd like to see is a preservation and an expansion of our hydroelectric capabilities, because they're the least impactful of the different kinds of major systems that we can have to power our economies. That's the relationship, yeah.

DR. HUGH GRANT: Just curious to know if you've looked at the hydrology record at all, because one (1) of the interesting thing that -- thing that's come out is the -- I think the description was we've been fairly wet here in the last twenty (20) years or so.

Have you -- is there any pattern, have you seen?

DR. DAVID BARBER: Yeah, there is. There's -- there's -- the hydrological part of the climate change thing is the more complicated part. The temperature is the simpler part. Modelling and projecting the hydrological cycle is difficult. Now,

it's getting better. The models are getting better. We can use what we call paleoclimate records to look at, you know, wet cycles and dry cycles. We can look at teleconnections. And some of the models now are getting these teleconnections quite good.

You can actually see that, you know, an ENSO event is going to drive a certain climate pattern which includes the hydrological cycle over North America. And so the variability that's associated with this, the climate models we have now, the best ones we have all tell us the same thing.

As we increase the variability, we can expect an increase in variability of these hydrologic events. That means increased probability of droughts, increased probability of floods. But it really depends on how those interface with the landscape. Like our landscape is managed when it comes to water. We manage it, right. Manitoba Hydro manages it, essentially. And so that can be a positive things, or it can be a negative thing, depending on how the interpretation of that is done by the regulatory agencies and how you regulate that watershed system.

When you think about it from an agricultural perspective, if you happen to be sitting underneath, like that graph I showed you, or the

diagram of the planet where you have these little blobs of temperature change, you also have those little blobs of precipitation change. If you happen to sit under two (2) of them, you're under a drought if it's dry; you're under a flood if it's wet. And it depends where you're receiving it from. So it's very complicated to get people to understand the variability in the precipitation.

I also threw that other graph in there to kind of show you the difference between precipitation and runoff. Just because you're getting a lot of precipitation doesn't necessarily mean it translates into runoff. If you put it in right after you've had a dry spell and the soil is able to absorb a lot of it, a lot of it goes into the soil. If you put it in the fall when the ground just starts to freeze, you put it in on top and it all runs off into the watershed. So precipitation and runoff are very different things.

The uncertainty associated with those are high, but the reality of it is, a lot of our requirements as a society are driven by water and what we do with water and how we manage it.

THE CHAIRPERSON: I think -- thank you very much, Dr. -- Professor Barber. We have limited

time available. A very interesting topic. And I want to thank you for taking the time and trouble to prepare your presentation and come to talk to us. I thank you very much. Also for accommodating us in our schedule. I know you waited for us, so thank you very much. Appreciate that.

DR. DAVID BARBER: My pleasure.

THE CHAIRPERSON: Thanks much. Have a good balance of the day. With that, I think we will resume the regular proceedings.

MR. SVEN HOMBACH: Yes, Mr. Chairman. If we can stand down for two (2) minutes we can get the witnesses back into position.

--- Upon recessing at 1:24 p.m.

--- Upon resuming at 1:28 p.m.

THE CHAIRPERSON: Is it your intention to acknowledge some documents immediately, or...

(BRIEF PAUSE)

MS. PATTI RAMAGE: She's right. It's not on. In an attempt not to disrupt the proceedings I was going to suggest let Ms. Saunders go, and then I'll

come on the mic and do everything. Ms. -- Mr. Wojczynski can speak to the exhibits and then we'll begin our cross.

THE CHAIRPERSON: Thank you for that. So without further ado, Ms. Saunders, please, on behalf of the Manitoba Metis Federation.

GAC LOAD FORECASTING, FUEL SWITCHING, WIND PANEL, RESUMED:

PAUL CHERNICK, Resumed (Qual.)

WESLEY STEVENS, Resumed (Qual.)

CROSS-EXAMINATION BY MS. JESSICA SAUNDERS:

MS. JESSICA SAUNDERS: Thank you, Mr. Chair. So thank you for your presentations this morning, Mr. Stevens and Mr. Chernick. As the Chair said, I represent the Manitoba Metis Federation. And we filed evidence on the socioeconomic implications of additional wind resources. We have a few questions for Mr. Stevens on his presentation on wind.

Mr. Stevens, you're aware in the NFAT filing that Manitoba Hydro has indicated that other resources not specified as being included in the PDP may well be added, and Hydro provides customer self-generation, wind, biomass, solar, and additional

enhancement of existing Manitoba Hydro generation as examples.

Are you aware of that?

MR. WESLEY STEVENS: Yes.

MS. JESSICA SAUNDERS: And, so based on your review of Manitoba Hydro's assumptions on the cost of wind generation and Manitoba Hydro's consideration of the plans that include wind, what is your view of Manitoba Hydro's statement that they may well consider adding wind in the future?

MR. WESLEY STEVENS: It's my view that wind at least -- that wind at least should -- should receive more consideration in a long-term planning process. It should not just be something that might be added later. But in considering whether and when to make very large investments, very large long -- long-term investments such as Keeyask and Conawapa, that you should from the beginning take a very serious look at wind and how that could fit in, either instead of or in addition to either replacing or enhancing those investments.

MS. JESSICA SAUNDERS: Thank you. And in response to questions from the Chair on the cost of wind in Canada versus other jurisdictions, did I hear correct in that you said that research on the subject

would comprise a certain percentage of overall project costs?

And was it 5 percent, or so?

MR. WESLEY STEVENS: I'm not sure what you're referring to in regard to Canadian versus US costs. I -- I didn't really have a conclusion.

MS. JESSICA SAUNDERS: Okay.

MR. WESLEY STEVENS: I did say 5 percent, but that was in connection with the construction schedule.

MS. JESSICA SAUNDERS: Construction schedule.

MR. WESLEY STEVENS: In a three (3) year -- in a three (3) year construction schedule about 5 percent would be sent -- would be spent in the first year, three (3) years before commercial operation day.

MS. JESSICA SAUNDERS: Okay. Thank you for clarifying that. What I will ask you, I -- I just want to get a sense of timing and further study that may be involved in some of the matters you spoke to in your presentation.

So in slide 13 of your presentation, you indicate that it may be possible to pair wind with either existing or new hydro to serve export markets, and that this has not been adequately studied, correct?

MR. WESLEY STEVENS: That's what that -- yes.

MS. JESSICA SAUNDERS: I'm wondering if you could give us an estimate as to the timing and cost of the research that would be involved in order to adequately look into that?

MR. WESLEY STEVENS: That's something that Manitoba Hydro is in the best position to do.

MS. JESSICA SAUNDERS: M-hm.

MR. WESLEY STEVENS: They have -- they have models that -- that would do that. I -- it would be a fairly major undertaking.

MS. JESSICA SAUNDERS: M-hm.

MR. WESLEY STEVENS: I don't know how long it would take. At a guess, more than a month, less than a year.

MS. JESSICA SAUNDERS: And I guess why I was asking for some comments on you was just based on your view of the costs that have been provided in the current filing, just any comments that you may have based on the information that you've reviewed that's currently available for -- for wind costs and such and -- and what, if anything, you think would be required to give it more serious consideration.

That -- that was all I was asking for.

MR. WESLEY STEVENS: Are you asking now about the capital cost of installing wind or about the integration of wind -- of -- of wind and hydro?

MS. JESSICA SAUNDERS: The integration of wind and hydro and how seriously that's been considered and how -- how much, say, research and time would be needed in order to -- to look further into that?

MR. WESLEY STEVENS: I can't really give you a good estimate partly because that would be -- that's not something that I or my firm could do. We don't have the models. It's a study. It's not -- you're not building something, so it's -- it's not a huge amount of money. But it -- it would -- it would take some, you know, I would say months -- a few months to -- to look at seriously.

MS. JESSICA SAUNDERS: Okay. And that was -- that was all I was asking. Thank you very much. Those are all my questions.

THE CHAIRPERSON: Thank you, Ms. Saunders.

Me. Monnin, any questions on behalf of the independent consultants?

MR. CHRISTIAN MONNIN: Merci, M. President. We have no questions. Thank you.

THE CHAIRPERSON: Merci, Me. Monnin.

Ms. Ramage, please.

MR. SVEN HOMBACH: We seem to be waiting for Ms. Ramage, so.

(BRIEF PAUSE)

THE CHAIRPERSON: Sorry, I overlooked Mr. Orle. I didn't realize you were there, Mr. Orle. Do you have any questions for these witnesses?

MR. GEORGE ORLE: Thank you, Mr. Chair. No, I don't have any questions at all.

THE CHAIRPERSON: Thank you for that.

(BRIEF PAUSE)

MS. PATTI RAMAGE: I think it -- yes, it's on. Prior to Ms. Saunders, Manitoba Hydro handed out three (3) documents. The first one is its book of documents for its cross-examination of this panel. And that should be noted as Manitoba Hydro Exhibit 189.

--- EXHIBIT NO. MH-189: Book of documents

MS. PATTI RAMAGE: The second is

Manitoba Hydro's response -- well, the second and third, actually, are Manitoba Hydro's response to GAC's pre-asks of Manitoba Hydro. And the first of those, which is headed, "April 25th GAC Pre-ask of Manitoba Hydro Question 4b," that should be marked as Exhibit 190. It is a two (2) page document.

--- EXHIBIT NO. MH-190: Response to GAC Pre-ask 4b

MS. PATTI RAMAGE: And then the second Manitoba Hydro Exhibit, number 191, is an overview of climate change impacts and what it means to Manitoba.

--- EXHIBIT NO. MH-191: Overview of climate change impacts and what it means to Manitoba

MS. PATTI RAMAGE: And so those are the documents we filed. And I think Mr. Wojczynski was going to explain the documents before I commence the cross-examination.

MR. ED WOJCZYNSKI: Yes. First of all, Exhibit 190 is a second half of the response to the GAC pre-ask related to taking the externality value of CO2 and applying it to the plan evaluations. We had

provided an exhibit earlier. And they had asked us also to add it to the exhibit -- previous Exhibit 171.

So if you'd turn to page 3, that's what we did. Similarly to the other exhibit, where you have the market, the dark blue is the market evaluation. If you -- and then the light blue is the embedded ROE. And then we have the provincial transfers. That -- that would be the top set where we're looking at Plans 1, 2, 5, and 14.

And if you go to the next set of bars, that's exactly the same plans and evaluations, except what we've done is added in the cost of CO2 or -- or greenhouse gas emissions on the assumption that the province instituted or the federal government instituted some sort of -- of capital -- of CO2 tax or charge or something where any emissions emitted had to go into some sort of mitigation fund or some such arrangements. And this was the request from GAC.

And in effect what that becomes is part of the market evaluation. It's no longer an externality. What happens, you internalize the externality, and that's a little bit like BC. BC has a -- a carbon tax. Alberta has a -- has a partial carbon tax if you go above a certain limit. So there -- those kind of things are being instituted on a provincial

basis.

So as per GAC's request we took the values that have been used in Chapter 13 from the EPA as estimates of externality costs for greenhouse gas emissions and then applied them to emissions in Manitoba, not ones in the US. And if you see what it does then compared to the All Gas, it takes the market evaluation and in the case of Keeyask Gas increases its benefit on an NPV basis by around 200 million; and then Keeyask Gas around 400 million. And then the Preferred Plan, Keeyask/Conawapa, around 500 million. Those are very approximate numbers, but just to give an indication of how the significance of that compared to the other numbers we've been dealing with.

So that was Exhibit 190. The other Exhibit 191 is related to this, and that was that GAC had a pre-ask on us providing a compendium or collection of -- of scientific literature on the impacts of climate change on Manitoba. Not globally, but on Manitoba. This actually -- we timed this a little bit to -- to suit the presentation that you just heard. Obviously, they're strongly connected.

And I'm not going to go through this whole thing. I will start by saying the reference, the scientific references are all in this compendium that

Kristina Koenig had prepared with a whole bunch of others. If anybody -- if anybody wants to peruse it or a copy, we can make that. We didn't think we would suggest you read it over the weekend.

But what I -- if I could just very briefly highlight if you turn to page 1 of the summary, which is the exhibit we handed out. And I won't repeat -- go through it all. And it's got some more detail in there.

But I'll just highlight that if you go to the third bullet, we're talking about the health and well-being of Manitoba's freshwater ecosystems, and the fish communities, their population size range and diversity are being and will be affected. A -- a loss of habitat for cold water fish species, northward expansion of warm water species. These things are already happening and going to be more extreme.

The permafrost is melting. The winter roads in northern communities are being affected. Caribou are being affected by climate change and that will increase. Polar bears, everybody's heard about polar bears in the Arctic, so I can't not mention them. Migratory birds, including endangered species, are being affected.

Agriculture is positive and negative.

You've heard that. Forest fires; West Nile virus is spreading in Manitoba as well as elsewhere. And the First Nation people are already adapting to various forms of climate change, but that will increase.

And I'll just -- one (1) more reference out of here on page 4. There's the Lake Winnipeg Consort -- Foundation who are very concerned about Lake Winnipeg and what's happening there. And they have a -- a position statement that global climate warming is -- is impacting the Lake Winnipeg system. And if you turn the page over:

> "Increasing water temperatures are contributing to the proliferation of toxic blue-green algae and to invertebrate species changes which ultimately influence the Winnipeg -- Lake Winnipeg fish community, et cetera."

So these are climate changes, a Manitoba issue. And last night while I was reading The Globe, I can't but help not mention this. There was an article -- there was a series of articles on climate change being put out by The Globe. And they're quoting some scientific papers that say that:

> "Climate change is a health threat no

less consequential than cigarette smoking."

Which surprised me. And they're relating it to asthma, and allergies, and things. And the other -- last comment I'll make before getting off the mic is that Dr. Oliphant noted that:

"The most vulnerable Canadians, including families on low incomes and many Aboriginal people, those that are more likely to live closer to industrial areas, highways, or forest that could be swept by fire, are currently feeling the effects the most."

And that's from The Globe on -- actually, on Tuesday. Thank you.

THE CHAIRPERSON: Thank you for that information. I -- I'm having a tough time in my mind reconciling what I heard from the expert from Quebec regarding the consideration of hydrological change flowing from the perceived climate change. Remember that evidence? He indicated that it was too uncertain to be able to say that there would be definitive hydrological changes that need to be considered as part of the PDP.

I'm having trouble reconciling what that individual said to what I'm reading here. And so...

MR. ED WOJCZYNSKI: I could comment briefly, but perhaps we need to provide a more full explanation, but -- and we -- and we will do that. But I -- I -- let me give a preliminary answer, not being an -- an expert on this, but certainly as being an -- an area being in -- of much interest. And I -- I don't think I mentioned this before, but I have presented to United Nations meetings on climate change and -- and how to deal with GHG management, so this has been a particular topic of interest to me.

The -- in the modelling, there was some indication of the possibility of increased runoff, but there is not enough indication to definitively say, and I -- on -- on how much increase there might be and whether -- what degree of certainty we have on that. But the other part is will there be increased droughts or not compared to what we're looking at.

I think there's a general trend in the climate change science if they say there'll be greater variability, for example, in precipitation. But as Dr. Barber just said, precipitation and runoff aren't the same thing. They're -- the soil and the water system mitigates some of that.

So whether or not the droughts will be worse or the floods will be worse, it's distinctly a directional tendency, but right now, the models don't have enough certainty to say that is what will happen or not. It's not that the models are saying it won't happen.

It's saying that the -- the -- I'm now looking at Kristina to see if I'm -- okay, she's nodding, yes. It's that the models are not saying that won't happen. They're saying the models right now, to the degree they can model these things and a degree there's enough information, they can't definitely conclude that it will go in that direction.

THE CHAIRPERSON: Thank you for that. I guess we're ready to proceed with the cross from Manitoba Hydro.

CROSS-EXAMINATION BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: Thank you. I'm going to begin the cross at the end, Mr. Chernick. If I could have you turn to slide 25 of your presentation this morning. The savings referenced in slide 25 begin at .6 percent and ramp up to 1.5 percent annually.

Would I be correct that that would include, in order to achieve those savings, a

combination of program savings, fuel switching for electric heat and hot water, and the potential for non-program savings, as well as conservation rates?

Would that be the combined effect of those?

MR. PAUL CHERNICK: No. That -- that would just be program savings. And fuel switching might -- some of the fuel switching activities might be programs.

MS. PATTI RAMAGE: I'm sorry, could you repeat that -- those?

MR. PAUL CHERNICK: Some of the fuel switching might be included in the efficiency programs where you're providing incentives or other support that cause specific customers to switch or to choose gas over electric. This would not include codes and standards. It would not include rate design, encouraging customers to generate some of their own power.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Are you aware that Manitoba Hydro has filed information on three (3) levels of enhanced DSM?

MR. PAUL CHERNICK: Yes, I am.

MS. PATTI RAMAGE: Okay. And if I could get you to turn to page 31 of Manitoba Hydro's rebuttal evidence, which we've provided at Tab 2, page 7, of the book of documents.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Okay. The chart at the top of the page summarizes the savings projected under each of the three (3) levels of DSM. And we can see here that including the non-program savings, such as codes and standards, that the ten (10) year average savings as a percentage of sales is 1.3 percent for Level 2 and 1.5 percent for Level 3.

Do you see that?

MR. PAUL CHERNICK: Yes, that's what's shown at the top of the page.

MS. PATTI RAMAGE: And these Manitoba Hydro projected savings are quite different than the .3 percent referenced in slide 25 of your presentation, correct?

MR. PAUL CHERNICK: That's correct. These include codes and standards implemented by the province, not by Manitoba Hydro. They include load

reductions assumed to occur from rate designs yet to be developed and that other utilities do not include in part of the -- as part of their conservation savings, as their energy efficiency savings. And it includes non-utility generation, which is also not generally considered to be a -- an efficiency program.

MS. PATTI RAMAGE: They also include fuel switching, correct?

MR. PAUL CHERNICK: And it includes fuel switching. As -- as I said when I referenced the -- the point three (.3), that some of that fuel switching may be in the form of programs, but so far the Company is only talking about informational programs and has only implemented informational programs, and it's not clear exactly what the company has in mind for the future.

MS. PATTI RAMAGE: Now, you'd agree that DSM savings are generally built up year by year, correct?

MR. RICHARD BEL: Could I ask a point of clarification? You mentioned non-hydro generation?

MR. PAUL CHERNICK: Non-utility generation.

MR. RICHARD BEL: Non-utility. What did you mean by that?

MR. PAUL CHERNICK: The -- under load displacement, the -- the Company is including a -- a slice of -- of energy that they apparently believe they can get from encouraging customers to generate their own electricity to meet some of their own load; to not sell to Hydro -- to Manitoba Hydro, as I understand it, but to -- to displace loads, to -- to serve loads that otherwise would be served by Hydro.

MR. RICHARD BEL: Thank you.

(BRIEF PAUSE)

CONTINUED BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: Okay. So we've agreed that DSM savings are generally built up year by year.

Would you agree there is inevitably a degree of uncertainty as to whether those savings will be realized every year as projected?

MR. PAUL CHERNICK: Yes, programs under perform and over perform depending on a number of factors. The -- the skill of the utilities and its contractors in recruiting trade allies into a program, for example, getting the -- the developers, the builders, the plumbers to participate, that can go

faster or slower than you thought.

The -- the market size, a program for new construction, for example, will not have much in the way of savings in a -- a real estate downturn when there's not much new construction, and it may then boom a couple years later when building catches up again.

And then there are other factors such as weather. If you have a really nasty, snowy winter, then the insulation trucks may have a harder time getting around to -- to do their work. There are all kinds of factors that can cause you to -- to spend more or less and -- and save more or less then expected the year before.

MS. PATTI RAMAGE: So if I could have you turn to Tab 3, page 11 of the book of documents.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Here we have provided an excerpt from Manitoba -- Manitoba's Clean Energy Strategy. And if you look at page 40, which is page 11 of the book of documents, and you look at the third paragraph down on the right-hand side of the page, there is a statement, and I quote:

"Nonetheless, for most Manitobans the

opportunity to move from conventional fossil fuel use to clean energy, and even on to fossil freedom, is increasingly a reality."

Do you see that?

MR. PAUL CHERNICK: Yes.

MS. PATTI RAMAGE: And then if we go back one (1) page in the Clean Energy Strategy to page 39, you'll see that this section -- which discusses freedom from fossil fuels. And on the -- if you look at the right hand side of the page, there it says:

"These Manitobans will achieve fossil fuel freedom through a simple three (3) step process. And one of the steps, steps number 2, is that heat will be provided for thousands of Manitobans through clean, renewable energy systems which eliminate the need for fossil fuels like natural gas."

Do you see that paragraph number 2?

MR. PAUL CHERNICK: I do.

MS. PATTI RAMAGE: And you're aware that the fifteen (15) year supplemental report to the 2014 to '17 Power Smart Plan, which is Manitoba Hydro

Exhibit 180, includes fuel switching in the fifteen (15) year plan?

MR. PAUL CHERNICK: I believe it's discussed in there. I haven't looked at it since yesterday, so I'm not quite sure.

MS. PATTI RAMAGE: You accept, subject to check?

MR. PAUL CHERNICK: I believe it is, yes.

MS. PATTI RAMAGE: And you'd acknowledge then there's a potential that some of the programs in that plan may ultimately not be approved or even cancelled at a later date?

MR. PAUL CHERNICK: Well, it's -- for a number of -- of the line items in the tables at the end of the -- or -- or on page 56 of the Exhibit 180, there are -- they represent programs or initiatives that either haven't been formulated or that the Company's talking about changing dramatically and would have to be approved by the Board. And therefore, they're all subject to uncertainty.

MS. PATTI RAMAGE: And I think -- I'll clarify for you -- it may help -- that pursuant to the Energy Savings Act, Manitoba Hydro must, in consultation with its minister, not the Board, prep --

prepare an energy efficiency plan. So the same party who has written the Clean Energy Strategy is a the party who -- who Manitoba Hydro consults with in preparing its -- its DSM plan.

And that was -- given that, do you see that there the is the potential that some of the programs might not ultimately go forward?

MR. PAUL CHERNICK: Well, I would certainly hope that Manitoba Hydro would be able to explain to the minister the -- the benefits of using the high-quality electricity to displace more gas in the US and to make Manitoba more money, rather than using it for a low value, low carbon offsetting purpose of -- of reducing gas heating in the province.

But if the -- if Manitoba Hydro cannot explain that and is precluded by law from implementing a program that is not approved by the minister, then that would be an obstacle to pursuing least-cost planning.

MS. PATTI RAMAGE: If we could move to page 12 in the book of documents, here we have Manitoba Hydro Exhibit 95, which was part of Manitoba Hydro's direct evidence. It's slide 129. And it deals with the economics of the various levels of DSM.

Have you had the opportunity to review

this slide before?

MR. PAUL CHERNICK: I -- I have gone through this -- this pack, so I guess I have looked at this.

MS. PATTI RAMAGE: We'll just walk through it quickly.

MR. PAUL CHERNICK: And I -- I do -- I understand how it's laid out.

MS. PATTI RAMAGE: You'd agree then when we move from base DSM to Level 1 DSM, incremental NPV increases for each of the three (3) plans shown? For example, in the All Gas Plan, the NPV increases by 535 million, it increases 497 million for the Keeyask/Gas/750 line, and by 285 million for the Preferred Development Plan? That's --

MR. PAUL CHERNICK: Yes, I --

MS. PATTI RAMAGE: Okay.

MR. PAUL CHERNICK: -- those are the numbers that Manitoba Hydro put in there.

MS. PATTI RAMAGE: Right. And similarly, when we move from Level 1 DSM to Level 2, you see a positive NPV effect for each of the plans, correct?

MR. PAUL CHERNICK: Yes.

MS. PATTI RAMAGE: And the analysis

then goes on to demonstrate when you move from Level 2 DSM to Level 3, it does not result in a positive NPV impact for any of the plans. It's negative 49 million for the All Gas Plan, negative 86 million for the Keeyask/Gas/750 line, and negative 102 million for the Preferred Development Plan?

You see that?

MR. PAUL CHERNICK: Yes. That's Manitoba Hydro's conclusions based on their assumptions about the -- the programs and the avoided costs.

MS. PATTI RAMAGE: And so based on Manitoba Hydro's conclusions, it -- one would -- if -- if one adopts those conclusions, it would indicate that DSM Level 2 provides the greatest benefit --

MR. PAUL CHERNICK: Well, given only these choices of -- of bundles and without relaxing Manitoba Hydro's constraints based on rate impacts and whatever other limitations have been put on DSM at the -- within Level 1, that would be the case.

MS. PATTI RAMAGE: What rate impacts are you referring to?

MR. PAUL CHERNICK: Basically, the -- the Company takes the position that it's appropriate to pursue all DSM that passes the RIM test, but anything that doesn't pass the RIM test is subject to an

undefined and undocumented truncation limitation reduction because of the fear of raising rates even though you're lowering bills.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Chernick, I'm advised that there's no rate impacts considered in this analysis. So would that change --

MR. PAUL CHERNICK: Oh, not in this analysis.

MS. PATTI RAMAGE: -- your conclusion?

MR. PAUL CHERNICK: This -- there's -- it's not in this analysis because it's all done at earlier stages, when you decide what you'll put into the programs in Level 1. The Company's explanation is that they look at the -- the rate effects and other things which are very difficult to understand exactly what they are, and comes up with the portfolio.

And it's not intended to be everything that's cost effective under the TRC. It's everything that's cost effective under the RIM to the extent that the RIM is a cost-effectiveness test, and it's in some of the other things.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Chernick, I'm advised that there was no RIM test applied to this information; that it -- that unlike, perhaps, past materials you've seen, this has been done based solely on TRC. So with -- I'm asking you to either accept that subject to teck -- check, or provide us with the analysis that supports the position you are making, or identify where in the record that that information -- you're deriving that information from.

MR. PAUL CHERNICK: Okay. If we're going to be taking an afternoon break at some point, perhaps I could go through the documents then rather than holding us up right now to find the Company's explanation of its use of the RIM test.

MS. PATTI RAMAGE: Okay. That'll be fine, and then we'll determine if we need to look at this any further. If I could have you to turn to page 13 in the book of documents. And that is Manitoba Hydro a hundred -- Exhibit 156. And this is where Manitoba Hydro assumed flat load beyond 2022/'23. I don't think the right -- this should be tab -- this should be page 13. Oh, it's there now? Okay.

We assume flat load. And we compared

the NPVs of a Keeyask with a 750 Line Plan with a No New Generation Plan.

And if you turn the page to page 14, would you accept that the analysis demonstrates the incremental NPV of the Keeyask/750 Line Plan is $402 million superior to the No New Generation case?

MR. PAUL CHERNICK: Yes.

MS. PATTI RAMAGE: And if you accept that evidence, you would agree that there is a sound case for proceeding with Keeyask, despite your concerns regarding alleged untapped potential of DSM.

Would you agree?

MR. PAUL CHERNICK: Well, actually, I -- I think in -- in my initial presentation I pointed out that adding additional resources, wind and/or Keeyask, might make sense based on the -- the potential for export revenues even without load growth.

This particular case does include load growth through 2022/'23, so it's only part of the way towards what I think we could achieve. But it certainly is possible that if -- even if you did that, that you would find that the export opportunities and the -- the benefits of the transmission interconnection would -- would justify their cost, even without any domestic need for the -- the generation.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Mr. Chernick, this morning you spoke of some of the unique opportunities Manitoba Hydro has because of its ownership of Centra Gas. And I'm not sure if you are aware, but my co-counsel, Ms. Boyd, and I are the survivors of a number of PUB hearings over the last decade and a half where the primary topic was putting measures in place to prevent cross-subsidization as between gas and electric customers.

So would you accept that your recommendations to using electric benefits to create incentives for the gas side of the business would require a fundamental shift in the thinking with respect to the treatment of gas and electric costs in this province?

MR. PAUL CHERNICK: I don't believe so. The -- I'm sure the Board would not be happy if -- if Manitoba Hydro were paying some of the -- the overhead costs for a plumbing supply firm just because there was some kind of business connection between them. But if you're buying a service from that plumbing supply firm to -- for one (1) of your conservation programs, then that's a perfectly reasonable and -- and laudable

business expense.

In the same way, I -- I don't think it would be appropriate to increase total costs for electric customers to lower costs for gas customers. But as the Company's own analysis has found, moving electric loads over to gas or preventing new loads from winding up on electricity rather than gas would make the electric customers better off. It would make the individual consumer better off. It would make the gas consumers better off. It's a win/win/win.

So you want to make sure that you do it in some fair manner, something that would be reasonable if you didn't have a business link. Unfortunately, a lot of places where the electric and gas utilities are separately owned, and -- and even some places where they're jointly owned, there's a great deal of competition between them, which makes it hard for them to work together even where it's in both of their interests.

I would hope that Manitoba Hydro would be able to overcome any institutional barriers there and -- and work for the common benefit of the consumers of both electricity and gas.

(BRIEF PAUSE)

MS. PATTI RAMAGE: I'm now going to change topics and move to the topic of wind. Mr. Stevens, you'd agree that both capital costs and capacity factors are important to -- or capacity factor are important factors in deriving the overall cost of wind?

Is that correct?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: And if I could have you turn to Tab 2, page 8, of the book of documents.

(BRIEF PAUSE)

MS. PATTI RAMAGE: You see here there are seven (7) sites identified in the -- or I should start by saying that this is page 63 of Manitoba Hydro's rebuttal evidence.

Did you have a chance to review the rebuttal evidence?

MR. WESLEY STEVENS: Yes, I did.

MS. PATTI RAMAGE: And you see in Table 2 in the middle of the page it's headed, "Average wind speed and capacity factors." It's seven (7) sites. And it's St. Leon/Darlington -- Darlingford area.

Can you confirm, to the best of your

knowledge, this is Manitoba specific information?

MR. WESLEY STEVENS: This certainly looks like Manitoba specific information.

MS. PATTI RAMAGE: And there are seven (7) sites identified in the first column of that table, correct?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: And the second column of the table shows the average wind speed at 80 metres, measured in metres per second, correct?

MR. WESLEY STEVENS: As -- as reported in a study by Helimax, I believe, which was dated 2008, yes.

MS. PATTI RAMAGE: And the third column provides capacity factors for two (2) different sized 80 metre wind turbines installed at each site, correct?

MR. WESLEY STEVENS: Yes. Again, as based on a study by Helimax in 2008.

MS. PATTI RAMAGE: Site 1 has a capacity factor for the GE 1.5sle turbine of 37.4 percent and 36.1 percent for the MWT-95/2.4 turbine.

Do you see that?

MR. WESLEY STEVENS: I see that.

MS. PATTI RAMAGE: Site 6, by way of contrast, has corresponding factors of thirty point

seven (30.7) and twenty-nine point two (29.2) for the two (2) turbines?

MR. WESLEY STEVENS: I see that.

MS. PATTI RAMAGE: Okay. So is it fair to say that for a given size turbine, the capacity factor varies across sites?

MR. WESLEY STEVENS: Certainly the same turbine at different sites will -- will produce different amounts.

MS. PATTI RAMAGE: All right. So what we would expect to see is that as the better sites are developed, we would expect a drop in the capacity factors, for example, these 80 metre turbines?

MR. WESLEY STEVENS: Holding everything else constant, yes.

MS. PATTI RAMAGE: And if hub heights were to remain at 80 metres, Manitoba Hydro's assumption of a constant capacity factor into the future in its NFAT analysis would result in effectively assuming an increase in capacity factor as less productive wind sites are developed, correct?

MR. WESLEY STEVENS: As less productive wind sites are -- are developed, it depends on -- on what scale we're talking about. If we're talking about the second -- or the third thousand megawatts, that

would certainly be true. If we're just talking about the next few hundred megawatts, that's -- that might not be true. It also depends on whether you're looking at a small area or a very large area.

MS. PATTI RAMAGE: Now, at page 4-2 of your report you raise the concern that --

MR. WESLEY STEVENS: Is there -- is there -- do you have that in the -- in the documents?

(BRIEF PAUSE)

MS. PATTI RAMAGE: I don't. It's been brought up here. It's -- it's not critical, because I was just going to -- to provide you some context where I'm going.

You raised the concern that Manitoba Hydro did not analyze any development plans that included both new wind generation and new intertie capacity?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: And what I wanted you to do then is to turn to page 54 in the book of documents.

MR. WESLEY STEVENS: Okay.

(BRIEF PAUSE)

MS. PATTI RAMAGE: And this is Manitoba Hydro's response to a -- a PUB Information Request. It's PUB/Manitoba Hydro First Round 26a Revised.

And I guess first off, have you reviewed this --

MR. WESLEY STEVENS: I have, yes.

MS. PATTI RAMAGE: -- Information Request before?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: Okay. The part I'd like to look at is on page 2, part C. And here it says:

> "New wind generation development in Manitoba would not enable the construction of new transmission for Manitoba's benefit in the US. As indicated in the MISO Wind Synergy Study, only new hydro generation provides dispatchable capacity and storage services which are needed in the MISO market to accommodate US wind integration. New Manitoba wind generation for export would

exacerbate the issues associated with developing US wind resources and would result in increased integration costs rather than lower costs. To the extent US utilities invest in new transmission for wind, it will be to support the development of local wind resources that qualify for RPS recognition."

So first off, I always ask, did I read it correctly?

MR. WESLEY STEVENS: Yes, you read it correctly.

MS. PATTI RAMAGE: Now, in terms of wind resources, would you agree that the states of Minnesota and North Dakota both have good wind resources of their own?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: And are you aware that Minnesota has 68 megawatts of wind under construction with a 2014 in service date and North Dakota has 205 megawatts, also with an in service date of 2014?

MR. WESLEY STEVENS: I'm not aware of the -- of the specific numbers. However, that -- those

numbers would not surprise me.

MS. PATTI RAMAGE: Okay. Would you accept also -- then subject to check that a further 213 megawatts of wind is in the advanced stages of development in Minnesota and 460 megawatts are in the advanced stage of development in North Dakota?

MR. WESLEY STEVENS: For the sake of argument, I would accept that. Those -- those numbers would not surprise me.

MS. PATTI RAMAGE: And those numbers would be in addition to the recent completion of 266 megawatts of wind constructed in Minnesota and 211 in North Dakota since 2012.

Would you accept that subject to check?

MR. WESLEY STEVENS: With the same proviso, yes.

MS. PATTI RAMAGE: All right. And then finally, would you accept subject to check that with these recent and upcoming additions, Minnesota will have 2,901 megawatts of wind by 2015, and North Dakota 1,808 megawatts in that same time frame?

MR. WESLEY STEVENS: Again, I -- I can't confirm those specific numbers. It's certainly my understanding that a substantial amount -- amounts of wind exist and are under construction in those

states.

MS. PATTI RAMAGE: So given those substantial amounts of -- that substantial amount of wind and the fact that export customers in Minnesota and North Dakota have access to their own wind resources, do you accept that it's highly unlikely that they're going to be interested in purchasing a wind-based product from Manitoba Hydro?

MR. WESLEY STEVENS: If by 'wind-based product' you mean having a contract with a -- with a wind farm in Manitoba under which they accept whatever -- whatever the output of that wind farm is at the time that it is generated by that wind farm, I -- I would certainly agree with that.

MS. PATTI RAMAGE: You'd agree that they -- it -- it's also highly unlikely they would support an interconnection to facilitate Manitoba Hydro generated wind, a supply of that into their region?

MR. WESLEY STEVENS: Again, if you're talking about exports of -- of electricity from -- directly from a wind plant as generated, I -- I don't see much benefit to -- to Minnesota -- Minnesota, Wisconsin, US states, of taking wind from Manitoba at the time generated.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Okay. Just to clarify, when you say, "the developer," what if the developer is Manitoba Hydro?

Does that change your answer?

MR. WESLEY STEVENS: No. I'm -- I'm talking about the -- the fact that wind -- wind exported on the variable basis. When -- when a megawatt hour of wind is generated in Manitoba, it's immediately exported. Whoever owns that, I don't see much benefit. It would -- it would only be if wind was working -- basically working to free up hydro generation in Manitoba.

MS. PATTI RAMAGE: So it would effectively have to be backed by hydro. Is that --

MR. WESLEY STEVENS: It would -- I would say it would effectively have to be integrated with hydro.

MS. PATTI RAMAGE: Okay.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Now, on slide 6 of your presentation, which is not in the book of

documents, you challenge Manitoba Hydro's practice as well as the practice of BC Hydro, the National Renewable Energy Laboratory, the International Renewable Agency, and Vestas of using a twenty (20) year life for evaluating wind. And in your materials you raise the term of Manitoba Hydro's wind farm contracts as part of the evidence for a longer term.

Can you confirm -- you haven't reviewed the terms and conditions of the St. Leon or St. Joseph purchase agreements.

Is that right?

MR. WESLEY STEVENS: That's right, I have not seen those contracts. I would in -- just regarding your question, Vestas -- with regards to Vestas, that was a reference to a warranty offered. That was not a recommendation of a -- of a term for evaluating wind projects. But -- but the others -- the other, I think it's, five (5) studies did use twenty (20) years for evaluating wind projects.

MS. PATTI RAMAGE: Can you provide any real operational examples of a turbine greater than 1 megawatt exceeding a twenty (20) year life?

MR. WESLEY STEVENS: My understanding is that the first turbine -- wind turbine greater than -- of greater than 1 megawatt was offered in 1996 or

1997. So there has been no chance for a wind project to -- of greater than 1 megawatt -- with turbines of greater than 1 megawatt to last for more than twenty (20) years. There simply hasn't been enough time.

However, there has been ample time to -- to monitor their performance, notice how they -- notice their failure rates and the cost of -- of repairs, and to come -- come to some conclusions about how long they're likely to last. And I would refer you to Jiminez, one of -- one of the NREL studies which again refers to -- unfortunately without referencing it, it's very frustrating -- refers to a research on actual wind farm operations and says that wind turbines typically last for twenty (20) to thirty (30) years.

MS. PATTI RAMAGE: And was I -- did I hear correctly that you grew up in Winnipeg?

MR. WESLEY STEVENS: I did.

MS. PATTI RAMAGE: So you're prepared to accept that it gets cold here?

MR. WESLEY STEVENS: It -- it has. Although, I have to say I live in Toronto now, and I like Winnipeg winters a lot more than I like Toronto winters. Toronto winters are miserable. Winnipeg winters are sunny and beautiful.

MS. PATTI RAMAGE: I like your style.

But with respect to our cold weather and recognizing you're not an engineer, would you acce -- accept that the impact of cold weather on a wind farm is brittle component failure due to microfracturing, especially under extremely cold conditions?

MR. WESLEY STEVENS: That certainly sounds reasonable. I -- I -- I can't -- I can't really spea -- speak to that. I have heard -- actually, I -- I can't -- I cannot to those specific words.

MS. PATTI RAMAGE: M-hm.

MR. WESLEY STEVENS: But I have in my investigations run across reference to special cold-weather packages for wind turbines, implying that some special measures may be -- may be advisable for particularly cold weather.

MS. PATTI RAMAGE: But you'd accept that cold weather would be a consideration in --

MR. WESLEY STEVENS: Absolute consideration. It's also -- as -- as I mentioned, it's also a consideration in that cold weather is denser and, therefore, has more energy content. But that may well be -- already taken into consideration in the studies of the capacity factors.

MS. PATTI RAMAGE: Just to make sure, you filed any analysis detailing the basis for your

extending of the life to twenty-five (25) years. Your evidence is based on comments of wind --

MR. PAUL CHERNICK: Wind developers.

MS. PATTI RAMAGE: -- wind developers. Right.

MR. WESLEY STEVENS: It's -- it's based on a -- on -- on these four (4) factors that I list, one of which is -- and, I -- I have to say, the most convincing one of which to me is conversations with -- with wind developers where I -- where I -- we -- it wasn't actually me. It was one of our -- one of our staff who talked to them, asked them questions which I had written out.

MS. PATTI RAMAGE: Okay. Those are the same people though who profit from building the wind and selling the wind?

MR. WESLEY STEVENS: They would be. I -- I have no reason to think that they were actually lying about -- lying in their answers.

MS. PATTI RAMAGE: Well, I wouldn't suggest that, but they -- they are motivated to promote wind development, correct?

MR. WESLEY STEVENS: Certainly, but they were -- and they were also very definitive about what they do.

MS. PATTI RAMAGE: In your presentation this morning, you also -- oh, we're slide 6, so that's perfect. You raised the concern that Manitoba Hydro provided a cost of four dollars and twenty-two cents ($4.22) and four dollars and ninety-nine cents ($4.99) per megawatt hour for wind integration cost.

MR. WESLEY STEVENS: That would-- yes, and that's a different slide.

MS. PATTI RAMAGE: Sorry, I wrote down slide 6 --

MR. WESLEY STEVENS: Okay.

MS. PATTI RAMAGE: -- I'm sorry, it's slide 8. There we go; there it's up now. I was only bringing it up to get us to the topics, so if I could now -- Diana, could you bring up Manitoba Exhibit 136? It's not in the book of documents.

(BRIEF PAUSE)

MS. PATTI RAMAGE: This -- Manitoba Hydro Exhibit 136 is a response to an undertaking.

Have you had the opportunity to review this before?

MR. WESLEY STEVENS: I have gone over this in some detail.

MS. PATTI RAMAGE: Okay, good. Well, if -- we will now again. If we look to the paragraph under the two (2) bullets which says:

> "It should be noted that the above costs are in 2005 dollars. As explained in Appendix 9.3, Section .1, these values are used in the calculation of wind integration costs for varying levels of wind development and are impacted by changing export prices over the detailed study period."

And under -- I'll ask, did I read it correctly?

MR. WESLEY STEVENS: Yes.

MR. WILLIAM GANGE: No. Section 1.7.

MS. PATTI RAMAGE: Did I not say 1.7?

MR. WILLIAM GANGE: You just said -- you just said section 1 -- that -- that -- just a tiny little mistake, Ms. Ramage, but I don't want you to be too much of a roll here.

MS. PATTI RAMAGE: Yeah. Be careful, Mr. Gange, or I'll -- I'll read the whole thing over again. We'll accept your correction.

CONTINUED BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: But now rather than reading it, would you agree the next paragraph says that:

"The wind integration costs represents an average cost over the detailed study period."

MR. WESLEY STEVENS: I have not had an opportunity to look at Manitoba Hydro's calculations. I agree that that's what Manitoba Hydro has -- has said in this undertaking. And it was clear from IR response to -- the response to IR-308 that they were using one (1) single number for the entire period. I don't know how they -- how good they calculated that, and in -- in particular I don't know whether it was calculated correctly.

MS. PATTI RAMAGE: You can see by the materials that are here that the four dollar and twenty-two cents ($4.22) per megawatt hour for the 500 megawatts of wind generation was in 2005 dollars, as was the four dollars and ninety-nine cents ($4.99) per megawatt hours for the thousand megawatts, also in 2005 dollars?

MR. WESLEY STEVENS: Yes, and I was wondering about that. There's a mention of 2005 US

dollars three (3) times on this page, and then 2012 Canadian dollars once. As -- as I understand it, the four-twenty-two (4.22) and four-ninety-nine (4.99) are, according to the 2005 study, are to be escalated based on elec -- electricity export prices, not based on inflation.

So it really made me wonder why there was this emphasis on 2005 dollars and 2012 dollars. And again, I would have to review their calculation to make sure that there wasn't -- there wasn't an application of, say, both inflation and price escalation. I don't know. I haven't reviewed it.

MS. PATTI RAMAGE: I'm advised that it's -- it's based on both, the -- the price -- the export price escalation and the -- and the change in dollars.

MR. WESLEY STEVENS: If that's true, then that would constitute double counting and would -- would be -- and could explain how you got to such a high number. But I -- I don't know.

(BRIEF PAUSE)

MS. PATTI RAMAGE: But if you do the forecast every year and recalculate, it's in the --

it's in the year of the current dollars, and therefore it's in both. So if you redo your forecast and you're working from a 2005 forecast, then if we move up to a 2012 forecast --

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: -- we're not going to be in 2005 dollars any more.

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: Does that make sense then?

MR. WESLEY STEVENS: Yes, that -- it could well be that Manitoba Hydro did the calculation correctly. I don't know. I cannot tell from the -- the words you've used have not -- have not inspired confidence in me that it was done correctly, but I don't know.

(BRIEF PAUSE)

MS. PATTI RAMAGE: And -- and based on the fact that we -- it's using the export price forecast, would you accept then, subject to check, that Manitoba Hydro used, as wind in -- as wind integration cost, an average for the thirty-five (35) year period of the price forecast?

MR. WESLEY STEVENS: I -- I can see from IRs -- from the LCA spreadsheet as response to IR-308 that they used some kind of average price.

MS. PATTI RAMAGE: Wind integration values would also be affected by the amount of wind on the system.

Is that correct?

MR. WESLEY STEVENS: When you -- certainly when you get to large quantities of wind, that's been the experience in -- in other jurisdictions. It depends on a number of factors. It's the proportion of wind to the system as a whole. It's whether the system is entirely thermal based or hydro based with costs in hydro-based systems being much lower than in thermal-based systems. A question of how integrated the system is with -- with other nearby systems, especially if those systems themselves have hydro.

MS. PATTI RAMAGE: Thank you for that, Mr. Stevens.

Mr. Chernick, back to you. I was only going to do this if I was moving along, and I've moved along quickly enough that I think the Board can handle my next question because it's a time consuming one (1) I'll say, but an entertaining one (1) at the same time.

If you turn to page 3 of the book of documents.

(BRIEF PAUSE)

MS. PATTI RAMAGE: And at page 3 you critique Manitoba Hydro's corporate heating website page. And in particular, if you look at the footnote at the bottom of the page, you say that -- that the video on that site simply explains geothermal heating.

Do you recall that evidence?

MR. PAUL CHERNICK: Yes.

MS. PATTI RAMAGE: Okay.

MR. PAUL CHERNICK: I wrote that.

MS. PATTI RAMAGE: And I have to tell the Board, I struggled with this one because I couldn't come up with a way of putting this information to you other than actually watching that short video. And I can tell the Board it's only about four (4) minutes long, but I -- I think it's worth seeing what's on that website. And I talked to Mr. Simonsen to see if he could bring it up. And if he could go to www.hydro.mb.ca.

Oh, he's already there. He's two (2) steps ahead of me.

(VIDEO PLAYED)

MS. PATTI RAMAGE: This didn't happen at my house.

(BRIEF PAUSE)

MS. PATTI RAMAGE: I -- I think we're probably close enough. The...

(VIDEO PLAYED)

MS. PATTI RAMAGE: I think we're done. Yes. So, Mr. Chernick --

MR. PAUL CHERNICK: That's a very nice video.

MS. PATTI RAMAGE: Is this the video -- this is the video on the web page under heating cost comparisons. Is this the video that you suggest --

MR. PAUL CHERNICK: This is not the video that I -- that I saw.

MS. PATTI RAMAGE: -- concerning geothermal systems?

MR. PAUL CHERNICK: The -- no, the -- the one (1) that -- that I got to was actually the same

website, but -- and under 'your_home/geothermal_heat_pumps/index.shtml'. And my apologies, I see that you do have a very nice informational video on the -- the benefits of -- of gas water heating and...

(BRIEF PAUSE)

MS. PATTI RAMAGE: Thank you, Mr. Chernick, and I'm glad you liked the video. It hurt my feelings that you thought it was --

MR. PAUL CHERNICK: I understand.

MS. PATTI RAMAGE: -- all about geothermal.

MR. PAUL CHERNICK: I'm very sorry. I -- I think for somebody of my age I do a pretty good job of searching the web, but every once in a while I -- I don't find exactly what I'm looking for.

MR. RICHARD BEL: Mr. Chernick, I just have a -- a clarification. I'm not sure I understand. That was with -- the question was put to you about Manitoba Exhibit 156?

(BRIEF PAUSE)

MR. RICHARD BEL: It was page 13 in this last book of documents. Yeah, okay. I think that's it.

MR. PAUL CHERNICK: All right. Thank you.

MR. RICHARD BEL: So my question is: There's a reference here to flat load growth. And I'm not sure if this is the kind of flat load growth that you were discussing in your -- is that -- is that the import of your answer?

MR. PAUL CHERNICK: No, it -- it -- one (1) of those things that I -- I said in my answer was, well, this is -- this particular case was for load growth through 2022/'23 and then flat thereafter. And the conclusion was that it still made sense to build Keeyask and the transmission line.

And as I pointed out, I said in -- in my -- my initial presentation that the -- the fact that there's no domestic need for Keeyask doesn't mean that there isn't an export value to it. And the transmission line will certainly have some benefits in terms of improving reality and access to lower cost energy at -- in -- in drought conditions and so on.

So I -- I didn't -- I wasn't suggesting that even if you had flat load from, say, 2014 on, that

Keeyask would necessarily be inappropriate. But you have to look at it in the kind of context that they -- the Company did in this exhibit to see whether, as a purely export operation, Keeyask was -- was cost effective. And it's entirely possible that it would be.

MR. RICHARD BEL: What was the reference to exports and -- when you were discussing that? Can you --

MR. PAUL CHERNICK: Well, if there's -- if you're meeting all of your domestic load with existing resources and you're meeting all of your committed sales, then there's -- there's no reason to build Keeyask for domestic load.

But if you build Keeyask and can sell the power, and you also get the benefit of the intertie which allows you to sell more economy power when you have it, to buy power off peak, reduce your -- your usage at -- at those times, the -- the usage of the dams at those times, and then increase generation at high cost times and sell power down to the States in -- in greater quantity is basically using Manitoba's dams as a storage battery for MISO, and -- with Manitoba Hydro pocketing the difference between the cost of the electricity in the middle of the night and the value of

the electricity in the daytime, all of those things combined might very well make Keeyask and the transmission line a good investment even without the domestic load.

There -- Manitoba is not an island, and you have an unusually good opportunity here to do the right thing and reduce environmental damage and make money at the same time, and -- and help out your neighbours to the south, as well. And it's entirely possible that Keeyask and -- and the transmission line will be part of a long-term strategy to do that.

It's a different kind of analysis than that that the -- the Company presented in its original filing. Does that help?

MR. RICHARD BEL: Yes, thank you.

(BRIEF PAUSE)

MS. PATTI RAMAGE: Sorry, Mr. Chairman, I'm -- subject to anything that arises during Mr. Hombach's cross-examination and the materials that Mr. Chernick said he would look at at the break, I think I -- I've completed my cross. It was the highlight of a video. I haven't ever done that before.

MR. PAUL CHERNICK: I'm glad I gave you

the opportunity.

THE CHAIRPERSON: Thank you, Ms. Ramage.

Mr. Hombach, please...?

MR. SVEN HOMBACH: I anticipate that I'll be fifteen (15) to twenty (20) minutes, Mr. Chairman. Would you like me to finish before the break, or would you like to take the break before I start?

THE CHAIRPERSON: I think the preference would be to -- to have a break now, so we'll take ten (10) minutes, and we'll continue after the break.

MR. SVEN HOMBACH: Certainly.

--- Upon recessing at 2:46 p.m.

--- Upon resuming at 3:01 p.m.

THE CHAIRPERSON: I believe that we're ready to continue with the proceedings, so Mr. Hombach, please.

CROSS-EXAMINATION BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Thank you. Good afternoon, Mr. Chernick and Mr. Stevens. The bad news

first, I won't have a video, but I'll try to be just as rivetting as the one that we just saw.

Mr. Chernick, if it's acceptable to you, we'll start with you. You were qualified as an expert in integrated resource planning, and I'd like to get a better understanding from you on what test for evaluating DSM you recommend as part of integrated resource planning?

MR. PAUL CHERNICK: I'm -- I'm sorry, what -- oh, what test?

MR. SVEN HOMBACH: What test.

MR. PAUL CHERNICK: Well, basically I would say that the total resource cost test, including all the costs and benefits that are identifiable is the -- the appropriate test, both in -- in resource planning and then in the detailed design and implementation of the programs.

MR. SVEN HOMBACH: And were you able to satisfy yourself during the break that Manitoba Hydro uses the total resource cost test?

MR. PAUL CHERNICK: Oh, I don't think there was any question that they use it to some extent, but I looked through the documents and found that what I was talking about is sort of embodied most clearly in the -- about -- what I was talking about with regard to

RIM is expressed most clearly in Exhibit MH-87, starting on page 67 where Mr. Kuczek says that Manitoba Hydro uses the RIM. It uses it to compare between programs as a measure of the value of a DSM opportunity, looks also at the levelized cost to the utility.

And then a few pages later, on page 71, looks at what happens when the -- under certain circumstances nonparticipant bills can go up even though the participants' bills are going down. And they pick an example in which the participants save seven dollars ($7) and the nonparticipants pay an extra seventy-three dollars ($73), indicating something like 99 percent of the customers are participants.

MR. SVEN HOMBACH: But when you hear references to economic DSM, what does that mean to you, and specifically what test does that mean to you?

MR. PAUL CHERNICK: That would be economic under the TRC.

MR. SVEN HOMBACH: Would you consider fuel switching to be a DSM measure that would be given the same status as other DSM measures in an integrated resource plan?

MR. PAUL CHERNICK: Yes.

MR. SVEN HOMBACH: And you recall My

Friend, Ms. Ramage, asking you about the spending of electric money to convince people to switch to gas?

MR. PAUL CHERNICK: Yes.

MR. SVEN HOMBACH: Would you consider that to be an electric DSM measure, as well?

MR. PAUL CHERNICK: Yes. If you spend electric money to convince people to switch from electric resistence heat to a heat pump, you reduce the amount of -- of electricity that you use. There are other costs incurred. If it's cost effective, it's a -- it should be included in the DSM program in the same way if you -- they're switching to a -- a gas furnace and reducing their -- the electric heating use down to, I guess, some fans, then their -- and that's -- that's -- that also can be a cost-effective DSM issue.

MR. SVEN HOMBACH: So to summarize that answer, as long as there is a benefit in the elect -- to the electric utility from a switch to DSM, you consider it to be appropriate for the electric utility to incur fuel switching costs?

MR. PAUL CHERNICK: I'm assuming that the measure is cost effective overall.

MR. SVEN HOMBACH: Let's go to slide 8 of your presentation from this morning.

(BRIEF PAUSE)

MR. SVEN HOMBACH: You spoke about how higher gas prices would improve gas end-use economics. Would that necessarily apply to residential customers?

MR. PAUL CHERNICK: No. What I meant there was that the cost to the residential customer would go up, but the benefit to Manitoba Hydro of having the extra electricity to sell into the United States would also go up.

MR. SVEN HOMBACH: But at the individual customer level, it may not necessarily be a benefit to that customer?

MR. PAUL CHERNICK: Yes. And as I discussed with the Board, it may be necessary if customers are very concerned about that; it may be necessary to offer them a -- a guarantee in which Hydro essentially says, Well, if the price of gas goes up beyond some point, then we'll share with you the windfall that we will get from our increased export sales that you, the fuel switching customer, has made possible. And that could be just a -- a guaranteed payment each year to the extent that the -- that the gas price goes over some benchmark. It could be structured a number of ways.

MR. SVEN HOMBACH: Are you aware of any such programs in other utilities you've worked with?

MR. PAUL CHERNICK: For that kind of -- of hedging for the -- for a customer who -- who converts?

MR. SVEN HOMBACH: Yes.

MR. PAUL CHERNICK: No, I'm not. And as I think I said to the Board, Manitoba's in a very unusual position where the electric utility stands to gain quite a bit if gas prices rise while customers who choose gas and help Manitoba Hydro make additional money could be put at -- at risk under high gas prices.

MR. SVEN HOMBACH: It's my understanding you've testified before the PUB previously?

MR. PAUL CHERNICK: Yes, three (3) times I believe.

MR. SVEN HOMBACH: Are you familiar with the Affordable Energy Fund?

MR. PAUL CHERNICK: I'm -- I'm aware that it exists. I'm not aware of the --

MR. SVEN HOMBACH: Yeah.

MR. PAUL CHERNICK: -- the details of its mechanism.

MR. SVEN HOMBACH: I was going to ask

you whether you consider that to be such a program, but I -- I don't need an undertaking to that if you're not familiar with it at -- at this time.

Let's go to slide 14 of the presentation. For a fuel switching customer how long do you expect a commitment to gas to be if somebody installs a new gas furnace or a new gas water tank?

MR. PAUL CHERNICK: Water tanks -- the water heaters tend to last on the order of twelve (12) to fifteen (15) years I believe. And furnaces, I think, are on the -- around twenty (20) years.

MR. SVEN HOMBACH: Is it fair to say, though, that there's some resistance to change? Meaning once somebody has a gas furnace they're unlikely to then switch back to an electric furnace the next time, or vice versa?

(BRIEF PAUSE)

MR. PAUL CHERNICK: Well, in a house that's -- that's go the -- the necessary supply, the -- the service line drop for the electricity, the breaker box being large enough to -- to cover the -- the load, I don't know how much resistance there would be. I -- I would think that a -- a customer who's been aware

that gas prices have risen above electric prices, if that's the case, would -- would look at that --- at the aging of his furnace as an opportunity to switch back to electricity if that seemed like a good idea.

MR. SVEN HOMBACH: If there was to be a larger percentage of solar energy or wind energy in MISO over the next fifteen (15), twenty (20), or even thirty (30) years, would that presumably change your conclusions about the greenhouse gas implications of people in Manitoba switching to gas?

MR. PAUL CHERNICK: Well, I -- I think those percentages will rise. The question is what does it do to the market prices and the -- the marginal emissions? And on slide 9 I discussed that, that wind and solar costs are likely to decline, and that more renewables in MISO might result primarily in the retirement of coal plants and the -- and less use of -- of the gas peakers which are less efficient.

But it could also result in the coal plants being more expensive to -- to run than the gas combined cycles and -- but staying on the system. And I'm sorry, that was the wrong example.

It could push the -- the coal up in the loading order. So at a given load level in MISO, more of the load is met with renewables and then coal, and

maybe you don't need any gas at all. So you're backing out coal at the margin and that would make the environmental benefits greater. It might make the economic benefits less, depending upon the relative pricing of coal and -- and gas.

I'm sorry I got that answer a little garbled in the middle. If you'd like me to run through it again I'll do my best.

MR. SVEN HOMBACH: No, I think that's okay. Thank you. Have you turned your mind to how large an impact on domestic electricity demand a concerted campaign to switch end-use heating to gas would have?

MR. PAUL CHERNICK: Well, I -- I think that Hydro has done that for us.

MR. SVEN HOMBACH: And if it helps, if we could go to Manitoba Hydro Exhibit 122. That, Mr. Chernick, is an answer that was provided in response to an undertaking calculating that the existing fuel switching initiative, if 100 percent successful, would reduce demand by approximately 903 gigawatt hours.

But first of all, it's my understanding, sir, that the fuel switching initiative is only in the south gas area and only applies to new construction and retrofits?

MR. PAUL CHERNICK: Well, the new -- new construction and retrofit's basically what the -- the market consists of.

MR. SVEN HOMBACH: So --

MR. PAUL CHERNICK: And -- and you -- you can't very well switch to gas in an area where you don't have gas. And just hang on it for a second.

The -- Exhibit 180, page 56, provides an -- an estimate of 286 gigawatt hours from the fuel choice program being contemplated by the Company at this point. So whether it's three hundred (300) or nine hundred (900), it's a substantial amount of -- of energy.

MR. SVEN HOMBACH: Are you suggesting that, aside from encouraging people to switch electric furnaces that have reached the end of their useful life, Manitoba Hydro should encourage people to switch otherwise still functional electric furnaces to gas?

MR. PAUL CHERNICK: Well, that's a cost effectiveness question. And let me take a quick look at the summary of the economics.

For a furnace -- this is on page 6 -- slide 6, of -- of my presentation this morning. Switching from an electric furnace to a gas furnace has an NPV, net -- net present value, under the TRC,

according to the Company, of about fifteen thousand dollars ($15,000).

So -- or I believe that's the choice between the two (2), assuming you'd have to either buy a furnace or -- either electric furnace or a gas furnace. And so even if you take out the -- the cost of the -- the electric furnace, or you -- you discount it, because if the electric furnace is only ten (10) years old and you think it'll last another fifteen (15) years, then some day you would have to replace it so you can -- you've delayed that -- you've -- you've avoided that replacement out there.

But even if you took the entire cost of the -- the electric furnace out of a couple thousand dollars, you'd still have a very large savings. So I suspect that it would be cost effective to -- to do early retirement and replacement for electric furnaces.

MR. SVEN HOMBACH: So that's a yes?

MR. PAUL CHERNICK: Oh, yes. I'm sorry. I was actually thinking it through while -- while I was answering your question, so.

MR. SVEN HOMBACH: If we could go to PUB Exhibit 58-2.

While we're waiting for that, do you recall the chart in the video that walked people

through the historic gas and electrical cost up to the present time?

MR. PAUL CHERNICK: Yes.

MR. SVEN HOMBACH: Vaguely?

MR. PAUL CHERNICK: Yes, vaguely.

MR. SVEN HOMBACH: If we could go to page 92 of Exhibit 58-2. Sir, this is a chart that was put to Manitoba Hydro's load forecast of DSM panel and projected into the future.

Have you had an opportunity to review this chart before?

MR. PAUL CHERNICK: I don't believe I've seen this specific chart, but I've seen similar comparisons.

MR. SVEN HOMBACH: If Manitoba Hydro agreed with the directionality of the chart, and they did advise that they did, in your view, would it be helpful to show customers the projected future prices of gas and electricity to encourage fuel switching?

MR. PAUL CHERNICK: That might be helpful, but as -- as I think I've indicated, that's -- it's not necess -- necessarily sufficient, but it certainly would help. And if Hydro were willing to provide the kind of guarantee that we were talking about, if gas prices actually get above electric prices

on an equivalent delivered basis, then some of that at windfall to -- to Hydro would be split with the -- the customers who have agreed to the fuel switching.

Then it -- it seems like that's a very low risk proposition for -- for Hydro to undertake. And I think that might be more of a comfort than looking at the -- the history and -- and the projected values.

MR. SVEN HOMBACH: Now, we also discussed the need for builder incentives. And I'm wondering if you could give the panel some example of what types of incentives for home builders you're thinking of?

MS. PATTI RAMAGE: Can I interject just for a second, Mr. Hombach? Just for the record, 'cause we're -- I'm trying to figure out here, the chart that's on the screen, can you give me the reference? I -- whose evidence that is, or --

MR. SVEN HOMBACH: That is the chart that was prepared by PUB advisors. It forms -- it is page 92 of PUB Exhibit 58-2. It was put to Manitoba Hydro's DSM panel and Manitoba Hydro was asked about whether or not the utility agreed with the directionality.

MS. PATTI RAMAGE: Okay. Thank you. I

was just trying to -- so I could follow along, for the record. Thank you.

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Mr. Chernick, I was asking you about your recommendations for builder incentives.

MR. PAUL CHERNICK: Oh, yes. Thank you. Well, with -- with builders there's opportunities for using both carrots and sticks. The carrots would be: If you put in a gas water heater and -- and furnace we will waive certain fees that we would otherwise charge you for the -- the hookup, or we'll contribute some hundreds of dollars towards the cost of doing that.

And we'll maybe give you a nice little medallion to put on the -- the front of your model home to let people know that this development is going to be economic and -- and environmentally efficient. And Centra (sic) can offer a discount on its usual extension to the builder.

Another alternative would be for -- for Hydro to say if you put in resistence heating, or you put in a -- a ground source heat pump below a certain efficiency, then the hookup charge will be larger

because you're going to force us to give up export revenues, or to procure additional resources. And, you know, we'll refund that to the customers over a period of time, but it'll show up as -- as something that the developer has to pay out of pocket and then get back through the sale price of the house. And that seems to be a strong motivator for the developers in general. So that kind of stick might chase them away from electricity towards gas.

If their customers really want electricity, of course they can do it and they'll get paid -- paid back. But for the vast majority of -- of customers who either would prefer gas 'cause they know it's cheaper or don't care, then you can overcome the -- - the developer's reluctance to spend his own money and, of course, be at risk of how long it's going to take to sell that house.

MR. SVEN HOMBACH: In your report, specifically on page 2-14, you also discuss rate design and inclining block residential rates. You're aware that Level 2 DSM, as proposed by Manitoba Hydro, actually includes such inclining rates?

MR. PAUL CHERNICK: Yes. I don't know the -- the detail of the conservation rates that the Company modelled for Level 2, but it sounds like, to

some extent, we're on the same wavelength in terms of believing that would be an appropriate way to go.

MR. SVEN HOMBACH: And when you're thinking about inclining block or inverted rates, are you envisioning that the block sizes would be the same for electric heat customers and gas heat customers in order to provide an increased incentive, or are you envisioning that electric heat customers be a -- provided with a larger initial load price block?

MR. PAUL CHERNICK: Well, that's a complicated question because there are a lot of considerations involved, and among them the statutory limitations on the extent to which Hydro and the Board can differentiate rates between groups of customers.

But ideally you would protect customers who have electric heat, and put it in -- in the past, and not by giving them some larger block in the winter. And either not do the same thing for new electric heating customers or give them a smaller block, except those who do not have access to gas. And exactly how you design the -- the rates is, as I said, somewhat complicated and something I haven't looked at for Manitoba in a few years now.

MR. SVEN HOMBACH: You critique the 2013 Power Smart Plan for not discouraging -- sorry,

for not encouraging fuel switching to gas.

Have you had an opportunity to review the 2014 Power Smart Plan?

MR. PAUL CHERNICK: I have looked through it, and there is a section on fuel choice, at least in the long-term plan. I don't really recall whether the short-term plan has fuel choice broken out.

MR. SVEN HOMBACH: If you can accept, subject to check, that the short-term plan does not address it?

MR. PAUL CHERNICK: I think that's correct.

MR. SVEN HOMBACH: Okay. In your view, does the long-term plan address your criticism?

MR. PAUL CHERNICK: Well, it's hard to tell exactly what -- what kind of a program, or portfolio of programs, is included in the long-term plan. The long-term plan is certainly a step in the right direction, and I'd be very interested in seeing how Manitoba Hydro intends to implement what's in the plan: the numbers that they project.

MR. SVEN HOMBACH: What you're saying is essentially the proof will be in the pudding?

(BRIEF PAUSE)

MR. SVEN HOMBACH: I didn't realize that would be such a controversial question.

MR. PAUL CHERNICK: Well, actually, it's not so -- so much whether the proof of the pudding will be in the eating, which implies that you have to wait until they've done it, but we haven't even seen the recipe yet. And so I would say the -- yes, the ultimate proof is -- is when we see the switching from electric to gas going up and gas to electric going down.

But the -- the initial -- 'proof' may be too strong a word, but the initial indication that they're on the right track would be when we see the recipe and they talk about what kinds of incentives they're planning on giving and to whom and how fast they -- they expect to be shifting over various usages.

MR. SVEN HOMBACH: Let's go to slide 24 of your presentation from this morning. You list on that slide that you have several examples of other utilities that are budgeting for 1.3 percent of DSM savings per year or more.

MR. PAUL CHERNICK: Yeah.

MR. SVEN HOMBACH: Just to be clear, those were incremental savings?

MR. PAUL CHERNICK: Those are

incremental savings and the one point three (1.3), those are reported actual savings after the fact.

MR. SVEN HOMBACH: Okay.

MR. PAUL CHERNICK: The -- the projections go over 2 percent.

MR. SVEN HOMBACH: And are those 2 percent projections in perpetuity, or is there a declining incremental DSM savings?

MR. PAUL CHERNICK: Well, I don't know of anybody who forecasts anything for the utilities in perpetuity.

MR. SVEN HOMBACH: Let me ask you this way.

Have -- have you reviewed the evidence of Mr. Dunsky?

MR. PAUL CHERNICK: I have.

MR. SVEN HOMBACH: And you're aware of the fact that Mr. Dunsky's recommending a gradual ramp up of DSM savings followed by a sustained annual incremental DSM savings of 1.5 percent per year?

MR. PAUL CHERNICK: Yes.

MR. SVEN HOMBACH: And you're aware that Manitoba Hydro projects significantly larger savings in the short term and then declining incremental savings over time?

MR. PAUL CHERNICK: Yes, and -- and I think Manitoba Hydro has projected that pattern for a number of years now, always with a -- a couple of years of relatively high savings and then having savings drop off.

MR. SVEN HOMBACH: Right. So -- so your recommendation -- is your recommendation to follow the Manitoba Hydro model of shoot high first and then have declining savings, or the Dunsky model?

MR. PAUL CHERNICK: I would -- I, and I think Mr. Dunsky would say --

MR. SVEN HOMBACH: Or your own model?

MR. PAUL CHERNICK: -- I -- I think Mr. Dunsky would agree with this -- start where Manitoba Hydro is for its plans for the next year or so and go up from there. And I don't know whether you can then maintain that level for, you know, fifteen (15) years or twenty (20) years. And we'll find out how technology changes and the markets change over time.

MR. SVEN HOMBACH: Thank you, Mr. Chernick.

Mr. Stevens, I have a few questions for you as well.

First of all, you'll recall My Friend, Ms. Ramage, asking you about wind exports and whether

or not there would be interest in buying Manitoba wind -- Hydro wind?

MR. WESLEY STEVENS: I do.

MR. SVEN HOMBACH: Now, when a US utility is purchasing energy they are not purchasing specific electrons, are they? They're purchasing either firm energy or opportunity energy?

MR. WESLEY STEVENS: Yes.

MR. SVEN HOMBACH: Okay. In your expertise, is there any way for a utility to distinguish what the source of that energy is if there is a supply mix consisting of more than one (1) source?

MR. WESLEY STEVENS: No. Well, hold on. Let me -- let me think about that. In some circumstances there -- there could be agreements about a generator injecting a certain -- injecting energy into the system from a certain source and then the utility extracting the same -- the same amount of energy or that energy without -- minus losses from the system at another point. So it is possible to relate exports to a specific type. And -- but -- but those are not the same type. They -- they are obviously not the same electrons.

MR. PAUL CHERNICK: And if Manitoba were exporting to New England, for example, and the

buyers wanted the energy to qualify for renewable energy credits, the energy would have to be tagged to generation from wind or small hydro, not Keeyask, or various other categories for renewables. And hour by hour the same amount would have to be delivered to the -- into the ISO for -- for that to be counted in that way. I mean, that's really a bookkeeping transaction. But the intent is to sort of, in some way, keep the suppliers honest and make sure that you really are getting more renewables into the system as you're paying for more of them.

And it sort of ignores the fact that with hydro you can -- you can store them. As a practical matter, even if you had to do that for -- to meet a state renewable portfolio standard and you wanted to have the wind tag on the power that was devel -- being delivered, you could always work out an arrangement where essentially you were -- the US utility was selling energy to Manitoba Hydro when it -- when there was excess and buying it back when it needed it to sort of firm up that -- that wind delivery.

MR. WESLEY STEVENS: Short answer: It's complicated.

MR. SVEN HOMBACH: And it would be a matter of contractual arrangements as to whether or not

somebody would want to specify that bookkeeping exercise, to use Mr. Chernick's words?

MR. WESLEY STEVENS: Yes.

MR. SVEN HOMBACH: Mr. Stevens, let's go to page 5 of your presentation for a moment. You referenced the time frames that several wind developers provided you with, and you included testing and you included permitting.

The three (3) year time frame that we see on the slide, does that include a land acquisition and approaching people to obtain various options to place turbines?

MR. WESLEY STEVENS: I don't know that. It -- it might. This -- this is a reference to significant spending. I don't think that time spent on -- on land acquisition and approaching people would involve significant spending, so I can't say from this whether or not that time is -- that activity is included in the three (3) years.

MR. SVEN HOMBACH: Are you able to undertake fairly easily to obtain an answer to that?

MR. WESLEY STEVENS: Yes.

MR. SVEN HOMBACH: Okay. Then I'd like an undertaking for you to approach the developer and ask whether that time estimate includes the time period

for land acquisition.

MR. WESLEY STEVENS: Okay.

--- UNDERTAKING NO. 136: Wesley Stevens to ask developer if the time estimate includes the time period for land acquisition

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Let's go to the next slide, page 6. There was some back and forth about the assumed lifespan of -- of wind farms.

And is it your understanding that, from a Crown utility perspective, that is really more of an issue of the contractual arrangements rather than the lifetime of the physical equipment?

MR. WESLEY STEVENS: It depends. When it comes to Crown utilities buying -- buying wind power, they usually set the term. Ontario has various contracts which are set to twenty (20) years. My understanding is that, in cases -- and this is from talking with developers -- that in cases where the utility has set a term of twenty (20) years, where the contract is for a term of twenty (20) years, the developers look at the value of the wind project

following for the next five (5) and, in some cases, ten (10) years, but -- but mostly five (5) years.

They assume that the proj -- that the wind project will in fact last for twenty-five (25) years, of which the first twenty (20) years will be covered by contract and that there will be some additional value to them in the last five (5) years. So there would be nothing to stop a utility from setting a term of -- of twenty-five (25) years for contractual purposes.

MR. SVEN HOMBACH: Have you seen any Crown utility similar to Manitoba Hydro develop wind power directly, or are these usually arrangements with independent power producers under a power purchase agreement?

MR. WESLEY STEVENS: I believe that Nova Scotia does a mix. It does -- it -- it's developing that -- the utility is developing some wind itself and it's -- it's contracting some out. I'm just running through the other utilities; for -- for the most part, they're contracting out, but certainly there's nothing stopping a utility from doing it itself.

MR. SVEN HOMBACH: Let's go to page 8 of your slides. The four dollars and twenty-two

cents ($4.22) per megawatt hour in 2012 dollars that you were recommending, what assumption is that making for the technology that's used to back up or firm up wind power?

Specifically, is that linked to building hydro power to firm up wind or to go with gas?

MR. WESLEY STEVENS: That is a number based on the 25 -- 2005 study, which looked at the -- at Manitoba Hydro's system which is primarily hydro. So that would -- that would be a number based on hydro.

If -- if you were talking about using gas to -- to firm up wind -- well, not to firm it up, but for wind integration costs, then a number on the order of eight forty-five (8.45) would not have surprised me. But for a system like Manitoba Hydro's, where you're using wind and it -- sorry, we're using hydro and existing hydro, eight forty-five (8.45) seems like a very high number and four twenty-two (4.22) seems like a more reasonable number.

MR. SVEN HOMBACH: So let me ask you a follow-up question.

Do you know whether this number would assume that no new hydro generation would have to be built and that existing generation is used, or does it include an assumption that some new hydro power would

have to built to firm up wind?

MR. WESLEY STEVENS: I don't know that because the 2005 study was considered confidential. I've not been able to review it.

MR. SVEN HOMBACH: In terms of the overall wind costs, it's fair to say that you essentially agree with La Capra's recommendations, or close to it?

MR. WESLEY STEVENS: Close to it. I -- I think the essential point about the wind costs is that on several fronts, Manitoba Hydro's assumptions have led to higher wind costs than -- than is reasonable.

And while La Capra and I may choose different specific assumptions, the point is that Manitoba Hydro's number is substantially too high. And if you put in more reasonable assumptions, then wind -- then wind -- wind is in the same ballpark as -- as new hydro.

MR. SVEN HOMBACH: Have you had an opportunity to review La Capra's wind economics?

MR. WESLEY STEVENS: I have reviewed their Appendix 3A and 'B', and I have -- I have looked at their report.

MR. SVEN HOMBACH: Do you agree with

the wind economics, or is that something outside your sphere of expertise?

MR. WESLEY STEVENS: We -- we have slightly different takes. For example, they -- they were recommending a capacity factor of 43 percent.

MR. SVEN HOMBACH: Right.

MR. WESLEY STEVENS: I recommended, for modelling purposes, taking the improvements in capacity factors that could reasonably come from new technology, specifically high -- higher towers, and for modelling purposes rolling that into the capital cost.

MR. SVEN HOMBACH: Okay.

MR. WESLEY STEVENS: There are minor differences, but I think we come -- come out to about the same place and we have the same concerns. I -- I looked at a number of -- I looked at a few factors that La Capra did not seem to look at, or at least they do not write about. For example, I looked in detail at wind integration, which is on slide 8, and I didn't see anything in La Capra's report -- I may have missed it, but I didn't see anything in La Capra's report about wind integration.

MR. SVEN HOMBACH: Let's have a quick look at La Capra's economics. It's Exhibit 45 -- La Capra Exhibit 45, slide 70.

And I appreciated it, sir, that those are the actual NPV numbers that La Capra came up with.

But are you able to address directionally on whether or not you agree with those numbers or whether, based on your points of disagreement with La Capra, you would expect those numbers to go up or down?

MR. WESLEY STEVENS: Okay. In my previous que -- in -- in my answer to your previous question, I was thinking more of La Capra's look at wind costs with var -- varying the capital costs, capacity factors, and so on. I wasn't thinking of the -- the next step, which is when they took that and translated into NPV -- NPV terms. Yes, I --

MR. SVEN HOMBACH: Is there something in --

MR. WESLEY STEVENS: -- I have looked at this --

MR. SVEN HOMBACH: Okay.

MR. WESLEY STEVENS: -- and while I have not tried to replicate it or -- or not get into it in detail, certainly directionally and in order of magnitude their numbers look very reasonable. Their -- their approach, their analysis, and their numbers look -- look very reasonable.

MR. SVEN HOMBACH: One (1) last question on the issue of wind integration, sir.

You're aware that over the recent past, water levels in the Lake Winnipeg basin have been quite high?

MR. WESLEY STEVENS: I actually didn't know that, but -- but, yes.

MR. SVEN HOMBACH: Would wind -- would the ability of wind to allow more water to be kept in the reservoir and be made available for hydroelectric generation be diminished in a situation where the water levels are already high?

MR. WESLEY STEVENS: It -- that's not a question I can really ask -- or I can -- I can answer. That would be the kind of question that I would highly recommend be looked at. If you're going to take -- if you're going -- going to -- wind -- wind, I believe, should receive more serious consideration, and it's exactly those kinds of questions that need to be asked --

MR. SVEN HOMBACH: And I was going to -- - I was going to ask you the same question with respect to drought.

I assume the answer would be the same?

MR. WESLEY STEVENS: Yes.

MR. SVEN HOMBACH: Okay. Thank you, sir. Those are all my questions.

(BRIEF PAUSE)

MR. RICHARD BEL: Mr. Chernick, I have one (1) question before you're released. And because we're going to have a DSM panel coming up, it's not really -- really related to your testimony tangentially. And that was the question of risk and DSM. And it's really a question about an opinion.

We've had two (2) experts on DSM: Elenchus and Dunsky. And there was a slight -- or a big difference in the way they viewed DSM, depending on your point of view. It's slide 51 of Dunsky.

(BRIEF PAUSE)

MR. RICHARD BEL: And I -- I guess I'm asking for your commont -- your comment on this issue. It -- it's Elenchus -- Elenchus saying that, in fact, DSM could be risky because you can't really predict how well those targets are estab -- you can't tell how well you can meet the targets in the future. And then Mr. Dunsky is saying that, in fact, DSM is the least risky

option.

So do you have a comment on that? Are you familiar with...

MR. PAUL CHERNICK: Yes, I -- I agree with Mr. Dunsky. The Elenchus discussion of DSM in general, and of risk in particular, I -- I didn't think really reflected much understanding of how DSM programs actually work.

One (1) of the important things about DSM is, unlike a major construction project, like a -- a major hydroelectric facility, you don't make the decision to go ahead and then find out five (5) or ten (10) years later how much it cost and when it came on. You find out year by year, and often month by month, how the -- the program is going and whether you need to correct something.

And so Elec -- Elenchus's concerns about risky DSM and -- and counting only part of what you think you found in the -- in the potential just struck me as being sort of off target. So I wouldn't put a lot of weight on the Elenchus's view of -- of risk of DSM.

DR. HUGH GRANT: Can I just ask you one (1) thing?

Are you aware of this literature that

says that utilities systematically overstate DSM savings and understate the cost?

MR. PAUL CHERNICK: Well, there are people who say that.

DR. HUGH GRANT: There are people that test it fairly robustly. I'm just worried -- I just wanted to know how widespread that literature was and--

MR. PAUL CHERNICK: Well, if you -- if you leave a utility on its own to run the programs without any real supervision, without independent monitoring and evaluation.

There will, of course, be a tendency to -- to want to look good, and to hence perhaps overstate the -- the benefits. And if you are giving the utility a reward, or you're going to penalize them if they don't meet their targets, and you trust them to self-report whether they met their targets, they'll meet their targets.

So you need to discount to some extent the claimed savings by some of the utilities in the mid to low part of the -- the pack, in -- in term -- across jurisdictions, some of whose regulators really don't pay much attention to -- to whether they're really producing what they say they are. In the high performing areas -- well, any of the New England

states, for example, the monitoring and evaluation programs are -- are quite -- quite rigorous, and I don't believe that the utilities are -- have much room to-- to pad their -- their reported values.

DR. HUGH GRANT: Just one (1) other thing. This concept of selection bias, is that commonly discussed, and does -- do people try to discount -- so the -- I guess the way I understand it is that you put in a DSM program to replace your refrigerator.

I was going to replace mine a year -- you know, a year from now anyway, so I decide I might as well take advantage of this opportunity. So that the actual DSM savings are smaller than -- right, so it's not like there's a -- the utility can go back and say, Oh look, we got rid of an efficient refrigerator for twenty (20), thirty (30) years. It was really only one (1) year of savings in that respect.

Does that -- you know, in -- if it's Dunsky or other people and they're throwing figures around, what kind of number are they using? I guess that's what I'm wondering, if there's selection bias arguments.

MR. PAUL CHERNICK: Well, again if there is adequate monitoring and evaluation for the

refrigerators, for example, then one (1) of the things that would be studied would be, How long do people keep refrigerators in at -- the absence of programs? And it's not that hard to -- to do that kind of study.

One (1) of the things that you can do is when -- for example, when my house was last audited by the -- the firm working for -- for our electric and gas utilities, they checked out the -- the refrigerator model, and looked up its efficiency and could tell us what size rebate we were -- we were eligible for. As they're doing those audits, they get a lot of data on how many refrigerators are left in 2012 of 1984 vintage, for example. And so they have -- and in 1980 vintage, and 1976 vintage, and so on, so that they can -- they can work out how -- how fast refrigerators seem to turn over naturally.

DR. HUGH GRANT: But do they actually do that in program monitoring?

MR. PAUL CHERNICK: Yes, I've --

DR. HUGH GRANT: Do you think --

MR. PAUL CHERNICK: -- I've seen -- I mean, I haven't tended to read the studies in -- in gruesome detail about how they gathered all the data and so on, but there are -- independent evaluators are often brought in to look at -- at data from before the

-- the program, from other jurisdictions that don't have such rigours programs, other kind of controls to try and figure out really what the remaining life is. And also to look at whether you're selectively replacing the refrigerators that have already begun to whine and knock and bang.

Now, I know that my refrigerator was working just fine. The food was cold. It was quiet. It was a wonderful machine. But it was wasting some hundreds of kilowatt hours a year, and we were offered a three hundred dollar ($300) rebate to -- to buy an energy efficient refrigerator, and basically send them the severed cord of -- from the old one. And -- and we did that.

And it was already a pretty old refrigerator. I don't know whether it had five (5) years or ten (10) years left statistically but, you know, it's sort of like working out life insurance premiums and guessing how much longer you're going to live. There's a -- a lot of statistical background that goes into taking the data that's available and projecting out what the -- what the remaining life is.

And it's not that those are perfect, but the important thing is that somebody uses the available data to come up with the best estimate. And -- and

that it's not the utility and you're not just trusting them to tell you what a wonderful job they're doing.

And I'm not a -- an expert specifically in evaluation, but I do see a fair amount of -- of the -- at least the titles of the evaluation reports that go back and forth, and good programs involve a lot of evaluation.

MR. WESLEY STEVENS: Can I just add something even though this is not technically within my area of expertise. I have done some work on DSM programs, a tiny fraction of Mr. Chernick has. That has include -- included looking at program savings and estimating program savings, only -- only a few such studies. And we specifically put into our calculations an adjustment factor for what would have happened anyway without the program. That was normal practice.

DR. HUGH GRANT: I'm just reading academic literature that did a pretty robust econometric study of US data for three hundred and forty (340) utilities using panel data with eleven (11) years included in it, and finds that the utilities reporting average costs of DSM at two (2) to three (3) cents. And when they control for every other factor they're getting an average cost between six (6) and twelve (12) cents, so.

But it's -- one (1) thing is the -- the data's probably about -- you know, it's stretching over a period that's -- it was five (5) years old at the time of the study. So there may have been improvements in the form of the monitoring, but it would be -- it's interesting.

MR. PAUL CHERNICK: Well, the other thing is, I don't think that that's -- I -- I believe I've seen that study and that basically it was trying to look just at the reported sales of a -- of each utility and their reported energy efficiency savings, and somehow tried to -- to project what their sales would have been if they had been just like all the other utilities in the country. And I think that was a very ambitious econometric exercise, and one (1) that probably didn't work very well.

DR. HUGH GRANT: Different study. That's not what they did.

MR. PAUL CHERNICK: Okay.

MR. SVEN HOMBACH: I'm not sure if Manitoba Hydro has any questions arising out of the examination?

RE-CROSS-EXAMINATION BY MS. PATTI RAMAGE:

MS. PATTI RAMAGE: For Mr. Stevens.

Now, Mr. Hombach got you to say that you agreed with La Capra's wind costs.

Do you recall that? Their assessment of wind costs?

MR. WESLEY STEVENS: We're talking -- there's -- okay. There are two (2) things in La Capra's report. One (1) is a levelized cost of energy calculation, a -- a questioning of when specific costs, and there's also a revision to the NPV calculation.

Which one are you referring to?

MS. PATTI RAMAGE: I was looking at the average cost of the project. Your report says nineteen hundred and forty dollars ($1,940) per kilowatt?

MR. WESLEY STEVENS: Yes. As I said, I think directionally La Capra and Power Advisory agree that the appropriate costs are lower than Manitoba Hydro's. We -- we have different opin -- somewhat different opinions about the exact number that should be used.

MS. PATTI RAMAGE: I -- I just want to clarify that because La Capra is two hundred dollars ($200) -- roughly two hundred dollars ($200) a kilowatt less than yours.

MR. WESLEY STEVENS: Yes. That's -- I believe their number came from the same study that I

used, the 2012 Department of Energy Study. They used, as I -- as I used in our report, they used a Midwest number. I've decided to back off from that a bit. I just didn't feel absolutely sure that that was the right number to use.

MS. PATTI RAMAGE: I'm going to correct you there. I -- I believe they used what was called the Interior number, and that would include states like Texas and Mex -- and New Mexico.

Do you recall that?

MR. WESLEY STEVENS: You are right. I believe that they called it -- I -- I've been call -- I've been saying -- using the word 'midwest'. And yes, I believe it is Interior and it stretches -- stretches all the way down to Texas.

MS. PATTI RAMAGE: Right. And your number uses the average of the states, which includes the west, California --

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: -- the southeast, Florida, the Carolinas, the northeast, New York, Main, the Great Lakes?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: So it includes all of those?

MR. WESLEY STEVENS: Yes.

MS. PATTI RAMAGE: And each one of those regions would have differences -- would be distinct from Manitoba, correct? Each area has their own distinct attributes and --

MR. WESLEY STEVENS: Yes.

MR. PAUL CHERNICK: And in particular, in some of the areas that you've mentioned the wind resource is concentrated on mountains and ridges, places that are much more expensive to -- to work on and around than the plains of North Dakota, or the Texas Panhandle, or -- or Manitoba.

MR. WESLEY STEVENS: And I'd like to add that. What I would love to see or have seen is a reasonable cost -- a reasonable estimate for a North America wide cost, and then an adjustment factor for -- for Manitoba; why -- how is Manitoba different from the North America as a whole. That would have been a very reasonable approach.

MS. PATTI RAMAGE: So if I understand you correctly, your preferred approach would be one that's taken the North America-wide costs and adjusted for Manitoba, something that was specifically done?

MR. WESLEY STEVENS: Yes. Starting out with a reasonable number for the North America-wide

cost.

MS. PATTI RAMAGE: Okay. Thank you. We have another request. And this is just like the video. I've never done this before, but -- and I don't know if it's possible. But we were very interested in the study that Dr. Grant was referring to, and I'm not sure if he's able to provide us; that's not one we're familiar with.

We'd like to -- Dr. Grant to consider an undertaking to let us know what that study is.

MR. SVEN HOMBACH: I admire your procedural creativity, Ms. Ramage. And I'm certain that is something that -- the name of the study is something that can be provided.

DR. HUGH GRANT: Yeah, just in my literature review right now is the sum of two (2) papers, so -- but certainly I will. Hard copy.

MS. PATTI RAMAGE: Thank you.

THE CHAIRPERSON: I want to go back to the risk issue. This is back -- I wonder if Diana could bring up slide 51.

I'm a bit concerned about this one because it's one thing to be right about the cost of DSM, or wrong about the cost of DSM, relative to an alternative, but what we're doing here is we're, in

theory, supplanting regular generation for DSM.

Now, if you're wrong about the ability to achieve expected DSM savings, you haven't got generation. In other words, if you're saying on a portfolio level we're going to supplant generation by using DSM, so if you're right, then it turns out to be a good decision, but if you're wrong, you didn't achieve the savings you expected, you don't have generation. You have no alternative. You know, there isn't -- there isn't something you can look to to supplant the expected DSM savings.

So it seems to me that that's a far more significant risk than just a cost issue.

(BRIEF PAUSE)

THE CHAIRPERSON: And correct me if I'm wrong. I mean, because we are talking at the -- you know, we're kind of mixing decisions at the individual program level with portfolio decisions. And so being wrong at the portfolio level is one (1) thing. Being wrong at the generation level is quite another thing.

MR. PAUL CHERNICK: Well, the point I was making was, even if you thought that the DSM had some significant probability of not working for some

reason, you would find that out within the next year or two (2). So that might mean that if -- if you decided that DSM was sufficient to meet requirements and that Keeyask was not needed and not cost effective for exports, and then two (2) years later you found that for some reason these models of energy efficiency programs that have worked in other places can't be scaled up to work in Manitoba, and you're getting much lower savings, then you can go back to the generation alternative. And that may delay the beginning of the sale by a year or so.

Remember, you're going to get something out of the DSM. It's not like every measure is going to fail, every program is going to fail.

But let's suppose that you get 80 percent of what you expected. That's going to mean that after five (5) years you're one (1) year behind schedule on the energy efficiency. And if that's enough to make the difference about -- in sufficiency, then in the process you can decide to develop a wind farm to give you a little bit more energy; you can sign a purchase contract with somebody in MISO to give you energy and perhaps sell them back capacity; you can start Keeyask, if that's what you've deferred.

So DSM is not this kind of all or

nothing prospect that you have with a major power plant where you hope to be done in five (5) years but maybe it's seven (7) years, and you hope that it's going to cost 5 billion but it cost 7 billion. Or -- it's something that you can monitor year-by-year and decide whether conditions have changed and you need to do something different. And you'll -- you may have some -- some little gaps that you need to fill in, but it's -- it's not a disaster.

It's not like you're going to wake up in December of -- of 2019 and realize, Oh, my goodness, all that energy efficiency we thought we were going to get since 19 -- since 2014 hasn't materialized, and we're several percentage short on our energy supply. It's something that develops gradually and you can adapt to over time.

(BRIEF PAUSE)

MR. RICHARD BEL: Promise, last question. Those states -- there was a report introduced by Hydro yesterday -- I don't think we need it. Anyways, those states that have mandated incremental DSM programs, the report seems to suggest -- or suggests that they meet their targets very close

to their targets in most cases.

Is that your experience if you separate out utilities that have mandated programs, as opposed to ones that aren't mandated? Mandated and monitored, let's say.

MR. PAUL CHERNICK: M-hm. I think there have been -- been some situations where utilities have far exceeded the -- their targets. Often what happens is that there's a -- an interplay -- a collaboration of some sort between maybe the regulators or the equivalent of the -- of the energy ministry, environmentalists, consumer representatives, who look at the options and bring in the consultants to design a program and say, Yes, we think that you can get a hundred gigawatt hours of savings over this time period, and that becomes the target because they've put together the programs and they can see how they could do it.

And then the utility actually has to go out and hire the right contractors, and write good educational materials for the -- for the trade allies, and twist the right arms to get the -- more efficient equipment into the stores, and so on, but it's something that they've already seen a path to do. And if they're being pushed hard, they're not going to be

able to beat that by a whole lot. And if they're watching out for their shareholders, they're not going to agree to targets that are much more than they can -- they can achieve. So it wouldn't surprise me that for -- in many states, in particular, the -- the targets and the -- and the achieved values tend to be pretty close, because it's based on a -- a fairly detailed projection of what they can get.

There are other states that basically say, Give us .75 percent savings or else we'll get annoyed with you. And the utility says, Well, we don't want our regulator annoyed with us, so let's -- let's beat that by a little bit so we look good, but we did -- we really aren't committed to doing this and that's all we're going to do. So you have that kind of situation as well.

MR. RICHARD BEL: And you've seen that -- you've seen the -- the Dunsky diagram with the Manitoba Hydro DSM curve? It rises up to 3 percent and then it falls off in 2018, and then he counterposes his on, the incremental 1.5 percent -- or 1.3 percent a year. So the -- that's a troubling diagram, because it's -- it looks like two (2) different views of what DSM is.

So that pattern -- the Hydro pattern,

and I'm assuming it's achievable. I'm just saying, is that a -- a typical pattern of DSM implementation or...?

MR. PAUL CHERNICK: No. I -- it's -- it's very unusual. And I -- I can't really think of another example that -- that's quite so vivid in terms of a utility saying over and over again, We can do a lot in the next few years, but then there's nothing after that.

And it -- it looks like the Utility is -- is willing and interested in doing some energy efficiency in the near term, but is reluctant to interfere with long-term construction plans by committing to a long-term energy efficiency program, so the numbers always go down.

And there's never a real explanation of why the numbers go down, and there are always these illusions to -- to rate effects, or, Oh, you've run out of opportunities, but there's never any data, any real analysis to back that up in -- that I've seen anyway.

MR. RICHARD BEL: Okay. I'm -- I'm out. Thank you. Thank you.

THE CHAIRPERSON: I think that completes the questioning from the -- from the panel. So I think that we'll probably allow the witnesses to

stand down, so we can have the Manitoba Hydro panel move over. Before you -- before we -- before the departure of the -- of the witness, I'd like to thank you, Mr. Chernick and Mr. Stevens, as well, for your contribution to the proceedings of this panel and -- and the work you're likely to do in the future.

So thank you very much and have a safe trip home, both of you. Thank you.

(PANEL STANDS DOWN)

MR. SVEN HOMBACH: Before we disband for the day I was hoping to briefly address an administrative matter. I've had an opportunity to speak to Mr. Orle during the break who has advised that tomorrow there will not be any MKO presenters here. MKO presenters will be fielded in Thompson on the 14th during the presentations day in Thompson, which means we can start with Mr. Bowman immediately in the morning tomorrow.

That likely will mean that Saturday morning will not be necessary for that panel to sit. That is to be seen. There will also be a presenter at 8:45 in the morning.

THE CHAIRPERSON: One (1) presenter or

two (2), Mr. --

MR. SVEN HOMBACH: There's a presenter at 8:45 and another one at lunch tomorrow. And I see Mr. Hacault is in the back wanting to address Mr. Bowman, no doubt.

MR. ANTOINE HACAULT: Thank you very much. Mr. Bowman will be ready to present at nine o'clock. The point I wanted to address immediately is we had, in anticipation of his presentation, made a pre-ask of Manitoba Hydro with respect to the plans and pathways. And we're hoping that Manitoba Hydro can address that issue before tomorrow morning, so that -- that we can have that information before we start our presentation.

So, just to let you know, it was made last week and I think they're -- they may be able to do that, but I wanted to advise all present that we had made that pre-ask.

MS. PATTI RAMAGE: Perhaps Mr. Hacault can clarify because I believe Manitoba Hydro emailed that information. Are you just simply saying you want -- it was emailed this afternoon. They're -- are you suggesting you want paper copies distributed by Manitoba Hydro?

MR. ANTOINE HACAULT: Well, we can

distribute them, but it would be useful if there would be a short explanation with respect to the results of that pre-ask.

MS. PATTI RAMAGE: I'm sure we can accommodate that. We're just moving faster than I can keep up right now of throwing information and trying to satisfy people, so.

MR. SVEN HOMBACH: Ms. Ramage, why don't the lawyers talk to you in the break, and then we can regroup in a few minutes.

MS. PATTI RAMAGE: I think it's fairly straightforward. Mr. Wojczynski can go on the mic first thing in the morning to -- to file that as an exhibit.

THE CHAIRPERSON: I don't know if Mr. Hacault heard that. Did you hear that? Did you want to know...

(BRIEF PAUSE)

THE CHAIRPERSON: Is it possible for Mr. Wojczynski to address it right now?

MS. PATTI RAMAGE: Yeah, it's just a matter of copies. I -- I didn't realize Mr. Hacault needed it for before we could get started.

THE CHAIRPERSON: Why don't we take a break and -- and then we can have copies made -- so take ten (10) minutes.

--- Upon recessing at 4:14 p.m.

--- Upon resuming at 4:24 p.m.

THE CHAIRPERSON: I believe that everyone's in position, so we will resume the proceedings. I'd like to thank the -- the members of the Hydro DSM panel for coming back, and we had some questions that we wanted to -- to have addressed.

And so I'll turn the microphone over to -- to you, Mr. Hombach, or is it Mr. Williams?

MANITOBA HYDRO PANEL 3, RESUMED:

DALE FRIESEN, Previously Affirmed

LLOYD KUCZEK, Previously Sworn

LOIS MORRISON, Previously Sworn

ED WOJCZYNSKI, Previously Sworn

MR. BYRON WILLIAMS: I just have a humble request, and I'm not sure it's often that My Learned Friend, Ms. Ramage, and I think the same way, but we're certainly appreciative of getting the link to

the -- the article Board member Grant was referring to.

I know in past proceedings the Public Utilit -- like, the payday lending proceeding, for example, the Public Utilities Board shared a -- had a list of res -- research that it -- that it had been gathered independently by its staff and that it -- it had referred to -- or that it was reading.

And -- and I simply make a suggestion, if the Board was so inclined, it would be -- it would be helpful to parties if there is a -- a list of -- of kind of documents -- and I leave that for your deliberations, but we found it helpful to see what else the Board was referring to.

THE CHAIRPERSON: I think that's a fair request, and we'll certainly consider it.

And, Mr. Hombach, please.

MR. SVEN HOMBACH: Thank you, Mr. Chairman, and good afternoon to the members of Manitoba Hydro's load forecasting and DSM panel. I bet you thought you were done. I do apologize that you're not.

A lot of new evidence was filed since you were examined by all of the parties at the end of March, and the panel, in listening to the recent evidence and in reviewing the new evidence that has filed by Manitoba Hydro, had a number of follow-up

questions.

Procedurally, the -- the panel is in position to request that Manitoba Hydro panel would be called back. I've spoken to Ms. Boyd, and it appears you're still sworn as witnesses, so you won't have to re-swear an oath.

The panel has decided that questions will be asked primarily though Board counsel and then certainly afterwards if Intervenors have any follow-up questions, they'll will be given an opportunity to address them.

Before we get started, I do understand that Manitoba Hydro would like to speak to the pre-ask of MIPUG?

MS. MARLA BOYD: Thank you for picking up my little cue. I do have a number of things that have been circulated to be filed. So the -- there's only the last one that the Mr. Wojczynski will speak to very briefly, but just to keep the record up-to-date, you're aware our -- our staff has been working very hard to try and put together the information that we were looking for in your list of information. So there's a series of exhibits that I'd like to introduce. They are the product of long nights and short weekends. And Mr. Miles tells me he doesn't cry,

but I would have said, Blood, sweat, and tears.

So I suspect I'll be telling you something very similar again tomorrow when we plan to file some financial analysis. But what I have here is the economic analysis. The first one is Manitoba Hydro Exhibit 104-3-2, which is the supply and demand tables for Plan 4. That's Keeyask19/Gas40/250 megawatt line hypothetical with DSM Level 2.

--- EXHIBIT NO. MH-104-3-2:
Supply and demand tables for Plan 4

MS. MARLA BOYD: The second one is Manitoba Hydro Exhibit 104-3-3, the supply and demand tables for Plan 12, DSM analysis K19 -- Keeyask19/Conawapa40/750 megawatt line and DSM Level 2.

--- EXHIBIT NO. MH-104-3-3:
Supply and demand table for Plan 12

MS. MARLA BOYD: The third one is Manitoba Hydro Exhibit 104-4-3. This is the economic summary tables for Plan 4 and at the 5.4 and 4.65

percent discount rates.

--- EXHIBIT NO. MH-104-4-3:
Economic summary tables for Plan 4 at the 5.4 and 4.65 percent discount rates

MS. MARLA BOYD: Next is Manitoba Hydro Exhibit 104-4-4. That is the economic summary tables for Plan 12, again using the 5.4 and the 4.65 percent discount rates.

--- EXHIBIT NO. MH-104-4-4:
Economic summary tables for Plan 12 at the 5.4 and 4.65 percent discount rates

MS. MARLA BOYD: Next is Manitoba Hydro Exhibit 104-15, revision 3. This is an update to our Exhibit 104-15, page 2, for Plan 12.

--- EXHIBIT NO. MH-104-15-REVISION-3:
Update for Plan 12

MS. MARLA BOYD: Next is Manitoba Hydro

Exhibit 104-16, revision 3, again, an update to our Exhibit 104-16, page 2, for Plan 12.

--- EXHIBIT NO. MH-104-16-REVISION-3:
Update for Plan 12

MS. MARLA BOYD: Finally, we have revision 4 for Manitoba Hydro Exhibit number 171. This is an update to page 2 of Manitoba Hydro's Exhibit 171, again, for Plan 12, showing Level 2 DSM added to the chart.

--- EXHIBIT NO. MH-171-REVISION-4:
Update for Plan 12

MS. MARLA BOYD: And finally, is the diagram that is an update to Figure 14.2 from Manitoba Hydro's filing. I tell Mr. Wojczynski that this is my picture of how engineers think. I'd propose that it be marked as Manitoba Hydro Exhibit number 192.

--- EXHIBIT NO. MH-192: Update to Figure 14.2

MS. MARLA BOYD: It was requested by MIPUG. And I understand they're looking for a larger

version of this to be discussed tomorrow, so we will have larger versions of it produced tomorrow on a storyboard for the room. But in the meantime, if Mr. Wojczynski can perhaps walk you through how engineers think, it will help people understand the -- the diagram that's there. And I understand it will be used tomorrow.

MR. ED WOJCZYNSKI: Our wonderful court reporter doesn't think I can do this in two (2) minutes. Has someone got a stopwatch? This was the pre-ask from MIPUG. They ask that Figure 14.2, which showed all five (5) pathways, that, recognizing how things have evolved, they ask that we, if possible, update it, and also provide these storyboards that will facilitate Mr. Moore's presentation, direct evidence tomorrow.

What we have done here is -- first of all, it's based on Exhibit 104-1 loosely in terms of the capacity energy tables and the like, assuming DSM Level 2 in the pipeline load, 2013 load forecast. And recognizing the reality of where we are today, what we have done is combined pathways 1 and 2, recognizing that one (1) of the decisions possibilities or paths to go down is in the -- is at this point in time not to decide to advance Keeyask or to commit anything to

construction or any -- and to drop the export sales that we have signed, the -- the 250 MP and the 308 WPS, by not committing these and not proceeding with the projects.

Effectively, we lose all those options. And then down the road, we would have to make decisions on what would be needed for domestic load. Based on the particulars assumed in these capacity energy tables, we would need something in 2024. And that means in 2019, you would have to -- Manitoba Hydro would have to commit construction of Keeyask, which would mean backing things up; that roughly three (3) years from now we'd have to restart the NFAT process all over again for that.

There -- a choice that could be made in 2019 is we would commit Keeyask for that 2024 in-service date, or we could decide not to commit Keeyask and instead go with gas generation. And we recognize all kinds of other things will happen in that time: DSM, continued negotiation of export sales, load growth.

And the little blue sort of caterpillar that's at the bottom there is meant to reflect that every year we were doing our review of our load forecast, the latest DSM information, latest export

contracts, all those things, what this is depicting is the assumption that the load forecast doesn't change, the DSM level doesn't change, we don't get any new export contracts, et cetera.

It's a simplification of reality, because otherwise you have a thousand lines here. So this is assuming that we go ahead as per what is in Exhib -- Exhibit 104-1. Then in '24 you could build the gas turbine and then you'd have to make choices around then: Do we later on put in Conawapa as well, do we later on put in Keeyask, or do we not protect those options and commit those options and go with gas or something else for the later date?

So that -- those are pathways -- Pathway 1 and 2 which evolve into Pathway 1 or Pathway 2, as we described before. And these include Plans 7 and 8. They include Plan 1. They also include the Gas/Keeyask Plan that we have talked about in the hearing process and is in the IR process, LCA/Manitoba Hydro I-336.

Then we drop in the bottom here to Pathway 4 and 5, which at the front end has -- has now combined into one (1) pathway, because fundamentally, the choice is, do we adv -- if that pathway occurs -- if -- if a choice is made to advance Keeyask to 2019 and proceed with the 750 interconnection line. We

already have the MP sale signed. We have the WPS sale signed. And effectively, it will -- by the time the decisions are made, December, all those sales will -- not only would they have been signed, but all the approvals will be in place.

And what they are waiting for is the conditions precedent as to whether or not the generation gets built or not, because those are the conditions precedent, and the interconnection line. Assuming that we -- that this -- these choices are made, then the -- the 750 line is expected to receive approval by 2017, both in Canada and the United States. Then Keeyask comes into service in 2019, the tie-line a year later.

You see below that again we have that blue caterpillar. And that is every year we would review again all those same issues of DSM and load and everything else, whether the Great River Energy, SaskPower, NSP, or some other contracts we're negotiating, whether they come to fruition, what are the capital costs, what happens -- and all of those things would be reviewed.

And in this situation here what we're looking at now in 2022, we would have to make by then a decision if we want to get Conawapa in time for meeting

the WPS sale requirements. So -- and if you just stay on that line you carry on, Conawapa comes in, in 2030 and just in time to meet the WPS sale contract requirements.

In this one, the assumption is that in all those reviews earlier, in the blue caterpillar, there were no new export contracts and nothing that would cause Conawapa to come earlier. But this assumes we would have been protecting Conawapa for an earlier in-service date, but that nothing new gets negotiated successfully, and that's sufficiently attractive for proceeding and that we stick with just the -- the Preferred Plan, Plan 14, and we end up having Conawapa 2030 in that case.

In that 2022 time frame, we have a choice not to commit Conawapa. Remember, if you commit Conawapa, the WPS sale then goes ahead, because that was the pre-condition. If we do not commit Conawapa then or earlier and we follow the end, which is the 'no' out of that green decision, that -- then you get that purple thing that says, "Renegotiate WPS sale."

At that point, as Mr. Cormie, and myself, and Ms. Flynn has discussed, we would be in a position to discuss with any of the WPS whether we mutually agree to carry on with having gas generation

or whatever, meet the requirements of the energy and capacity that would be required for that sale.

And in that case you'd have a -- if we -- if it was successful on our side or their side, you get the 'Y', the 'yes', and we have the Keeyask/Gas Plan, which is Plan 5. Or if due to Manitoba Hydro not wanting to or WPS not wanting to, then you go with the 'N' on the top and you end up in Plan 6 or Plan 12, where you have Keeyask and -- and Gas eventually, but not on -- not on the time frame of this chart. And that's Plan 6 or Plan 12. That is our sort of depiction of the decisions we have and the flexibility in the future to change as we go along.

Obviously, there's a whole bunch of other in-service date possibilities. There's also a few started. Conawapa and a year later you wanted to cancel it or something, you could always do those things. But we're not trying to get into the thousand and one (1,001) possibilities there actually could be. We just -- these are just a general indication. Thank you.

THE CHAIRPERSON: Now, just -- just a question here in respect of looking at the very first pathway, Keeyask 2024.

That date was selected based on pipeline

load?

MR. ED WOJCZYNSKI: Yes, as per the -- some of the -- the analysis we've provided in -- in Exhibit 104. The assumption here with the 2013 load forecast, DSM Level 2, and the pipeline load. Recognizing that the load forecast could be higher or lower, DSM could be higher or lower, pipeline load could be higher or lower; I mean, there's all those possibilities.

But we have the capacity energy tables in Exhibit 104 for this one (1). We've provided economic analysis of some of this. So that's why we -- we chose to use that out of the many possibilities.

(BRIEF PAUSE)

CONTINUED CROSS-EXAMINATION BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Ms. Ramage earlier made reference to the Energy Savings Act. And if I could ask Ms. Villegas to put Section 7 of that statute up on the screen for a moment. Since this panel has last been examined, Manitoba Hydro has filed its two (2) Power Smart plans. It's filed the three (3) year plan as Exhibit 153, and the fifteen (15) year supplement as Exhibit 180.

Were both of these prepared in consultation with the minister under the Energy Savings Act?

MR. LLOYD KUCZEK: Well, the thr -- the -- the overall plan was prepared in consultation. We -- we decided -- the first year we did it we presented the fifteen (15) year plan and it was -- as a draft. And it was decided that their preference was to have a three (3) year plan. So that -- that's how that one (1) evolved.

And then after we concluded what would be in the three (3) year plan, we suppl -- or -- consequently later we developed the fifteen (15) year plan, but it was more of a formal -- it was more of a formal process just to document what was in the fifteen (15) year plan previously with some adjustments. So -- and it was done later on.

This year we -- we consulted with them again to -- to see if they wanted a three (3) year plan and a fifteen (15) year plan as well. And it was concluded that we would proceed with the three (3) year plan, and so we developed that. And then subsequent to that we developed the fifteen (15) year plan.

MR. SVEN HOMBACH: So just to clarify, the province asked you to develop a three (3) year

plan. Manitoba Hydro then developed a supplementary fifteen (15) year plan?

MR. LLOYD KUCZEK: Well, the issue was what -- what period of time they wanted to focus on. And their preference was to focus on the three (3) year plan. And so that -- that was the -- the conclusion of our consultations to develop a plan in accordance with the Act. And -- and the fifteen (15) year plan we developed then and -- and provided it to government as well, because we needed it for integrated resource planning purposes.

MR. SVEN HOMBACH: Has Manitoba Hydro ever considered going with a longer range plan, such as some other jurisdictions are doing? For example, the Ontario Long-term Energy Plan?

MR. LLOYD KUCZEK: We've had some brief discussions, but generally we've had a -- I believe we had a twelve (12) year plan at one (1) time. We extended it to fifteen (15) years. It wasn't always fifteen (15) years. It was a ten (10) year plan, and -- and then we extended it to fifteen (15). And we've had some discussions, but we've -- we've concluded to -- it's best to stay with the fifteen (15) year for -- at this point.

MR. SVEN HOMBACH: You're no doubt

familiar with the slide from Mr. Dunsky's presentation that shows Manitoba Hydro's incremental DSM savings going up quite rapidly and then going down.

Is that an intended effect of the plan, or is that simply a side effect of the measures that you focussed on?

MR. LLOYD KUCZEK: Mr. Dunksy's diagrams were based on the information that he had available, and what -- what we -- I have here, and we'd like to provide you with, is a -- a graph that depicts what's actually in our 2014 Plan. So the information that Mr. Dunsky had -- was -- it was based on the Level 2 DSM numbers that were provided, but that wasn't our -- what ended up being within our approved plan. So the peak that you'll see in Mr. Dunsky's diagram will not be as peaky, for example.

If you -- if you had the information in the 2000 -- the approved plan, it would show that. The other thing that it would show is is that in the longer term period, it's -- doesn't drop off as much.

MR. SVEN HOMBACH: Did you say you have a chart available at this point? Could it be put on the screen?

(BRIEF PAUSE)

THE CHAIRPERSON: I'm sorry, Mr. Kuczek, the -- the data that Mr. Dunsky used for his graph was...? What time frame are we -- prior to the Plan? The...

MR. LLOYD KUCZEK: We -- we can't duplicate exactly what Mr. Dunsky developed, but we assumed that he used the -- the data that he had available from the Level 2 DSM, and then he added the codes and standards from our 2013 plan. So the codes -- energy savings that -- that are going to be achieved through Codes and Standards got adjusted considerably in our 2014 plan so that it -- that explains the difference in the longer term.

MS. MARLA BOYD: Sorry to --

MR. LLOYD KUCZEK: We --

MS. MARLA BOYD: -- sorry to interrupt. I'm just wondering if we should mark that as an exhibit before I forget. It would be Manitoba Hydro 180 -- 183 -- 193. Thank you.

--- EXHIBIT NO. MH-193: Manitoba Hydro's chart

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Thank you, Ms. Boyd. So if I'm reading this chart correct, then Hydro

projects that after 2022, there's going to be annual incremental savings in the approximately 1 percent range to 2028?

MR. LLOYD KUCZEK: Correct.

MR. SVEN HOMBACH: Has Manitoba Hydro given any thought as to what's going to happen beyond that date, whether that's going to be extended at a similar level?

MR. LLOYD KUCZEK: The component from the Codes and Standards should extend beyond that, and it depends on which of the -- which Codes and Standards that we're referring to. I'm -- I'll just give you an example which will help explain things.

So -- so when we work towards modifying the Codes and Standards of new construction in the -- in the commercial sector, for example, and once you've got that in place, what happens as you go forward into the future is every new building that gets built, you -- you capture the -- those incremental energy savings that result from that code going into the future, so every year you will capture that. So that's why you see the flatlining into the future a significant...

(BRIEF PAUSE)

MR. LLOYD KUCZEK: So a significant component of the savings at the back end is related to Codes and Standards.

MR. RICHARD BEL: Could I ask -- can I just jump in, because it's about --

MR. SVEN HOMBACH: Absolutely.

MR. RICHARD BEL: -- it's about the forecast. So when I was looking at this again last night, a question that jumped up at me was when you integrated the DSM Level 2 into all the net present value economic analysis plans, am I correct in assuming that after 2023, in that analysis, DSM drops to point five (.5) forever? So is it this one (1) hit in the DSM Level 2 economic adjustments, or -- or is it continuing along at 1 percent? I'm just curious.

(BRIEF PAUSE)

MR. LLOYD KUCZEK: You -- that's the graph that Mr. Dunsky developed that showed the point five (.5), I believe. So we couldn't recreate that -- that graph that Mr. Dunsky provided, but again, you know, in fairness, I mean, Mr. Dunsky didn't have -- we just filed our 2014 Plan, I believe, the day before.

MR. RICHARD BEL: Yeah, I was clear on

that. I was asking about when -- we're seeing the plans were updated in the economic analysis for DSM Level 2. What level of DSM was carried forward into the future? Was it point -- point zero-five (.05)? Because after 2018, the original DSM level dropped down, and is that what was carried forward, or did it drop to zero, or...?

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: And -- and maybe if I can try to clarify. Manitoba Hydro provided economic analysis of various plans with DSM Level 2 over a seventy-eight (78) year timeframe, so presumably, for every single year a DSM assumption was made. We're not currently aware of what assumption you're making after the end of the fifteen (15) year Power Smart Plan going forward for purposes of that economic analysis.

So if that data could be provided either right now or by undertaking, it would be helpful.

MR. ED WOJCZYNSKI: We did provide the capacity energy tables for the DSM Level 2, and that provided the load and the DSM in it. Now, I don't have a handy graph for that, but that is part of the exhibits we have filed. Let me just see if I can -- even some of the ones we filed today.

THE CHAIRPERSON: It would be simpler, I think, Mr. Wojczynski, if we could have an undertaking from Manitoba Hydro to provide the information to address Mr. Bel's question. I think that'll be best for you and best for us so that we have a complete answer.

MR. ED WOJCZYNSKI: So the undertaking is -- or, Lloyd, do you want to say something? Do you have something there?

MR. LLOYD KUCZEK: Well, I just want to be -- we have to be a little careful, because you need to look at both the load forecast and the DSM numbers, because we -- we've provided you with a modified load forecast, and within that, we provided you with an adjustment due to the codes.

So that adjustment got transferred into the Power Smart Plan that we developed. So you got to look at both, and you kind of have to understand what's going on.

THE CHAIRPERSON: Okay --

MR. LLOYD KUCZEK: If --

THE CHAIRPERSON: -- and that's fair. I understand the difficulties involved. I just want to make sure that we have a complete answer. I mean, you're -- you're projecting -- this graph is suggesting

a 1 percent savings until 2028/'29.

And I -- I guess the question is what -- what's happening beyond that, assuming DSM Level 2, and so on? So I -- I think a, you know, an undertaking from your part would be satisfactory for us.

MR. LLOYD KUCZEK: We -- we'll provide a -- an undertaking to provide you with the information that the assumptions for DSM beyond '28/'29 that were used.

--- UNDERTAKING NO. 137: Manitoba Hydro to provide information on the assumptions for DSM beyond 2028 and 2029

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Has Manitoba Hydro prepared an annual report under Section 8 of the Energy Savings Act yet?

MR. LLOYD KUCZEK: Our first requirement under the Act will be March 31st, 2015 -- '15, yes, to do that.

MR. SVEN HOMBACH: So it hasn't been prepared yet, so that's going to be prepared closer to the deadline?

MR. LLOYD KUCZEK: It usually takes us close to a year to actually prepare that report, but having said that, we prepare -- without the legislation, we prepare that report every year anyways.

MR. SVEN HOMBACH: Are you prepared to file the most recent report on the record of the NFAT if that has not been filed yet?

MR. LLOYD KUCZEK: We'll do that.

MR. SVEN HOMBACH: Thank you. That's an undertaking to file the most recent progress report on DSM on the record.

(BRIEF PAUSE)

MR. LLOYD KUCZEK: We'll provide -- provide that.

--- UNDERTAKING NO. 138: Manitoba Hydro to provide the most recent progress report on DSM

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Has Manitoba Hydro ever considered having an independent auditor evaluate DSM progress, as opposed to Manitoba Hydro evaluating

it internally?

MR. LLOYD KUCZEK: Yes, we've had a number of discussions about doing that, and you can do that for individual programs and you could do that for your entire program, or portfolio. It's a fairly expensive venture to do and we're currently hiring Mr. Dunsky to do a review of just the process component at this point of our Lower Income Program.

We have talked to BC Hydro, because they -- they went down that road within their processes and there's advantages and disadvantages to undertaking -- or using external evaluations, but they're usually fairly expensive.

MR. SVEN HOMBACH: You spoke of disadvantages. Is -- is really the main disadvantage price, or are there other concerns that you have?

MR. LLOYD KUCZEK: Price and resource commitments, because, you know, even when you hire somebody to undertake a deman -- or a market potential study, a DSM market potential study, it takes up a lot of resources internally to do that.

It would be the same thing with undertaking an external review and the dat -- we have the data. It would just be a question of working with an external consultant to explain what the data is,

provide them with the -- the information, and they would do their analysis.

MR. SVEN HOMBACH: Manitoba Hydro filed a table that indicated that there would be a positive NPV of going to Level 2 DSM and a drop off going to Level 3.

Does that mean that Manitoba Hydro considers Level 2 DSM to be economic?

MR. LLOYD KUCZEK: Correct.

MR. SVEN HOMBACH: In your view, does the Utility currently have the necessary infrastructure to deliver economic DSM or to, for that matter, deliver Level 2 DSM and, if not, what resources would be needed?

MR. LLOYD KUCZEK: We -- we believe we need some additional resources. And we have plans in place to -- to get those resources. And we've already moved down that path.

MR. SVEN HOMBACH: When you discuss additional resources, does that mean additional personnel resources, or is it really a matter of having the -- the funding available?

MR. LLOYD KUCZEK: We have the funding approved and we need additional resources internally. And we're also open to using external resources where

it makes sense, such as using the AKI Energy Organization that we've been working with with First Nations.

MR. SVEN HOMBACH: Okay.

MR. LLOYD KUCZEK: That's very helpful.

MR. SVEN HOMBACH: During the last GRA there was discussion about two (2) community DSM delivery programs. I believe they were called 'build', where people go door to door, specifically with respect to low income programs.

Is Manitoba Hydro considering using additional third-party organizations to assist it in delivering DSM programs?

MS. LOIS MORRISON: One (1) of the initiative -- yes, we are. We are -- one (1) of the initiatives recently approved involves a greater outreach in electric heat communities to increase the number of people uptaking insulation upgrades. So essentially, yeah. We are definitely going to be going out to the community.

MR. LLOYD KUCZEK: But -- but just to add to that, we currently do outsource some -- some of our programs today, like the Refrigerator Buyback Program. We're using an external entity to help us there. The Water and Energy Savers Program, we're

using an external organization there. Build and Beep, we've been working with them. Those are two (2) community-based organizations, but there's also the AKI Energy organization that we referred to, so.

Manitoba Hydro is open to working with an external party for any of our programs where it makes sense.

MR. SVEN HOMBACH: What do you currently actually see as the main barriers then to achieving DSM?

MR. LLOYD KUCZEK: Each program has different barriers. So that -- that would be -- to an -- answer that question in -- in general is -- is difficult. But the opportunities are out there and it's really a question of -- in getting customers to participate in the programs. In a very simple -- to give you -- provide you with a simple answer, in terms of financial constraints we have financial services that we offer customers through loans and our PAYS Program.

So that -- that addresses that concern. But even though that addresses the financial concern, there's all sorts of other barriers, you know, that customers have and they're just not motivated to -- to incorporate those measures.

MR. SVEN HOMBACH: Okay. Getting back for a moment to the chart that was introduced as Manitoba Hydro Exhibit 193.

Do I understand you correctly that Manitoba Hydro does see it as its mandate to pursue all economic DSM, or at least it sees it as its strategy?

MR. LLOYD KUCZEK: I would view it as a strategy, close to a policy, but it's our overall strategy.

MR. SVEN HOMBACH: So are you assuming then that after 2023/'24 there will not be any economic DSM available to achieve incrementally more than 1 percent?

MR. LLOYD KUCZEK: There's a lot of uncertainty to what is going to be available in that time frame. What's included in our pro -- our plan today is our best estimate of what we're going to achieve. And we've had discussions about whether or not there potentially could be more in that time period beyond there. And we do believe there could be.

MR. SVEN HOMBACH: And if you've heard Mr. Dunsky's evidence on new technology becoming available, it just might not be here yet. He used the example of CFLs versus LEDs for example.

Is there any specific reason that

Manitoba Hydro is more cautious in its projections?

(BRIEF PAUSE)

MR. LLOYD KUCZEK: You -- you know when -- to forecast when a -- and Mr. Dunsky threw out the examples of shale gas and the fracking as an example of what can happen in the future. And he's correct there. But that -- that's a disruptive technology event. And those are very difficult to forecast. And I wouldn't -- I wouldn't want to count on those things happening.

What we do is we monitor emerging technologies as -- as there's developments that take place. And we incorporate those opportunities into our plan as -- as the risks become lower. And we were more conservative in the past than we likely will be in the future.

An example would be the LED technology for residential applications and road -- roadway lighting and -- and commercial as well. We were monitoring that market. We didn't think it was going to happen as quick as it did, but it did. But that doesn't mean all opportunities will unfold quicker than what some people are forecasting, so.

MR. SVEN HOMBACH: Now, there's been

quite a bit of discussion during the course of the hearing as to whether DSM should be considered at the load forecast level or at the integrated resource plan level.

Is there any specific reason why Manitoba Hydro did not use DSM as a resource as part of a plan? Let's say, for example, DSM plus gas, or DSM plus wind?

MR. ED WOJCZYNSKI: I'd like to answer that one.

MR. LLOYD KUCZEK: And I'll supplement that answer.

MR. ED WOJCZYNSKI: Could we turn to Exhibit 104-16, please, page 2? The one we just did -- it -- I believe that was just done this afternoon.

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: This is an integrated resource planning analysis of DSM along with the different supply options that were available to us in terms of gas and hydro.

MR. SVEN HOMBACH: So you're saying essentially DSM is part of all of the resource plans? That's...

MR. ED WOJCZYNSKI: Well, let me explain.

MR. SVEN HOMBACH: Sure.

MR. ED WOJCZYNSKI: If you take a look at the -- and I did try and explain this once when we were doing a number of undertakings and we didn't dwell on it a lot. But I think there's been a lack of appreciation of what this involves. So I think it would be worthwhile if we spent two (2) minutes on this.

MR. SVEN HOMBACH: We won't time you, Mr. Wojczynski. Please go ahead.

MR. ED WOJCZYNSKI: Now, first of all this does not have solar. This does not have wind mixed in. And we acknowledge that with a full scale IRP you look at all the options. And we did other analyses earlier that effectively screened those out.

And so this -- this analysis is -- is an IRP, but it's an IRP that looks at gas, looks at hydro, looks at interconnections with its associated imports, exports, and everything and looks at DSM levels that are different. We have the three (3) levels of -- well, actually if you look here and I'll explain how we do that.

We have under the DSM levels --

effectively we have four (4) levels of DSM. And then we have the different plans. And -- and you know the plans. I don't have to go through them all. And these are all comparable against each other. You'll notice that we have in the All Gas Base DSM we have a zero there. But all the others we have an -- an NPV number which is relative to that point.

And this is using the TRC analysis, so this is the -- the TRC analysis. We've talked about benefits and costs previously. So all of these can be compared against each other.

One of the concerns that people have expressed, and it's a -- it's a justified issue that you have to address, is it could be with one plan -- one mixture of supply options that DSM would be more attractive than in another supply option mix, or portfolio, or plan. They're all the same thing. A plan is really a portfolio.

And, so you can do that here. You can compare DSM Level 2 let's say with Keeyask/Gas versus at-base DSM, and you can compare it against having Conawapa, as well, and you can compare the numbers against each other. So if you -- and you look at -- look at the All Gas.

One concern might be that DSM looks

better in an All Gas scenario. So maybe DSM Level 3 would not look good in the Preferred Plan but maybe it would look good in an All Gas Plan. And if you did not do a full-scale mix of all the possibilities, you wouldn't have that information. This tells you, when you look at it, that you have the direct analysis of an NPV, and you can compare directly All Gas with Level 3 DSM against the Preferred Plan, or one of the other plans.

So you have a direct comparison of different amounts of DSM with different supply resources. Now, have we got every single plan with every single level of DSM? No. But we think that this is a reasonably sufficient amount of information to tell us that we have that -- that optimized mix.

MR. SVEN HOMBACH: That was helpful, Mr. Wojczynski, thank you. If we could go to Hydro Exhibit 95, slide 4.

(BRIEF PAUSE)

MR. SVEN HOMBACH: That is the chart that sets out the need for new dependable energy, and the need for new capacity under the various DSM scenarios, and the with and without pipeline load

scenarios.

To clarify, these dates do not assume new export contracts, do they?

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: This does not assume new exports, no.

MR. SVEN HOMBACH: If the Minnesota Power contract, as well as the Wisconsin Public Service contract were included, what would be the need for new generation under a DSM 2 scenario -- the earliest in-service dates?

Is that something we can glean from the demand and capacity tables, or the demand and energy tables?

MR. ED WOJCZYNSKI: Sorry, could you repeat that? I --

MR. SVEN HOMBACH: Yes.

MR. ED WOJCZYNSKI: -- I missed one of your components.

MR. SVEN HOMBACH: If we make the assumption that the Minnesota Power and Wisconsin Public Service contracts were included under a DSM 2 scenario, what would be the earliest required date for

new energy and for new capacity?

And if Manitoba Hydro would like to address that by way of undertaking, I'd be happy to accept an undertaking.

MR. ED WOJCZYNSKI: We have -- you can get those right from the tables we just looked at, even the exhibit we just looked at where it has the in-service dates. And, so I could just look at that for one second.

MR. SVEN HOMBACH: Yes.

MR. ED WOJCZYNSKI: If you look here at Level 2 DSM and Plan -- well, we could look at Plan 5. In that one, with Level 2 DSM and it doesn't -- without the pipeline load, you -- you would need -- after Keeyask, you would need a new resource in 2031.

MR. SVEN HOMBACH: And -- and just perhaps let me clarify, Mr. Wojczynski. Plan 5 in Exhibit 104-16 assumes that Keeyask is being advanced to 2019 --

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: -- and then deals with subsequent gas. My question was actually: If you assumed that there was no advancement in Keeyask to 2019, when would the earliest date for new generation be, assuming that those two (2) contracts are

continued?

MR. ED WOJCZYNSKI: Okay. And I think what you're asking me is a very particular question that, based purely on the capacity energy tables and nothing else, when would we first show a deficit of -- of capacity or energy in that scenario. That, I don't --

MR. SVEN HOMBACH: Yes, with the contract.

MR. ED WOJCZYNSKI: That information, I don't have, but I will answer the question in a more general sense. If we don't have Keeyask at the front end, we will not have the MP sale, and we will not have the WPS sale, because the whole contractual package with MP is that we have to have Keeyask to get the line and the pack -- and the sale.

But we can provide you the answer of when we first hit a dependable energy deficit, but that's a different question than, When would we need Keeyask?

MR. SVEN HOMBACH: I'm mindful that we can't go into CSI, Mr. Wojczynski, so I will tread carefully, but are you in a position to state whether that is something that -- that is written in stone, or whether those contracts could be completed if Keeyask

wasn't built? And if you can't answer it on the public record --

MR. ED WOJCZYNSKI: I can state that the contracts cannot be -- I can state at this point that the contracts cannot be fulfilled as the packages they are with Keeyask not being part of the mix already. I can point to one (1) particular thing, but I -- we may want to have a broader discussion that includes Mr. Cormie and Ms. Flynn.

But -- but as a first piece of information, I can point to the certificate of need with the -- the transmission line specifically states Keeyask being part of the package, because part of the benefits that Minnesota Power looks for and -- and the whole regulatory system are the benefits associated, not with just having the interconnection, but having the additional generation that provides the kind of benefit to the region, including assisting with wind, for example.

I also point to the condition precedent in the contract, the MP contract, 250 contract that has Keeyask. Now that is a condition precedent favourable to Manitoba Hydro, but it was part of the context for Minnesota Power, and there's some other elements that would be CSI that I can't get into.

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: And maybe this is a topic that -- on the day, I don't know what day has been chosen yet, but where the finance and economics panel are back up. That -- and I believe there's going to be a CSI portion to that, that that, perhaps, might be a time to address that more fully.

MR. SVEN HOMBACH: I -- I agree with that suggestion. I certainly have a few more questions, but we'll leave those for the CSI panel.

THE CHAIRPERSON: But I guess that, you know, just to -- to address that issue in a public forum without delving into the specifics of the contract, there are some people out there who believe that you have sufficient power to supply that Minnesota Power without new generation, for example. Yeah. I -- I could recognize that it's contingent upon Keeya -- Keeyask/Gas and a new US interconnection, but there are people out there who believe you can supply that contract with existing resources and no intertie.

And -- and you are suggesting that it's a contract term, admittedly, but you have the power to be able to supply that contract, don't you?

MR. ED WOJCZYNSKI: Yes, there are -- there are two (2) different questions. If you just look at the amount of capacity in the energy tables, the amount of surplus power we have, and you look at the amount of power required for the Minnesota Power sale, with enough DSM, for example, and if the load forecast doesn't go up, then there could be enough surplus power, I'm talking about dependable power here, to meet the requirements, say, just of the MP sale. Let's -- let's leave WPS or any other sale alone.

But when MP are entering into the arrangement, including with the interconnection, they are doing so with the express interests in the package that includes additional hydro on Manitoba Hydro's system to help fill the tie-line, and also provide more general benefits to them, so -- as part of an economic package, and -- and a whole economic package is not just the sale in isolation by itself. I don't know if that helps.

MR. SVEN HOMBACH: Are you in a position, Mr. Wojczynski, to address on the public record whether the construction of Keeyask is a condition precedent for Minnesota Power?

MR. ED WOJCZYNSKI: We're -- I -- I think we're getting into the CSI portion. Mr. Cormie

is here. If...

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: We know that a portion -- at least a -- a good portion of this is CSI, so from that point of view, it's probably better to have that full discussion there, but I -- but I -- I --

THE CHAIRPERSON: Well, you know, I think -- I think, Mr. Wojczynski, let me just intervene here just to make sure that we understand where we're going here. Like, what you tell us, we don't expect you to reveal any CSI. You -- you -- we expect you to talk in general terms so that all the Intervenors can hear you, and the public can hear you, and so on.

If you confirm it by going to CSI, we can delve into the contracts to confirm what you're saying, but for the standpoint of talking in general terms, let's -- let's have a conversation so that everybody can hear it and we can confirm your -- the details in a CSI portion.

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: And for the record, Mr. Wojczynski, I don't believe that the condition

precedent on the Minnesota Power Contract are actually CSI. I believe those are set out in the public version, but perhaps your lawyers can confirm that. I can move on in the meantime.

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: Perhaps the other questioning on the DSM could proceed and we have a small caucus to see what we can say in -- in this very important topic. It's not that we have any doubts that Keeyask is a condition of the MP -- arrangement for MP, but how we can explain that better than I'd explained it without getting into the CSIs is the issue. So maybe a -- a few of us could caucus and at least do -- do that to -- in a short while, while the DSM questions continue.

THE CHAIRPERSON: Speaking of shareholders, which you are through the government of Manitoba, we don't -- we want to -- we don't want to harm Manitoba Hydro competitive positions, so let's all agree on that point.

I -- I don't want anything about, really, the CSI being revealed here, but I -- I do want to have a general discussion in public about the issues

that you face, and -- and I think that everybody need -- - everybody deserves to hear that discussion, I think.

MR. ED WOJCZYNSKI: And I think Manitoba Hydro shares that. Our preference that we be able to have as much transparent discussion of that and the ability for the -- the general public, as well as the stakeholders, because the more we can share publicly, the more people will understand and accept and minimize what's in CSI, and we fully share that with you, Mr. Chair.

MR. BYRON WILLIAMS: Mr. Chair, if I just might say before Mr. Wojczynski disappears for his caucus, we certainly would like to ask him some questions related to the material that was filed today, which relates to both DSM and his -- the calculations. So I hope he's not disappearing for -- for too long.

MS. MARLA BOYD: I don't think he's intending to disappear at all. We'll just, at some convenient point in the -- the proceeding, take a bit of a break and come back and discuss it after.

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: I can move on in the meantime. You referred to the demand and capacity tables earlier, Mr. Wojczynski, and I'd actually like

you to take you to -- to one of them. If we could go to Manitoba Hydro Exhibit 104-3, page 57 of the document? If we could zoom to the core page level.

(BRIEF PAUSE)

MR. SVEN HOMBACH: That was my musical interlude for the day. This is the table for the K19 Gas 750 Plan, Mr. Wojczynski, and can you please confirm that under the contracted exports, this includes the Minnesota Power and the Wisconsin Public Service contracts?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: And if I'm reading the table correctly, if you look at the 2025/'26 year, about two-thirds (2/3s) on the right side of the page, the new energy for -- the new capacity from Keeyask in that year would be 630 gigawatt hours.

Do you see that?

MR. ED WOJCZYNSKI: Yeah.

MR. SVEN HOMBACH: Sorry, the 630 megawatts. We're dealing with capacity now, not energy?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: And on the bottom

there is an exportable surplus of 648 gigawatt hours, sorry megawatt.

So slightly more than that?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: If we move over one (1) year to 2026/'27, we see that the exportable surplus is less than the 630 megawatts provided by Keeyask?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: So that means that under this scenario the earliest required in-service date for Keeyask for capacity would be 2026/'27, including the Minnesota Power and Wisconsin Public Service contracts?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: Leaving aside the contractual issue that we just discussed?

MR. ED WOJCZYNSKI: From a capacity point of view, yes.

MR. SVEN HOMBACH: Right. If you look in the middle of the page on the left side you see the line about contracted imports? Under 'base supply power resources'?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: Those are the

diversity agreements, are they not?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: Has Manitoba Hydro considered extending the adversity agreements beyond 2024/'25? That -- that would push back the in-ser -- the required in-service date for Keeyask, would it not?

MR. ED WOJCZYNSKI: And that would require -- Mr. Cormie could answer better than me, but subject to check I know we certainly talked about it, but it's also something we'd have to have negotiation with MSP about.

And --and my -- my understanding subject to Mr. Cormie confirming it is that that's something we would have with them when they're in the -- the time frame of thinking about that far into the future. It's also the time frame they are starting to think about the diversity exchange in that time frame. They'd also be thinking about extending the MSP sale which also terminates ar -- in 2020 -- after 2025, so.

MR. SVEN HOMBACH: For a moment let's go two (2) pages down to the energy table for the same plan. Page 59. And if we could zoom to the page level again.

The way I'm reading that chart, Mr. Wojczynski, from an energy perspective under this plan

the earliest required in-service date would be 2029/2030, so three (3) years after the required need date for capacity?

MR. ED WOJCZYNSKI: You've got --

MR. SVEN HOMBACH: Specifically -- let -- let me take you through it. If --

MR. ED WOJCZYNSKI: You're -- you're taking -- you're having -- you're subtracting Keeyask energy out?

MR. SVEN HOMBACH: Correct. If we look at the top right of the chart we see that in 2029/'30, Keeyask adds 3,003 gigawatt hours of energy?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: And if we go to the very bottom of the 2029/2030 year we see exportable surplus of 2,699 gigawatt hours?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: So less than Keeyask? If you go to the left one (1) year to 2028/'29, we see that the exportable surplus is actually more than the energy provided by Keeyask?

MR. ED WOJCZYNSKI: Yes.

MR. SVEN HOMBACH: So based on that, the earliest required in-service date from an energy perspective would be '29/'30?

MR. ED WOJCZYNSKI: Yes, that's what I was saying. You -- you're subtracting Keeyask out and coming to that conclusion, yes.

MR. SVEN HOMBACH: Given your comments about the need to consult with Mr. Cormie, I would like to request two (2) undertakings from Manitoba Hydro. Firstly, to confirm when, if the diversity agreements were extended beyond 2024/'25, the earliest required in-service date for Keeyask would be, both from an energy and capacity perspective.

(BRIEF PAUSE)

MR. SVEN HOMBACH: That's acceptable?

MR. ED WOJCZYNSKI: Yes.

--- UNDERTAKING NO. 139: Manitoba Hydro to confirm when, if the diversity agreements were extended beyond 2024/'25, the earliest required in-service date for Keeyask would be, both from an energy and capacity perspective

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: And secondly, to provide additional confirmation as to whether Manitoba Hydro has considered extending the diversity agreements, and whether doing so would be feasible. And if not to -- to provide some background information as to why not.

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: Yes, so we got these two (2) undertakings that we will take on. But perhaps before I go off the mic, I should add that when you subtracted out the Keeyask energy from that, the calculation we just did, what was still left in there was the additional dependable energy our system obtains by having the -- the 750 megawatt tieline available with the exports.

So you -- if you're looking at a situation of not Keeyask and not the new tieline, then you're -- you can't count on all that dependable energy, because you'd have lost the depend -- the increased dependable energy that we could get with the tieline.

--- UNDERTAKING NO. 140: Manitoba Hydro to confirm if it has considered extending the diversity agreements, and whether doing so would be feasible; and if not, to provide some background information as to why not

MR. ED WOJCZYNSKI: It looked like you were going to ask me something on that.

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: It is. Would it be feasible for Manitoba Hydro to have the 750 megawatt line constructed before Keeyask is placed in service? And if not, why not?

MR. ED WOJCZYNSKI: I think that's another undertaking.

MR. SVEN HOMBACH: I'd be happy to treat it as such.

--- UNDERTAKING NO. 141: Manitoba Hydro to indicate if it's feasible to have the 750 megawatt line

constructed before Keeyask is placed in service

MR. ED WOJCZYNSKI: Yeah, you know, perhaps rather than us go off and do a -- a caucus in which to give a -- a full discussion that we -- we probably require. Mr. Cormie could at least provide what he -- what he can just off the top of his head and why don't we see if that --

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Because I understand that Mr. --

MR. ED WOJCZYNSKI: -- is a faster response than having to do a caucus.

MR. SVEN HOMBACH: As I understand, Mr. Cormie's also still sworn, so that certainly would be acceptable. Welcome back, Mr. Cormie.

DAVID CORMIE, Previously Sworn

MR. DAVID CORMIE: Well, it's good to be back. I put on my tie for you.

MR. SVEN HOMBACH: What wisdom do you have to share with us?

MR. DAVID CORMIE: I -- I want to speak about the arrangement with Minnesota Power and -- and the conditions under which the new interconnection will be dealt.

It has been clear since we began negotiations with Minnesota Power back in 2007 that there needed to be a package, a package of new generation associated with new transmission. And that's what was necessary in order to have the interconnection built. Building an interconnection without new generation was never -- was never anticipated, was never part of the understanding of the Minnesota Regulator of Minnesota Power at -- at any time. It was always seen as a package.

We did negotiate in the agreement the possibility that Keeyask could be delayed for regul -- regulatory reasons, but it was always everyone's understanding that if Keeyask is not built, there will be no interconnection. Keeyask can be flayed and we negotiated the ability to delay that into the contracts, but there will be no interconenction if there is no associated construction of Keeyask in the 2020/'21/'22 time frame.

Minnesota Power is filing with -- with their Regulator. The discussions we've had with the

Minnesota Regulator, the -- the negotiations that we've had with Minnesota Power have alway -- always been premised on that there will be new hydro generation. We were able to negotiate a -- a contract with Min -- Minnesota Power that gave us the flexibility to -- with conditions prece -- precedented in Manitoba Hydro's favour that -- that -- which Manitoba Hydro could waive.

But if you read through the iss -- through the contract and you -- you look at the -- how the environmental attributes are handled and the subsequent negotiations that led to the upsizing of the 250 megawatt line to 750 megawatts, that whole package is based upon the construction of Keeyask and the delivery of not only the power and the energy, but in Minnesota Power's ability to invest in new transmission, the wind synergy benefits that they would achieve, the lower LNP prices that they would see as a result of the delivery of new hydro into the region.

And that was all part of the package that led them to cont -- and -- and leads them to continue to believe that this is a good deal for -- for their customers. For Manitoba Hydro to now say that we're not building new generation, we just want the new transmission line, it's a -- it's a non-starter. And -

- and we still have to go through the Minnesota regulatory process in order to get that line permitted. To go there now and say that we want the line but we don't want to build new generation, I think that that -- that would be -- that would be a surprise, and -- and it probably would put the project at extreme risk.

(BRIEF PAUSE)

MR. SVEN HOMBACH: I want to be clear, when you talk about not building new generation, we're -- my earlier question was about not advancing Keeyask to 2019 but advancing it to when it would be needed for energy and capacity, does your same answer hold true for that? Are you -- was your answer based on not building any new generation?

MR. DAVID CORMIE: Minnesota Power requires the new generation early in -- either in 2020. They can -- they can cope with a delay up to '22. The contract reflects that. Anything beyond that date does not work to meet their -- their load requirements, and -- and a delay to 2031 or -- or some later date, it's not -- it's not part of the -- of the contract.

And the -- the reason that we have negotiated the ability to delay was for regulatory

reasons, not because Manitoba Hydro was choosing an -- a later in-service date. Our objective was to have an in-service date of 2019, but to cover off the possibility that there were -- there were delays associated with -- in getting the environmental approvals, or going through regulatory approvals. It wasn't that Manitoba Hydro had the choice of choosing a later in-service date.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Have you had an opportunity to caucus about my earlier question about the conditions precedent, or is that something that will have to be addressed later?

MR. DAVID CORMIE: I understand the conditions precedent, so if you have questions I'm prepared to answer those.

MR. SVEN HOMBACH: It's your understanding they're public?

MR. DAVID CORMIE: Yes.

MR. SVEN HOMBACH: Okay. Is it a condition precedent for the benefit of Minnesota Power that Keeyask go?

MR. DAVID CORMIE: No, it's a condition

precedent in favour of Manitoba Hydro.

MR. SVEN HOMBACH: Which means Manitoba Hydro could waive it?

MR. DAVID CORMIE: Yes.

MR. SVEN HOMBACH: Okay. So then based on that comment, on what are you basing the assumption that the transmission line may not get permitted if Keeyask is not advanced?

MR. DAVID CORMIE: If you read -- if you read Minnesota Power's Certificate of Need filing with the Minnesota regulator, the -- the premise of the entire project is that the line is needed to deliver new hydro, and the new hydro will be used to served mani -- Minnesota Power's new load requirements. And -- and to now say that we are not prepared to build new generation would be a distortion of the bargain that was struck between the companies.

MR. SVEN HOMBACH: Is it a condition precedent of constructing the transmission line that Keeyask gets built, or are you basing this purely on the proceeding before the regulator in Minnesota?

MR. DAVID CORMIE: The -- the line is necessary to deliver the new hydro from Manitoba. The Power Purchase Agreement and the investment in transmission are -- are linked contractually, and they

will not -- they can't be -- they can't be separated.

MR. SVEN HOMBACH: Okay. So let's be clear on this. You -- you indicated that building Keeyask is a condition precedent for the benefit of Manitoba Hydro that Manitoba Hydro could waive. You also indicated that the transmission line would be at risk if Keeyask is not built. That is why I asked you if it is a condition precedent of building the transmission line that Keeyask is actually constructed.

MR. DAVID CORMIE: The -- the Minnesota Power contract terminates if Manitoba Hydro does not commit to building Keeyask within the window that's provided in the contract.

(BRIEF PAUSE)

MR. DAVID CORMIE: Manitoba Hydro has the option of proceeding with the first rock in -- in the river in the summer of 2014. We can delay that by up to two (2) years, and that would delay the in-service date of Keeyask by two (2) years, and the contract allows for that. A delay in putting the first rock beyond two (2) years in -- in the river for Keeyask will result in the termination of the agreement.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Let's move on for a -- a moment. The -- the 2014 load forecast, that's not going to be provided in time for the -- the NFAT concluding, is it?

MS. LOIS MORRISON: No, it will not be available.

MR. SVEN HOMBACH: Are you, at this point, in a position to advise whether it's generally consistent with the 2013 forecast or whether it's going to be revised upwards or downwards?

MS. LOIS MORRISON: At this point, the only information that we can provide is what we've already put on the record in terms of some of the adjustments that were mentioned in the presentation done by Mr. Kuczek. In terms of -- we are anticipating to make some adjustments related to reflect price elasticity. We will be making an adjustment to reflect increased activity or response to our fuel -- our fuel choice initiative, and also for codes and standards.

And we are, as Mr. Friesen has previously testified, in discussions with the top consumers to have a better understanding as to what their future load requirements are.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Do the updated load for -- sorry, the updated population forecasts that were filed as Exhibit Manitoba Hydro 93 suggest that residential forecasts will also be lower as a result of lower than anticipated population growth?

(BRIEF PAUSE)

MS. LOIS MORRISON: At this point in our analysis, they are approximately the same.

MR. SVEN HOMBACH: Okay.

(BRIEF PAUSE)

MR. SVEN HOMBACH: The 2014 Power Smart Plan that's been filed, I looked for the words 'Level 1' or 'Level 2', and -- and they are not in there. It -- does it assume Level 2?

MR. LLOYD KUCZEK: No. Level 2 was developed for the purpose of the sensitivity analysis, so our 2014 Power Smart Plan is not equal to any of the levels. The only thing you could -- it -- I can say is

it's -- in terms of energy savings that we're planning to achieve, it's close to Level 2.

MR. SVEN HOMBACH: Can you be slightly more specific when you say, "close to Level 2," where between the two (2) it is?

MR. LLOYD KUCZEK: You know, it's so close, I -- I don't think it -- it would be -- there's much of a difference. It might be slightly lower in the further years, but it's -- it's fairly close. We made adjustments within the program to individual programs, so that's why, you know, I'm saying it's -- it's different, but it's similar, and it's -- it's close to Level 2.

MR. SVEN HOMBACH: Now, you did provide the costs that were assumed collectively in the economic analysis in Manitoba Hydro Exhibit 104-4. The fifteen (15) year Power Smart Plan does not provide the cost of individual measures beyond the fifteen (15) year date.

Has Manitoba Hydro conducted any analysis at this point as to what the cost on a measure-specific basis are going to be beyond the fifteen (15) years?

MS. LOIS MORRISON: Are you referring to by a program-by-program basis beyond the fifteen

(15) years?

MR. SVEN HOMBACH: Yes.

MS. LOIS MORRISON: That information is in the background spreadsheets or in the background Excel files as -- as to what we provide or what we will eventually provide to resource planning, so we do have that information.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Now, Level 2 DSM, as I understand it, that includes Level 1 DSM plus fuel switching, conservation rates, and load displacement, and when you're discussion conservation rates, that means inclining rates?

MS. LOIS MORRISON: Yes, we are modelling a structure based upon an inclining rate -- inclining block rate structure.

MR. SVEN HOMBACH: And you've assumed that that's going to be phased in in 2019?

(BRIEF PAUSE)

MS. LOIS MORRISON: In terms of Level 2 DSM, ir are you looking at our '14 plan?

MR. SVEN HOMBACH: I'm looking at the -- the '14 year plan.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Which is Exhibit Hydro-180. Will you accept it subject to check that you're assuming 2019?

MS. LOIS MORRISON: Yes, I will.

MR. SVEN HOMBACH: Okay.

MS. LOIS MORRISON: There's a number of dates floating around, so yes, I'll -- I'll accept that.

MR. LLOYD KUCZEK: Just add a comment, though, the -- the 2014 plan, when we're talking fuel switching and conservation rates, those programs are not improved -- approved internally. These programs and the energy savings that we have within the plan are placeholders at this point, and we have to do further analysis to -- and consultations with the government before a -- a decision is made to move forward with those initiatives.

MR. SVEN HOMBACH: And they would also have to approved externally by the PUB?

MR. LLOYD KUCZEK: The rates, yes.

MR. SVEN HOMBACH: Inclining rates would be a first in Manitoba, would it not?

MR. LLOYD KUCZEK: No, we actually had inclining rates, very insignificant inclining rates, for a short period of time.

MR. SVEN HOMBACH: It must have been before my time in the province.

Do you recall when that was?

MR. LLOYD KUCZEK: Five (5) years ago.

MR. SVEN HOMBACH: Are you making any specific assumptions on what the sizes of the blocks would be, or what the difference in pricing between the blocks would be in reaching your Level 2 projections?

MS. LOIS MORRISON: In preparing the estimates of the placeholder, as Mr. Kuczek referred to it, we modelled it after what BC Hydro has in place, and so essentially assumed similar -- if we were to apply a similar structure, what would be the corresponding energy savings that we might realize? We have not done, as Mr. Kuczek mentioned, a specific detailed analysis or rate design that would be reflected in the Manitoba market.

There's a lot of factors that we have to consider, specifically that were raised by this Board under the previous hearings when we did have the

previous inclining structure related to recognizing customers with elect -- electric heat and some -- a number of other issues. So what we put in, as -- as I mentioned, is a -- is a placeholder as to what we think the savings could be based on, a analysis -- of the BC Hydro initiative.

MR. SVEN HOMBACH: Let's actually maybe put the chart up for a moment. It's Manitoba Hydro Exhibit page 56.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Mani -- Manitoba Hydro Exhibit 180, page 56.

(BRIEF PAUSE)

MR. SVEN HOMBACH: On the bottom, you see the conservation rates and you're seeing the assumptions.

If we look all the way on the right, you're assuming that conservation rates would account for approximately 14 percent of the savings?

MS. LOIS MORRISON: That is correct.

MR. SVEN HOMBACH: So if for any

reason, whether internally or externally, you could not get inclining rates approved, your savings would go down by approximately 14 percent?

MS. LOIS MORRISON: If all else stayed the same, yes.

MR. SVEN HOMBACH: Can you provide the panel with an explanation of what assumed changes to the fuel switching program are included in the new report?

(BRIEF PAUSE)

MS. LOIS MORRISON: The fuel choice initiative -- or sorry, the Fuel Choice Program that's presented here is a -- a broadly designed program based upon an incentive, where we pay the customer a substantial amount of money to support them changing to a natural gas furnace. I believe we used a value of about three thousand dollars ($3,000) in putting together the -- the projections for the savings and the program uptake.

(BRIEF PAUSE)

MS. LOIS MORRISON: And I should

mention, this is in addition to the savings that we are anticipating to -- or the reduction in load requirements that we're expecting to see from our fuel choice -- our heating costs -- heating education campaign, or the heating education initiatives, working with -- which -- where we, as previously mentioned, focussed primarily on new developments and encouraging people not to make a switch to electric, but to stay with gas.

MR. SVEN HOMBACH: Okay. And the -- the third component of Level 2 would be the load displacement, correct?

MS. LOIS MORRISON: That is correct.

MR. SVEN HOMBACH: Let's go to page 42 of the document for a moment. Sorry, actually, let's go to page 42 of Manitoba Hydro Exhibit 153.

(BRIEF PAUSE)

MR. SVEN HOMBACH: Page 42. The Customer-sided Load Displacement Program that's contained in the 2014 Power Smart Plan, is that the Load Displacement Program that's assumed under Level 2 DSM?

MR. DALE FRIESEN: It is a -- a more

refined version of what we proposed, yes.

MR. SVEN HOMBACH: And that is a new program, is it not? It wasn't in the 2013 plan?

MR. DALE FRIESEN: That is correct.

MR. SVEN HOMBACH: Okay. Let's scroll down to the bottom of the page. You're assuming a three (3) year energy savings of about 335 gigawatt hours?

MR. DALE FRIESEN: That is correct.

MR. SVEN HOMBACH: And the customers are listed on the top that you're signing up, the eleven (11) in 2014, fourteen (14) in 2015, and seven (7) in 2016/'17. Those are all incremental, are they not?

MR. DALE FRIESEN: That is correct.

MR. SVEN HOMBACH: Are you confident that you can actually achieve this target?

MR. DALE FRIESEN: The -- the targets that we've identified here are based on opportunities that we feel are relatively well established. They're customers that we currently have engagement with and are working with to evaluate and substantiate the business case, so we feel that the opportunity is there. There may be some year-to-year variations due to timing of construction, permitting, other issues,

but we feel that these savings are achievable, if not exactly within the three (3) year timeline that's given here, but they are -- they are achievable, yes.

MR. SVEN HOMBACH: Collectively, then, are you confident that you can actually achieve Level 2 DSM, provided that you can obtain conversation rates? Yeah, let me re-ask the question, Ms. Morrison.

Collectively, then, is Manitoba Hydro reasonably confident that it can actually achieve Level 2 DSM, provided that you can get conservation rates improved --

MR. LLOYD KUCZEK: We've had a number of discussions about our plan and -- with regards to our confidence, and at this point, we are confident that they're -- we're going to achieve the -- the energy projections within our plan.

MR. SVEN HOMBACH: And please remind us, Manitoba Hydro is not discounting DSM. It's assuming that 100 percent of DSM is going to be dependable and can be relied upon?

MR. LLOYD KUCZEK: Yes, and -- and it's -- our view is similar to what some of the other witnesses have testified. With the plan, we make adjustments every year. So as we move forward, each program is reviewed in terms of how well it's

performing, and -- and we may be off in terms of the year that we're going to get the savings, but we mig -- and we might have to make adjustments to the program designs. The adjustments could be -- could include increasing incentives. It could be changing where we're targeting incentives from the customer to, potentially, a supplier, but overall, we've been doing this for a number of years, and each year we review the plans, the individual programs, we make adjustments.

There'll be changes from one plan to another going forward, and generally, we believe this is our best estimate of what we're going to achieve going forward and it's similar to a load forecast. There will be changes as we -- as we move forward, and we'll make those changes accordingly each year.

MR. ED WOJCZYNSKI: I need to supplement that. From a decision on the future supply point of view, we are not going to discount the DSM, and what -- if you remember the definition of 'discount' that was provided by the consultant -- and now I can't remember which one it was, there have been so many good consultants. Where that is the definition of 'discount' in there is where you -- you reduce it by 10 percent or 20 percent or such -- such thing to account for uncertainty.

Manitoba Hydro is certainly not going to do that, and everything Mr. Kuczek said is accurate, but -- but also, just like load forecast has uncertainty, there's some uncertainty associated with it. There's also some uncertainty associated with DSM, and we've heard various DSM witnesses, including Mr. Dunsky, saying the same thing.

So when -- from a resource planning point of view, when we're looking into the future deciding what the in-service dates are and what are the risks, we consider -- particularly when it's in the longer term, not just a couple years out, we consider the uncertainty in load forecast.

We also will be considering the uncertainty in DSM, and particularly, when we're doing the middle of this ramping up of DSM and -- and there have been many agreed that this is a dramatic ramping up of DSM that we will be considering the fact that ten (10) years out, we don't even have all those programs fully designed yet, and the program will be updated as we go along.

So we're not going to discount it, but we will consider the fact there's some fundamental uncertainty, and it -- just like there is in the load forecast.

DR. HUGH GRANT: Sven, can I?

MR. SVEN HOMBACH: Yes.

DR. HUGH GRANT: I'm just -- while you've got this table up, I'm wondering, can I look at this and try to figure out what the utility cost per kilowatt hour saved is to the utility or to the customer, because this -- I take it the energy savings is cumulative, is it? So I've got, say, for 2014, that's the investment undertaken by the utility, but it's going to provide this stream of benefits?

MS. LOIS MORRISON: When we calculate the levelized costs per kilowatt hour of, say, the utilities investment or the resource cost investment, we look at the program as whole. We wouldn't look at just the three (3) years. So to -- to determine what the levelized utility cost is, it's best to go to the fifteen (15) year supplemental document, and it's all of those --

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: That's Hydro Exhibit 180. MS. LOIS MORRISON: And Mr. Williams has very nicely told that it's on page 42, so he's apparently skipped ahead.

So on page 42 are the metrics that you're looking for in terms of the Utility's perspective metrics, and if you go back to page 38, you would see the integrated perspective metrics that we've talked to at quite a bit of length in this -- this hearing in terms of looking at the total resource costs, benefit analyses, looking at the levelized resource costs.

And then going to page 42, you would find for each program proposed, you would find the levelized utility costs also included. So if we go down just a little bit further please, you can find the load displacement and alternative energy. There, you can see that the levelized utility cost is one (1) cent a kilowatt hour.

DR. HUGH GRANT: Total resource cost?

MS. LOIS MORRISON: The total resource cost, you have to go back to page 38.

DR. HUGH GRANT: Just give me a ballpark, because I can't find -- I'm getting a headache trying to follow the scroll, there.

MS. LOIS MORRISON: It's five (5) cents.

DR. HUGH GRANT: I want to get a question in. Maybe this is just as good as time as

any. I'm still struggling to try to figure out this remarkable gap between apparently the cost in some US states of generating capacity and the apparent -- how cheap DSM apparently is. So we could all just go to Hawaii, where they're spending what, thirty-one (31) cents to generate a kilowatt hour of electricity.

We could go in and tell them that for three (3) cents a kilowatt hour, we could save them all this money, and I'm still trying to, you know, understand this large gap. And I understand -- I -- I get that there's a incentive problem in -- in some case.

But -- but could you enlighten me on this, why there -- there would be -- why you would have these utilities producing power at thirty (30) cent -- thirty-one (31) cents a kilowatt hour, extreme case obviously, when we could go and enlighten them and tell them we could, you know, save them that cost?

MR. DALE FRIESEN: Okay. If you don't mind, I'll address that question. The premise of the load displacement program, as we've indicated in our literature, is on a no-cost or low-cost fuel basis. So essentially, what we're dealing with here is the original or the originating energy source for load displacement is based on byproducts or waste products

that are coming from various industrial and agricultural processes.

So initially we have a very low fuel cost, so that in and of itself has a tremendous impact on the levelized resource cost. The actual technologies that we are using to convert these energy sources into electricity are priced in the range of thirty-five hundred (3,500) to five thousand dollars ($5,000) per kilowatt. These are not exotic technologies. These are proven technologies that are in the marketplace today and have well-established costs. So that's the basic premise.

Now, the difference between the levelized resource cost and the utility cost is premised on the fact that the customer has an immediate benefit, which is the marginal value of the energy that they're no longer required to purchase from the electric utility.

And when you compare those three (3) values, you look at a levelized cost in the range of five (5) cents, you look at a marginal return to the customer on energy not purchased being in the range of four (4) cents, you're left with about a cent. And that's where the levelized utility cost component comes from.

DR. HUGH GRANT: Okay. What I was struggling with is so presumably my concern here should be about the social costs and the social benefits. I don't care if it's, you know, from the point of view of who's going to actually pay for it. If it makes sense to undertake the investment from a social perspective, we should do it.

So if I were to use total resource cost as my metric, why in the world would we not -- you know, why shouldn't Hawaii shut down half of their generating stations and put DSM in? It seems like a lot -- you know, there's megawatt, megawatt comparison, whatever.

If I can save a kilowatt hour, you know, for five (5) cents total reserves cost instead of spending thirty-one (31) cents to produce it, why aren't we doing this?

MR. DALE FRIESEN: I'm struggling a little bit the -- the thirty-one (31) cent kilowatt -- cost per kilowatt hour in the context of Manitoba. And -- and --

DR. HUGH GRANT: I just picked an extreme case. I mean, I thought we could go -- you know, go consult in Hawaii and make a fortune doing this. It just seems it's such a gap --

MR. DALE FRIESEN: Like --

DR. HUGH GRANT: -- it's such an enormous gap, why isn't it --

MR. DALE FRIESEN: Yes. So if -- if you look at the -- again, if you return to the premise of our program, our program is -- is based on what is a mutually beneficial case for both Manitoba Hydro and our customers. They have waste streams. They have byproducts that may or may not have a cost to them to dispose of today. In some cases, there may not be a cost today but there may be a cost in the future.

So by using that energy in a productive way, or that waste energy in a productive way, we're providing a benefit to them that factors into this equation. So not every jurisdiction, not every customer in other jurisdictions has that same opportunity. And that opportunity is really derived from the type of industry that you have, and many other jurisdictions are pursuing load displacement, and their resource costs are very similar to ours.

DR. HUGH GRANT: I just don't understand why they're not doing it more. So in other words, we could sit here and talk about building a dam which, let's for the sake of argument say would -- is going to cost us ten (10) cents per kilowatt hour,

provided that -- just --

MR. DALE FRIESEN: The supply of waste product and -- or no-cost or low-cost energy to convert to electricity is not unlimited. It's dictated by the level of industrial activity and the type of industrial activity that you have available in your jurisdiction.

So I'll give you a representation. We have a customer that, for every kilowatt hour -- or for every 10 kilowatt hours of energy that they consume, they produce the equivalent of about 25 kilowatt hours of waste energy. It's a product that they dispose of today.

So I can't expand my capability to generate beyond that 25 kilowatt hours even if I had a hundred percent efficiency, which I can't achieve. So of that 25 kilowatt hours that I have available, if I have a conversion of efficiency of, let's say, 50 percent, I get 12 1/2 kilowatt hours. That's the absolute theoretical limit of what I can accomplish and what can -- what I can achieve.

So it's -- there is an upper limit as to what you can achieve based on the resource you have available to you. And that resource is dictated, like I said, by the type and quantity of energy supply you have available, which is related to the type of

industry you have.

DR. HUGH GRANT: It's not you. It's either the time of day or my cognitive limitations. Thanks for at least -- I'll get back to you on this.

MR. DALE FRIESEN: Okay.

DR. HUGH GRANT: Thanks.

THE CHAIRPERSON: I'd like to attack things from a slightly different perspective. And, you know, I want to frame it from the perspective of the householder or the small business owner out there who is faced with potentially rate increases of 4 percent over an extended period of time.

And it seems to me that we should be able to tell that small business owner or householder that, you know, despite these increases, there are opportunities for you to reduce your cost if you undertake certain things. And we've already described, you know, if I switch my furnace to a gas furnace I save six hundred dollars ($600) a year. If I change my water heater, I'll save eighty dollars ($80) a year.

So is there a way in which we can tell that householder or the small business owner that, you know, sure you'll get 40 percent rate increases or, you know, over and above what you're paying now, but you can save 20 percent, or you can save 16 percent, or...?

Is there in some way we could put it in those terms to the householder?

MS. LOIS MORRISON: Much of the advertising and the communication that we do to date, and we -- we do try to -- when we're -- when we're communicating to our customer we're trying to tell them what they can save on their bill, and that's a very strong message for when we talk to customers about improving the insulation on their home or making a change to -- you know, to their water heating equipment.

When we're messaging though we -- when we're out in the general public we -- in terms of advertising the Power Smart programs, we usually try not to say, Oh, by the way, we're going to hit you with a rate increase and this is what you can do to -- it -- it's how we message.

What we -- what we would expect to be doing as we go forward is having a stronger message out to the public about what they can do to reduce their energy bill and, therefore, see a reduction in -- in their overall -- the overall impact to their bill.

But we -- we don't normally try to mix those messages, because they're aren't usually well received. We -- we -- they -- they don't -- customers

won't focus on the message that would help them.

MR. LLOYD KUCZEK: But -- but, you know, overall, if you -- if you're involved in the DSM industry, whether it's the load displacement opportunities or residential or commercial, there's all sorts of people out there, and they're -- they're all different.

And so to achieve the -- the opportunities in the DSM industry we are with our plan over a number of years achieving significant numbers in terms of gigawatt hours. I think it'll work out to over 6,000 gigawatt hours over by the end of this fifteen (15) year period. That is -- that's not insignificant.

Part of that is through codes and standards. Changing codes and standards is a long-term process. We have people involved in that that work on it for a number of years. And then it takes a while before they're actually implemented. And as you see in our graph, it takes a number of years before you even reap the benefits from that.

But just individuals themselves, within my own family -- and I've used this as an example before, and I'll just put this on the table because there's many more types of people out there, but it

helps to understand what we're dealing with.

So I have a brother that's a millionaire. He does not care about energy efficiency. So no matter what we do and what the incentives are, not likely to get him ever, right. You -- you almost wait -- you have to wait till he sells his home, his cottage, the next person moves in might make -- make the changes. That's over decades.

My father, he's now in his 70s -- or 80s, actually but, you know, when I started in this he was in his 70s. When I talk to him about energy conservation he -- he comes back with: Lloyd, I don't know how long I'm going to be here. Why -- why do I care about pay backs of six (6), seven (7) years, right?

So -- so the -- the seniors think differently. My sister is on the low income side of the category, and she's got all sorts of other things she's focussing on. And so you -- you don't talk to her about energy efficiency unless you're going to give it to her, just like we're doing with our program. So -- and, you know, I have another brother that's a blue collar worker, and he's implementing some of the measures because he can afford to.

And -- and so each one of you would be

different and each one of us are different. Ms. Morrison didn't change her fridge and -- or furnace. I mentioned that earlier, right? You -- you know, and she understood the economics.

You know, so it -- it -- what -- what I'm really communicating -- the message is it's a -- it's a challenge, but there's an opportunity there. And as a utility we should pursue the opportunity because it's economic. And -- and so we've had a program in place and we're wrapping it up, more aggressive, captured more opportunities and we think it makes sense.

THE CHAIRPERSON: But you realize the dilemma you're -- I -- I -- you realize the dilemma you're -- you know, the -- the public -- what the public has in -- in their head is 3.95 percent increases over the next twenty (20) years. That's -- that's what's sticking in people's mind. And it seems to me we should be able to tell the typical householder can save 20 percent of their bill by adopting an available set of -- of energy measures.

I -- I think you're doing that, but you know, is there some way we can quantify what a typical householder can save by adopting the measures that are available from Manitoba Hydro?

MR. LLOYD KUCZEK: Well, not everybody has opportunities to save 20 percent, you know, right? So a lot of people, the opportunities are minimum. Like, you could change to CFLs or LEDs today, but if we told them how much they're saving per month they probably wouldn't even do it because it -- it's not a big savings.

Changing their fridge, if they've got a really old fridge makes sense. But if your -- if you've got a fridge that you bought even ten (10) years ago and you -- you know, even if it's consuming 650 kilowatt hours a year and you're going to buy something that's going to do five-fifty (550), do people really care? Do they want to go through that inconvenience?

So -- so the opportunities are there, but the bigger ones are with insulation. That's a big measure. And not everybody wants to do insulation. It depends on, again, you know, all those categories I talked about. You know, it depends where they are in life, what they're planning to do, whether they're going to stay, whether they're going to move.

Do you want to add to that?

MS. LOIS MORRISON: We -- I -- I believe we did file as an undertaking some examples of what the possible savings might be. And -- and we were

very challenged -- for a residential customer if they did -- if their house was this and if they did this and if they did this. And -- and our challenge in trying to respond to that undertaking is, as Mr. Kuczek mentioned, we don't -- there's the average house, but no one lives in that average house.

So when we do our -- our advertising for -- so -- so here's an example. We did a mailing to the Interlake area a little while ago. And in that communication to the customer we said, You could save this much on your home based on the fact that the majority of them -- some of the -- the houses we targeted were electrically heated. And they -- they could have installed a water and energy saver package and save a certain amount.

So what we did was we looked at the homes that might be more likely for that area, picked out what we think they might be best benefited from, and then we put together a communication as to what they could save. We don't talk about percentage, but what we said was you could save 'X' amount of money, dollars, on your -- your monthly energy bill by doing this.

So it's -- it's hard to say the average home because I said the -- the savings in the average

home don't really reflect what the -- what the Man -- the -- the ratepayers are going to see. So what we want to do is try to target it.

And -- and I do believe, as I said, we had the one (1) undertaking where we identified if the home is electrically heated and they upgrade their insulation from -- I think it was 'R' -- their attic insulation from R30 to R50, and if they add -- if they undertake the water and energy saver package, and if they do these components they could save this much on their average bill.

Like, we -- we tried to give you an idea as to what that might be. But to give you the one (1) number is difficult because we wouldn't do that. We would target it to the individual -- to those groups to more represent what they would realize because those people that are going to see the greater savings, as Mr. Kuczek mentioned, are the ones that need to upgrade their insulation. So we're going to target the older -- the home -- the areas that have older homes and have more opportunity.

MS. MARILYN KAPITANY: So, Ms. Morrison, I haven't been involved with PUB for very long, but we did talk about this as the gas rate hearing that -- that I was involved in. And I don't

see what's changed since then. And yet, you've expanded your -- the plans that you have for DSM and you've built it into NFAT. I'm not sure what the impetus for that was, but I'm happy to see it.

But I don't see what's changed that's going to allow you to reach your targets now when you haven't been in the past. And -- and I look at some of the jurisdictions that have had really good success and I expect that you probably have talked to those people in Washington, in Vermont, and asked them, like, what is it that they're doing that's not happening in Manitoba and what is it that's going to get us up that ramp and actually have us meet these targets?

We talk about it being dependable energy. How is that going to happen?

MR. LLOYD KUCZEK: Well, first of all, I'll let Ms. Morrison elaborate on that, but I'll just point out, with the new plan, first of all, we've identified some new opportunities, or we're pursuing some new opportunities that aren't necessarily new, like conservation rates. We've talked about that for a while.

So now what we've put on the table is an -- an aggressive rate structure that's going to actually achieve some results. The previous

conservation -- or inclined blocked rate structure that we had in place was -- an I even said that in our shop, you know, it's not going to do anything, right.

So we put a serious rate program in place to -- or we're proposing one. Fuel switching, we think there's opportunities there. We've talked about that at -- at these hearings for a number of years, so that's on the plate but again has to be discussed further.

Load displacement, we were pursuing load displacement with one (1) of our customers in 2005 for a period of time when the export market was very lucrative. We've since -- recently these other opportunities have surfaced. This is something that -- that I had in mind in -- in 2005, but they've surfaced and they were brought forward and we've put them in the plan.

If you look at the numbers associated with those three (3) components, they're fairly significant. That's going from, you know -- so it's -- it's not similar to the other programs that we have within our portfolio. So the other thing that we did do is we -- we didn't extend our programs beyond '17/'18. We had our plan that ended at that point. So our staff had programs that designed and -- and were

going to end at that time. So when we updated this plan, we said, Well, why are you stopping at '17/'18? Like there's probably still more opportunities.

So another significant component was added just by extending the programs further in time, because some of the people that I talked to will change homes and they will implement those measures. So you still capture those opportunities. It's just -- it takes time for -- for things to happen and things to change within a -- a home, or within people's lives.

And adding to that we modified some of our programs to be more aggressive. So and -- so we -- Ms. Morrison could talk to, you know, the discussions we've had with other utilities, but those programs that we're talking about, those typical programs, we're quite confident that we're going to achieve the results from those programs. I'm not too concerned about that.

Load displacement, Mr. Friesen and his staff are working on that. They're -- we've talked about the confidence level there. They're fairly confident. The two (2) that require further discussion are the conservation rates. We've talked to BC Hydro and -- and their staff about what they've achieved. They've implemented them for a number of years.

And so we feel our numbers that we're

estimating, if we implement the rate structure we're talking about, are reasonable. And then with fuel switching, you've seen the slide or the video, the opportunity there, the economics associated with that are so substantial, how could you not capture some opportunities there?

So in terms of confidence and -- and our ability to achieve these results, and I -- I think the witness testified this afternoon, you might not get 100 percent in all the programs. There's one (1) program, the Geothermal Community Initiative, I'm concerned on that one (1). But as a package, there'll be pluses and minuses.

MR. RICHARD BEL: Could I ask about -- I just want to carry on this for a bit. The -- the new package you put in here, 2014/2017, and could we look at slide 57 from Dunsky?

(BRIEF PAUSE)

MR. RICHARD BEL: So Mr. Dunsky's yellow lines are at one point three (1.3) and one point five (1.5) and he's going out to, what, 2025 there and you're at 1 percent. So what we're having is load forecasting in this range. Am I right? So you're sort

of Level 2 extended, and not exactly that because that was based on his calculation, but must be close to that.

Am I -- am I correct?

(BRIEF PAUSE)

MR. LLOYD KUCZEK: It's very difficult for me to -- to speak to the numbers that went into Mr. Dunsky's graphs here.

MR. RICHARD BEL: He's one point -- he's -- he's one point three (1.3) incremental, his -- his low case.

MR. LLOYD KUCZEK: I'm sorry, what's the question?

MR. RICHARD BEL: Well, the question is: So -- so we are flattening load based on the scenario here. Am I -- am I right? Because this is about flattening load. If we're carrying out -- that's what he's showing here.

(BRIEF PAUSE)

MR. LLOYD KUCZEK: We can't give a precise answer there. I know.

MR. RICHARD BEL: I get it. I get it. No, I -- I wasn't asking for an exact. I'm not -- I was just saying, but we're in that kind of -- if we're incrementally moving forward, we -- we must be in this region. But I'll leave that point. That's an observation, I think.

MR. LLOYD KUCZEK: You know, generally what I know is, with our updated Power Smart Plan, with the -- what we know -- expected at this point to happen with our load, we -- we are still expecting our load to grow at 0.9 percent, as -- as I recall it, so.

And I think Mr. Dunsky, if I'm looking at that, is suggesting it's going to be flat, and that's not what we're thinking with our numbers in our plan.

MR. RICHARD BEL: I think, to be fair, he said, "near flat." Anyways.

MR. LLOYD KUCZEK: We'll have to look. But I'm not thinking that we're there.

CONTINUED BY MR. SVEN HOMBACH:

MR. SVEN HOMBACH: Mr. Kuczek, to follow up on that point, one (1) of the issues that was raised is the risk of underestimating the load.

Based on that, if the load ever was

underestimated and new generation needed to be brought online quickly, what's the approximately lead time to bring a small gas plant into service? The panel has heard different years.

MR. ED WOJCZYNSKI: My apologies. I was trying to keep up with the other preparations.

MR. SVEN HOMBACH: I'd be happy to re-ask the question.

MR. ED WOJCZYNSKI: If you could, please.

MR. SVEN HOMBACH: Certainly. There's been some discussion about the risks of underestimating load with reliance on DSM. And the panel apprec -- certainly appreciates that hydroelectric developments have a long lead time.

What's the equivalent lead time for bringing a small gas plant into service, how many years?

MR. ED WOJCZYNSKI: Ones that would be practical for the kind of purpose we were talking about -- you can have smaller area derivatives that have very short lead times, of a year. But -- but for the industrial kind, we're talking about -- and not combined cycle -- simple cycle -- something in the order of three (3) years probably makes sense, assuming

you've done some pre-work for that and the transmission is available. So that -- that's assuming you've done some pre-work.

Of course, you've got now the issues of you're using that as your resource and -- and the cost associated. But in terms of lead time, it could be a bit longer. It could be a little bit shorter. Combined cycle would take a bit longer.

MR. SVEN HOMBACH: Is the 2014 forecast making any assumptions that would see advancements in off-grid technologies like solar, like small-scale residential wind turbines, or the likes?

(BRIEF PAUSE)

MR. DALE FRIESEN: Those types of measures would be addressed in our DSM Plan. They would not be addressed in our load forecast. So we would -- we would examine the impact of those measures within the context of our DSM plan.

MR. SVEN HOMBACH: Have you considered installing smart meters as part of the DSM Plan? And if not, why not?

MR. LLOYD KUCZEK: We're currently -- we have been for a number of years looking at smart

metres, and we're still looking at smart meters. The -- - the business case for smart meters is -- it's a challenge. At this point we think there is a business case, and at some point within the -- the next decade we would expect to have smart metres in place.

(BRIEF PAUSE)

MR. SVEN HOMBACH: I don't have additional questions to the DSM panel. I do have one for you though, Mr. Cormie. We discussed the Minnesota Power contract earlier, and you indicated that if Keeyask is not proceed with or if it's delayed beyond more than two (2) years, that the contract would terminate. And I believe you indicated that constructing Keeyask was a condition precedent for Hydro but not for Minnesota Power.

Can you point us to the section that you're relying on in saying the contract will terminate?

MR. DAVID CORMIE: Yes. We'll -- we'll take that as an undertaking, and --

MR. SVEN HOMBACH: Okay.

MR. DAVID CORMIE: -- provide that tomorrow, or shortly. Yeah.

MR. SVEN HOMBACH: Certainly. Thank you, Mr. Cormie.

--- UNDERTAKING NO. 142: Manitoba Hydro to provide the section they are relying on in saying the contract will terminate

MR. SVEN HOMBACH: Now, I am advised by Mr. Williams that he has about forty-five (45) minutes of questions, so given that the MKO will not be fielding presenters tomorrow morning, I'm seeking the panel's guidance as to whether the panel would like to break for the day and then continue briefly with the DSM panel in the morning or...

(BRIEF PAUSE)

MR. SVEN HOMBACH: Perhaps we could stand down for a -- for a minute.

--- Upon recessing at 6:22 p.m.

--- Upon resuming at 6:27 p.m.

CONTINUED CROSS-EXAMINATION BY MR. BYRON WILLIAMS:

MR. BYRON WILLIAMS: Mr. Chair, I'm a little afraid to speak unless the court reporter gives me permission, and I do apologize for that. And it -- just a bit of house -- housekeeping to start with.

In -- there was a discussion Mr. Hombach had with -- in terms of Manitoba Exhibit 153, page 40. Mr. Friesen, that's probably your part of the world. Okay. And if we scroll down to the bottom of that page -- and I'm just trying to reconcile some math here, sir. We see the -- in terms of load -- customer-sided load displacement we have incremental savings starting from a 2013/'14 base of 335.6 gigawatt hours.

Is that right?

MR. DALE FRIESEN: Did you say 2013/'14?

MR. BYRON WILLIAMS: Well, to back up, our baseline -- our base zero is presumably 2013/'14?

MR. DALE FRIESEN: Correct, yes.

MR. BYRON WILLIAMS: And if we move out what this is showing us is, as you discussed with Mr. Hombach, we've got 335.6 gigawatt hours cumulative as of 2016/'17 from that base?

MR. DALE FRIESEN: That is correct.

MR. BYRON WILLIAMS: And if we could just, Diana, please turn to Hydro Exhibit 180, Appendix

A2 and scroll down to the middle of the page. A2, Appendix A2. Scroll down a bit more, please.

And Mr. Friesen, if we see about on the -- on the -- the screen in front of us, about two-thirds (2/3) of the way down the page, you'll see the heading "Load Displacement and Alternative Energy"?

MR. DALE FRIESEN: Correct.

MR. BYRON WILLIAMS: And if we move out to the blue, being the 2016/'17 year, you'll see for customer-sided load displacement the figure of 305.1 gigawatt hours.

MR. DALE FRIESEN: Correct.

MR. BYRON WILLIAMS: And that would be the analogous figure to the -- to the page we saw previously in the three (3) year power plan, would it?

MR. DALE FRIESEN: That is correct.

MR. BYRON WILLIAMS: And is the difference, sir, between the two (2) figures generation versus meter, or -- or what is the difference, sir?

MR. DALE FRIESEN: It is the difference between generation and meter. That is correct.

MR. BYRON WILLIAMS: And if we can stay on this page and scroll to the left? And -- and look to the -- in the bottom right-hand corner, and this may go to Ms. Morrison, or -- or to Mr. Kuczek, but we'll

see the figure 2,739 gigawatt hours.

Do you see that, Ms. Morrison?

MS. LOIS MORRISON: Yes, I do. Thank you.

MR. BYRON WILLIAMS: And what I understand that to be is starting with the base year of 2013/''14, that is the forecast cumulative savings for the Power Smart '14 Plan, leaving aside codes and standards and regulations.

Is that right?

MS. LOIS MORRISON: Yes, that is correct. It would not include any savings that were projected to have been achieved in '13/''14. It would only include the savings expected to be achieved in '14/''15 going forward to '28/''29.

MR. BYRON WILLIAMS: Okay. Thank you. And if we could turn, Diana, to Hydro Exhibit 87, slide 80? Hopefully I've got that page right.

Ms. Morrison or Mr. Kuczek, you recognize this page being the projected energy savings for -- from different levels of DSM that was presented, I believe, way back in week 1 of this hearing?

MS. LOIS MORRISON: That is correct.

MR. BYRON WILLIAMS: And so if we look at the red line, we will see finishing in the 2028/''29

year a projection for Level 2 DSM, I'll suggest to you, of 2,961 gigawatt hours.

Would that be right?

MS. LOIS MORRISON: that is correct.

MR. BYRON WILLIAMS: So would that be an apples to apples comparison with the figure that we just discussed in terms of Power Smart '14 being 2,739 gigawatt hours?

(BRIEF PAUSE)

MS. LOIS MORRISON: Generally, for the purposes of comparison, it would be about the same, because this is fiscal year ending '27/'20 -- sorry, fiscal year ending '28. So this would be '13/'14 to '27/'28, so it's -- it's a -- still a fifteen (15) year time frame.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: So just so I understand, the calculation of Level 2 DSM that's presented here runs from the 2013/'14 year to the 2027/'28 year and achieves 2,961 gigawatt hours as -- or at least, it forecasts that achievement?

MS. LOIS MORRISON: That is correct.

MR. BYRON WILLIAMS: And it is -- what you're telling me is it is not strictly analogous to the figure of 2,739 gigawatt hours I presented to you, because that figure -- that forecast starts a year later, being 2014/'15, and runs a year farther.

Would that be fair?

MS. LOIS MORRISON: That is correct, though there is an offset.

MR. BYRON WILLIAMS: Okay, and by 'offset', Ms. Morrison, you can help me out, what do you mean by that?

MS. LOIS MORRISON: Just that one (1) starts a year later than the other, and goes a year later than the other.

MR. BYRON WILLIAMS: Okay. Yeah. Fair enough. And sticking with Level 2 DSM for a moment, leaving aside codes and standards, is there incremental DSM savings forecast beyond the '27/'28 year for Level 2?

(BRIEF PAUSE)

MS. LOIS MORRISON: We have to find the exhibit number, however, we did provide an undertaking

where we identified specifically what was assumed after the '27/'28 year. It was under -- Manitoba Hydro Undertaking number 12.

MR. BYRON WILLIAMS: I can't even remember that far back, Ms. Morrison, but.

MS. LOIS MORRISON: Well, you -- you unfortunately have spent much more time here than I have, so I -- I can appreciate that.

MR. BYRON WILLIAMS: Well done, though.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: So what -- so what you're suggesting here is that with the exception of the Refrigerator Retirement Program, you did not assume -- well, why don't you explain what you're saying here? I'm not brave enough, Ms. Morrison.

MS. LOIS MORRISON: I don't know if I am either. It -- like you said, it's been a while. What we were identifying here was the assumptions that were included in the analysis, and specifically, we identified that the Refrigerator Retirement Program savings ended. However, all the other savings continued on for measures, and we assumed reinvestment.

Then we identified where additional

incremental energy savings were being presented pra -- past the 2027/'28 fiscal year, and those initiatives are listed following as the Residential Geothermal Incentive Program, the Commercial Lighting Program, Commercial -- or the Power Program, Commercial Building Code, and the Conservation Rates Initiative all presented savings that had incremental savings passed either a year, or a few years past the '27/'28 date.

MR. BYRON WILLIAMS: And just so I understand, are you suggesting to me that the pace of incremental DSM savings post-'27/'28 under DSM Scenario 2 was roughly the same or somewhat lower than it was up to '27/'28?

(BRIEF PAUSE)

MS. LOIS MORRISON: You are correct that past the '27/'28 fiscal year, under the DSM Level 2, there were fewer incremental or new initiatives being brought in, or new savings, or new projects being undertaken under that -- in -- in that timeframe as compared to the timeframe leading up to that period.

MR. BYRON WILLIAMS: Could we go back to Exhibit 87, slide 80 for just a second?

(BRIEF PAUSE)

MR. BYRON WILLIAMS: So, Ms. Morrison, if I looked at the -- the red line as it ends at 2027/'28, what you're suggesting to me is that it flattens out somewhat past the 2027/'28 year. Is that what you're telling me?

MS. LOIS MORRISON: Its slope would be a little lower, yes.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: So just to get a sense of the magnitude of difference between DSM plan -- excuse me, DSM Scenario 2 and Power Smart Plan 14. The two (2) figures that I -- I had given you previously being the twenty-nine sixty-one (2,961) for Level 2 ended at '27/'28. And the two thousand seven hundred and thirty-nine (2,739) for Power Smart 14 ended in '28/'29.

If I'm trying to get a sense of the magnitude of the difference of the plans, would I be for -- of course, for the first time in my life far too simplistic in -- in subtracting the two (2)?

MS. LOIS MORRISON: There would some --

looking at the program level strictly, you -- there -- there are some nuances because the fact that there is savings in the '13/'14 year versus the '27/'20 -- because of that offset there's some nuances. So there -- it is a little bit over simplified, but generally it's pretty close.

MR. BYRON WILLIAMS: So it would be about a 7 percent difference between the two (2) plans?

MS. LOIS MORRISON: I'm -- I'm hesitant to accept that without checking it and -- and doing a further detailed look. It -- it's -- yes, as Mr. Kuczek is whispering to me, it's close, because we tend to look at the overall package of codes and standards and such when we're -- we're looking at our analysis, but from just the program level, per se, yes.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: So is Manitoba Hydro telling me, subject to check, I can rely upon an assumption of 7 percent difference?

MS. LOIS MORRISON: Yes.

MR. LLOYD KUCZEK: It depends what you're using it for, like I -- I think when I talked about this before when I was testifying that, you know,

I -- I don't like to get too detailed in terms of the specific numbers. There's -- there's a lot of -- this is an art, it's not a science so if you talk twenty-nine sixty-one (2,961) or twenty-nine hundred (2,900), you know. To talk twenty-nine sixty-one (2,961) is -- to me doesn't mean a lot. We're going to get roughly 2,900 gigawatt hours and -- and you know, or twenty-one sixty-one (2,161) as we say, that's what we're targeting but...

MR. BYRON WILLIAMS: Did -- did you misspeak?

MR. LLOYD KUCZEK: What -- what did I --

MR. BYRON WILLIAMS: You might've said twenty-one sixty-one (2,161), sir, but that -- that's probably a --

MR. LLOYD KUCZEK: I misspoke.

MR. BYRON WILLIAMS: Okay.

MR. LLOYD KUCZEK: I have progressives.

MR. BYRON WILLIAMS: Here's my challenge -- and Mr. Wojczynski, you can feel free to chip in, as well.

What I'm trying understand for my client is given that there appears to be some difference between Power Smart 2014 and DSM Scenario 2, can I -- can I rely upon that 7 percent difference in -- in

considering the implications for a net present value of the comparison between the plans?

(BRIEF PAUSE)

MR. ED WOJCZYNSKI: I heard your question. And maybe because it's 6:44, but I don't think I understand it. So if --

MR. BYRON WILLIAMS: Well, let -- let me ask it better --

MR. ED WOJCZYNSKI: Okay.

MR. BYRON WILLIAMS: -- if I could? Sir, in doing the net present value calculations, whether it's in Exhibit 104-15, or 104-16 Revised, you relied upon DSM Scenario 2, correct?

MR. ED WOJCZYNSKI: Yes. And the other levels, but for this discussion, yes.

MR. BYRON WILLIAMS: And I believe the evidence that I have from Manitoba Hydro in terms of the difference between DSM Level 2 and Power Smart 14 is, subject to check, in the range of 7 percent?

MR. ED WOJCZYNSKI: In terms of gigawatt hours.

MR. BYRON WILLIAMS: In terms of gigawatt hours.

MR. ED WOJCZYNSKI: Yeah, but then you talked about NPV, that's the part I was having trouble with.

MR. BYRON WILLIAMS: What I'm trying to understand is: Would we expect if we did a calculation of 104-15, for example, using Power Smart 14 gigawatt hour savings, all other things being equal, that the results would be different?

MR. ED WOJCZYNSKI: Sorry, that the results would be...? And you trailed off at the end.

MR. BYRON WILLIAMS: It is 6:45, I did trail off. I apologize.

MR. ED WOJCZYNSKI: Yeah.

MR. BYRON WILLIAMS: We would expect the results to be different?

MR. ED WOJCZYNSKI: They'll be different but -- but there wouldn't be 7 percent different. I mean, if you look at the level -- if you look at, for instance, Plan 5, going from base DSM to Level 1 DSM to Level 2 DSM, the numbers actually increased. Then Level 3 they go down slightly, but they're -- they're essentially bouncing around with that plus/minus called 40 million or something that I, at the beginning of this whole process, called noise.

So essentially, we're seeing for Plan 5

at least, 400 million -- or just under 400 million net present value benefit with the 2013 assumptions. You also saw on the flat load sensitivity we did that was related to Mr. Thomson's statement on day one, we got over 400 million for a flat load. So as earlier indicated, Plan 5 at least really, whether it's Level 2 DSM or 7 percent more, I don't expect we're going to see anything different than around 400 million for that scenario. It is true, the Preferred Plan is a different story.

And -- and that one we could simplistically right now assume that it would be part of the way between 45 million positive under Plan 14 and minus seven (7). So -- but it -- it's -- so somewhere between those for the Preferred Plan. So I -- I don't know if that helps you.

MR. BYRON WILLIAMS: It helps. And -- and the point you're making, sir, is that the impact of different levels of DSM does have an impact on the relative change in the plans?

MR. ED WOJCZYNSKI: It does for the Preferred Plan, but not for the Keeyask/750 Plan.

MR. BYRON WILLIAMS: And as compared to the Keeyask/Gas plans, more DSM would -- would tend to disadvantage the Preferred Plan?

MR. ED WOJCZYNSKI: Could you repeat that? I think you referred the Preferred Plan and the Keeyask/Gas Plan.

Were you comparing the Preferred Plan to the Keeyask/Gas Plan?

MR. BYRON WILLIAMS: Sir, all I was saying is -- is as compared to Keeyask/Gas plans, whether it's Plan 6 or Plan 5, am I correct in suggesting to you that they tend to perform somewhat better under more DSM as compared to Plan 14?

MR. ED WOJCZYNSKI: Yes.

MR. BYRON WILLIAMS: Now, just -- just a couple of small points for you, Mr. Wojczynski, and then I -- I think I will be done with you and be focussing on the lord -- load forecast.

But if we could pull up Hydro Exhibit 104-15, which I believe was filed earlier today. Or is that it right there, that was quick.

Mr Wojczynski, and -- and just so you know, I'm going to want to kind of reconcile this with Manitoba Hydro Exhibit 192.

So, sir, if I looked at Plan 6 under DSM Scenario 2, I've got a gas in 2040?

MR. ED WOJCZYNSKI: Yes.

MR. BYRON WILLIAMS: And -- and if I

were to go to Manitoba Hydro Exhibit 192 under pathway 4, we see that new resources are kind of -- or are anticipated around 2037, is that right?

MR. ED WOJCZYNSKI: Under which path was that, sorry?

MR. BYRON WILLIAMS: Pathway 4, sir. You see if you fol --

MR. ED WOJCZYNSKI: Yes.

MR. BYRON WILLIAMS: Okay. And is the difference between the timing of Plan 6 is portrayed on Manitoba Hydro Exhibit 104-15, and here being some three (3) years earlier - being Manitoba Hydro Exhibit 192 - is that the pipeline influence, sir?

MR. ED WOJCZYNSKI: Subject to check, yes. Let me just think about that for a sec. I sometimes answer too quickly and --

MR. BYRON WILLIAMS: That's the way we like it, Mr Wojczynski.

MR. ED WOJCZYNSKI: Yeah, yeah, I've learned that. Okay, so the question was with Plan 6 in DSM Level 2 in the -- we have it at -- gas coming in at 2040. And then on this pathway one, we have it coming in on 20 -- we say 2037 and that is Plan 6, as well, so I would say yes, subject to check, that -- that is right.

MR. BYRON WILLIAMS: And so subject to check, if I'm trying to reconcile the timing between, let's say, Exhibit 104-15 of some of the supplemental generation sources as compared to Manitoba Hydro Exhibit Number 192, I'm likely to understand that any timing differences are primarily related to a -- a difference in terms of including the pipeline load?

MR. ED WOJCZYNSKI: I -- I would say generally that's true, yes.

MR. BYRON WILLIAMS: And just one (1) second before we leave Manitoba Hydro Exhibit 192. Mr Wojczynski, you'll re -- recall earlier in the hearing we were talking about a decision point for Conawapa being on or about 2018.

Would that be fair, sir?

MR. ED WOJCZYNSKI: Yes, that was for '26 in-service date.

MR. BYRON WILLIAMS: Okay. And so when I look at Manitoba Hydro Exhibit 192 and go down to pathway -- just below pathway 5, we see a -- a different timing for Conawapa -- the decision point being 2022.

Is that right, sir?

MR. ED WOJCZYNSKI: Yeah, I can't this see this proper -- I need my glasses, I got --

MR. BYRON WILLIAMS: That's --

MR. ED WOJCZYNSKI: -- floaters so I need this thing, so.

MR. BYRON WILLIAMS: That's also how we like it.

MR. ED WOJCZYNSKI: So 2022, is what we have in there and that is to protect a 2030 in-service date, or to commit for a 2030 in-service date.

MR. BYRON WILLIAMS: And if we go up to pathway 1, we see a commit to Conawapa -- a construction under that as being the 2023 year?

MR. ED WOJCZYNSKI: Yes.

MR. BYRON WILLIAMS: And just so I understand, sir, and -- and to assist our clients, when we're thinking of the timing for the Conawapa decision point, are we now really thinking about 2022/'23?

MR. ED WOJCZYNSKI: Only in the scenario where we are not giving any consideration to other export sales than a WPS and NP. As when I introduced this earlier this afternoon, I discussed how at the bottom of Exhibit 192, I believe it was -- the one up here -- if you'd go at the very bottom, there's the blue caterpillar, and the blue caterpillar, the very first box says,

"Review Conawapa 2026 in-service date

and DSM level."

And then -- and then the idea was with the arrow that every year we -- we review our Power Resource Plan, the load forecast DSM, and then when you get to 2018 we'd explicitly say in that year, which -- pardon me, 2019. In 2019 we are considering whether we would want to commit Conawapa for 2027.

But -- but given that we're saying there's no other sales in this -- assumed right now, we let it slip. Then we let it slip another year. Then we let it slip another year. To protect the WPS sale, you need to be committing by 2030. If we had the MSP 500 sale. If we had something from Great River Energy, the 600 megawatts. If we had an -- if we had the SaskPower. If we had -- there's some other negotiations underway.

If any of those, or some of those happened then we would -- we would -- at those other blue boxes we would then commit Conawapa at that point, assuming that it was attractive to do so. We...

MR. BYRON WILLIAMS: That's helpful. And -- and thank you for going through that. And I apologize if I missed it the first time through.

MR. ED WOJCZYNSKI: There's a lot of material here.

MR. BYRON WILLIAMS: If we could go back to Manitoba Hydro Exhibit 180, and Appendix A-2, and Mr. Wojczynski you're always welcome to stay around but I think I'm on load forecasts, and --

MR. ED WOJCZYNSKI: I wouldn't want to leave this fun place.

MR. BYRON WILLIAMS: None of us really do, sir. If we -- if we focus on the energy efficiency subtotal, if we could scroll down a bit on the page, you'll see just under 'Industrial' the energy efficiency subtotal.

And does this go to you, Ms. Morrison?

MS. LOIS MORRISON: Depends on what the question is.

MR. BYRON WILLIAMS: Mr. Kuczek is -- is nodding his head, so. Just -- I want to work my way across this table with you. So we see the -- let's just take an example.

As we go across this table, these are cumulative figures; is -- is that right?

MS. LOIS MORRISON: Yes. They represent the cumulating energy savings year to year as new projects and new participants enter.

MR. BYRON WILLIAMS: So if I wanted to understand the incremental additional savings between

two (2) -- two (2) particular years, I would take the -- - the figure for the second year and sub -- and subtract from it the -- the savings from the first year. Would that be fair?

(BRIEF PAUSE)

MS. LOIS MORRISON: Generally, yes.

MR. BYRON WILLIAMS: And you can -- we're not going to go through every year, and you can either pull out a calculator or -- or accept my calculations subject to check, but if I were to look at the incremental difference between 2015 -- going from 2014 to 2015/''16, would you accept, subject to check, that it is about 114.2 gigawatt hours being the difference between two thirty-five point one (235.1) and one fifteen point nine (115.9)?

MS. LOIS MORRISON: Yes.

MR. BYRON WILLIAMS: And if I were to go out a few more years to the 2018/''19 year and seek to calculate the difference between the '18/''19 and the '17/''18 year, would you accept, subject to check, that that would be 103.3 gigawatt hours, being the difference between the '18/''19 cumulative figure and the 2017/''18 cumulative figure?

MS. LOIS MORRISON: Yes.

MR. BYRON WILLIAMS: And if I were to go out three (3) more years to 2021/'22, can we agree, subject to check, that the difference between the '21/'22 year and the '20/'21 year would be 77.6 gigawatt hours?

MS. LOIS MORRISON: That is correct.

MR. BYRON WILLIAMS: And let's go out three (3) more years to 2024/'25, and you would accept, subject to check, that the difference between the 2024/'25 year and the '23/'24 year would be about 51.5 gigawatt hours?

MS. LOIS MORRISON: That is correct.

MR. BYRON WILLIAMS: And, so just kind of -- what we're seeing in the early years are incremental growth in savings in excess of 100 gigawatt hours per year.

By the time we get out to the 2024/'25 year, we would have say incremental savings on a year-to-year basis of about half that?

MS. LOIS MORRISON: Looking at the efficiency programs alone, yes. And some of that would be reflected by the nature of the programs. The program that comes to mind is the roadway lighting conversion program where we know there are only so many

roadway lights out there, and we plan to convert them within that first period of time.

Once they're converted to LED, we will have to wait until something better comes along, and given that we waited fifteen (15) to twenty (20) years before something better came along last time, that's reasonable.

MR. BYRON WILLIAMS: Okay. And there you -- there you see the philosophical difference presumably between Mr. Chernick and Mr. Dunsky and -- and Hydro.

Would that be fair?

MS. LOIS MORRISON: To a certain extent, yes. There are diminishing savings -- in terms of the energy efficiency component of our plan, each time you go out to look at a new technology the slice gets thinner.

Again, going back to the roadway lighting program, in the early '90s, and I -- I hate to admit I -- I was around for that, we converted all of our roadway lighting from incandescent and mercury vapour -- we still had a few incandescents but primarily mercury vapour to high pressure sodium.

And when we did that program, we saved about 50 gigawatt hours, going back on memory here, by

converting all those lights. And those light -- we had fewer lights then. We have more lights now. This time around when we're going to do the conversion, we're anticipating going from HPS to LED to save about 35 gigawatt hours. So we have more lights in place, however, even with the substantial savings with LED that slice is smaller than when we went from incandescent mercury vapour to HPS.

So when you're looking at efficiency components of -- of equipment, you're -- you're -- every time you take a slice that slice gets smaller. When we talk about some of the other initiatives that are going in further down, such as what Mr. Friesen spoke to in terms of load displacement, that's more those newer technologies that are introduced here.

MR. BYRON WILLIAMS: And -- yeah, 'cause I was just -- we're going to come to load displacement --

MR. DALE FRIESEN: No, actually I'm talking on efficiency, and that phenomena that Ms. Morrison spoke to, about the slice getting smaller, affects Codes and Standards as well. So I'll give you an example.

If your refrigerator or other device went from 90 to 92 percent efficiency, the next time

you only have 8 percent losses. If you go from ninety-two (92) to ninety-five (95), next time you only have 5 percent losses. You can't take away more than your losses essentially. That's your limiting factor. It's the law of science.

'Cause I think we can all agree that we're not going to get greater than 100 percent efficiency. And as we approach that threshold, the challenge becomes progressively larger from both a cost perspective and a technical perspective.

So it's something we always have to keep in our minds, that we can't fundamentally ignore science here. We have to look at that in the efficiency spectrum, in particular, whether it's Codes and Standards or -- or whether it's programs, that we have some limitations there that we have to recognize.

MR. BYRON WILLIAMS: And we'll -- we'll come to that. Let -- let's go to load displacement for a moment, and let's look at Hydro Exhibit 153, page 40 again. And you had a bit of a conversation -- if we can scroll up on the page a little bit.

You had a bit of a conversation with My Learned Friend -- thank you -- Mr. Hombach about this program. And just without asking you to elaborate, in -- in the short-term under 'load displacement,' you're

looking at the conversion of waste streams and byproducts into useful energy.

Would that be fair?

MR. DALE FRIESEN: That is correct.

MR. BYRON WILLIAMS: And of course you're targeting some major customers segments including forestry, chemistry, chemicals, metals, et cetera.

Would that be fair?

MR. DALE FRIESEN: That is fair.

MR. BYRON WILLIAMS: As you look to the future, you note that other emerging sources, such as wind and solar, may have potential in certain in -- instances to offset purchase energy.

Would that be fair?

MR. DALE FRIESEN: There's been considerable discussion about solar at this hearing in many different parts of the hearing. And I think there's also been a lot of discussion about grid parity. So all of us recognize, I believe, that there is a future opportunity for solar, small wind, et cetera; it's a question of timing.

And in our current plan, the uncertainty is if you -- if you look at the evidence that's presented by various presenters, the uncertainty with

respect to when solar becomes cost competitive, it's a pretty big window.

And then there's the discussion of competition to solar, and that competition could be existing generation sources, and solar may not have a significant advantage over them.

So as Mr. Dunsky pointed out, and several others have pointed out, grid parity is one (1) discussion point, adoption rate is a completely second and almost separate discussion point and the rate at which these technologies get adopted.

Given all of these uncertainties, we have not included solar in our 2014 Plan.

MR. BYRON WILLIAMS: And just to follow that through, if I was looking for solar or a -- an alternative energy to show up, I would probably expect it to be in the customer's sited load displacement line.

Would that be fair, sir?

MR. DALE FRIESEN: That would be a logical place for it to -- to be, you know, depending on the -- the type of customer you're addressing it, we may create separate programs. So for instance it could be a residential program for rooftop PV, and there could be a commercial program but, essentially, you're

correct.

MR. BYRON WILLIAMS: If we could turn to Manitoba Hydro 180, Appendix A-2 again. And if we can scroll down to load displacement and alternative energy and, Diana, it's on the page, but if you could pull it up a little bit more -- oh, I think that's too far. That's lovely, thank you.

And, Mr. Friesen, if -- let's pick the year 2021 and go down to the customer's sited load displacement, you'll see cumulative savings of 580.6 gigawatt hours out to that point in time.

Would that be fair, sir?

MR. DALE FRIESEN: That is correct.

MR. BYRON WILLIAMS: And if I moved arou -- along that line each year out to 2028/'29, I would see that same figure of 580.6 gigawatt hours.

Would that be correct?

MR. DALE FRIESEN: That is correct.

MR. BYRON WILLIAMS: And what the constants of that figure suggests is past 2021 there are no incremental savings built into the 2014 DSM Plan related to customer sited load displacement.

Would that be fair?

MR. DALE FRIESEN: That is what the numbers say, yes.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: And if I just went up one (1) line, sir, that is the Bio Energy Optimization Program, correct?

MR. DALE FRIESEN: That is correct.

MR. BYRON WILLIAMS: And if we turn to the 2019/'20 year, we see -- we -- just one (1) second, please. We see the cumulative savings to that point in time of 61.9 gigawatt hours. Is that correct?

MR. DALE FRIESEN: That is correct, as well.

MR. BYRON WILLIAMS: And if I move along that line out to 2028/'29, as well, that -- that number remains constant?

MR. DALE FRIESEN: That is also correct.

MR. BYRON WILLIAMS: And that suggests to me that past 2019/'20, there is no incremental savings related to this built into the forecast.

Would that be fair?

MR. DALE FRIESEN: That is what the numbers say, yes.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: Mr. Cormie, you're here. And, Mr. Cormie, a big part of your business is monitoring what's hot, what's happening in -- in the American marketplace.

Would that be fair, sir?

MR. DAVE CORMIE: Those are your -- your words, not mine.

MR. BYRON WILLIAMS: But it -- it would be fair that in -- in your constant efforts to optimize export revenues for Manitoba Hydro, it would be important for you to keep your finger on the pulse of the American marketplace?

MR. DAVE CORMIE: My -- my priorities are with several of our major customers and that's where I focus.

MR. BYRON WILLIAMS: Okay. You would keep your mind, sir, on the -- what's going on in terms of generation in the American marketplace.

Would that be fair, in terms of new generation, what the sources of new generation are?

MR. DAVE CORMIE: I understand what our customers view their alternatives to be.

MR. BYRON WILLIAMS: Okay. And you're saying, sir, that you go no father than just your customers?

MR. DAVE CORMIE: Those are the ones that are important to me. Others I -- I can't sell to them and then so I -- I don't necessarily pay attention to them.

MR. BYRON WILLIAMS: So your evidence is that you have no reference to the office of energy projects, energy infrastructure updates in --

MR. DAVE CORMIE: I don't follow that, no.

MR. BYRON WILLIAMS: So just to confirm then, you're not in a position to comment on what is the number one new generation in -- in-service for the first three (3) months of 2114 (sic) among American generation sources?

MR. DAVE CORMIE: No, I can't comment on that.

MR. ED WOJCZYNSKI: But there are others who monitor that in Manitoba Hydro.

MR. BYRON WILLIAMS: Mr. Wojczynski, is that you?

MR. DAVID CORMIE: No, I think that would be Ms. Flynn's area that monitors what's happening in the MISO market in general.

JOANNE FLYNN, Previously Sworn

MR. BYRON WILLIAMS: Subject to check, would Manitoba Hydro agree that the number one source of new generation in-service in -- in the United States between January and March 2014 was solar?

MS. JOANNE FLYNN: Subject to check, yes.

MR. BYRON WILLIAMS: And accounting for roughly 51 percent of installed capacity in terms of megawatts in that time period?

MS. JOANNE FLYNN: Subject to check, yes.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: And, Ms. Flynn, I -- I think I can just confirm your --- your check. So I'll just -- with your counsel's permission, show that to you.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: I think I heard evidence from Manitoba Hydro that you can never get past 100 percent efficient.

Was -- was that Hydro's evidence?

MR. DALE FRIESEN: That was a statement that was attributed to me, yes.

MR. BYRON WILLIAMS: And would it be fair to say that in terms of heat -- heat pumps, one might expect somewhere between 200 and 400 percent efficiency?

MR. DALE FRIESEN: Generally, you wouldn't refer to that as an efficiency, that's a co-efficient of performance. It's a -- it's a different measure of explaining the relationship between electricity input and energy output. It doesn't -- the co-efficient of performance doesn't account for the energy that you utilize from the ground source or air source that you're using.

So if you would take all the energy that's drawn into the heat pump and measure that against the energy that's delivered by the heat pump, you would have an efficiency of less than 100 percent.

MR. BYRON WILLIAMS: Okay. Fair enough. Now, just a couple last questions, I think. I'm going to have a -- in a little bit a couple for you, Mr. Kuczek. You can't give Ms. Morrison all the hard work after making fun of her purchasing decisions.

But in Manitoba Hydro Exhibit 180, 42 -- page 42. This is actually for you probably, Ms.

Morrison. If we scroll down to -- towards the bottom of that page. And, Ms. Morrison, you'll recall that this is the levelized utility cost metric that you had some discussion with with Board Member Grant.

Do you recall that discussion?

MS. LOIS MORRISON: Yes.

MR. BYRON WILLIAMS: And if I looked at the overall portfolio metric for the 2014 Plan, would I be correct in suggesting that the LUC, or levelized utility cost, is one point eight (1.8) cents per kilowatt hour?

MS. LOIS MORRISON: That is correct.

MR. BYRON WILLIAMS: And I apologize for making you flip around a bit, Diana, but if you could go back to Appendix A-2.

To Mr. Kuczek, or -- or Ms. Morrison, if I look through the energy efficiency programs for Manitoba Hydro in the 2014 Power Smart Program, would I be correct in suggesting that there is no home energy report type project -- product, or O Power type product? Would that be fair?

MR. LLOYD KUCZEK: It's hidden.

MR. BYRON WILLIAMS: Is it, Mr. Kuczek?

MR. LLOYD KUCZEK: You -- well, you now found it, I guess, but... So we're unsure if we're

going to pursue that program, but what we did do is put some dollars aside to pursue the program. So the dollars are aside, and -- or set aside, and -- and we're evaluating whether or not we will pursue it, in time.

MR. BYRON WILLIAMS: I'm pretty happy to hear that, Mr. Kuczek. Now, in terms of the marketplace that that could potentially benefit, what are we talking, three hundred and seventy thousand (370,000) houses or so?

MS. LOIS MORRISON: Actually in all of our discussions to-date with 'O' Power, they have not encouraged us to pursue all three hundred and seventy (370) --

MR. BYRON WILLIAMS: Okay.

MS. LOIS MORRISON: What they've recommended is that we focus on the high energy users because we can identify those people, and specifically target them. And, so it's a much smaller group than the three hundred (300) and some --

MR. BYRON WILLIAMS: Fair --

MS. LOIS MORRISON: -- thousand customers.

MR. BYRON WILLIAMS: -- fair enough. If I look at 'O' Power actually being ruled out, would

I be fair to say that one of the markets across Canada that it's been ruled out would be in Nova Scotia?

MS. LOIS MORRISON: You may know this better based upon your discussions with your expert, Mr. Dunsky. Last discussions we had with Nova Scotia is they were -- they were in discussions and exploring the -- the idea of.

MR. BYRON WILLIAMS: We can do this one (1) of two (2) ways. Would you accept, subject to check, that it's currently available in Nova Scotia, or would -- or would you undertake --

MS. LOIS MORRISON: My counterpart behind me has indicated that, yes, they -- we are aware of it. I just didn't know yet.

MR. BYRON WILLIAMS: And I just found out today myself, Ms. Morrison.

And would it be fair to say that it -- it would be your expectation that there are many -- excuse me, a number of other jurisdictions in Canada that are about to launch 'O' Power?

MS. LOIS MORRISON: Yes. Based on our conversations with 'O' Power, they have indicated to us that they are very active in the marketplace, and seeking out additional clients.

MR. BYRON WILLIAMS: Subject to check,

would you agree that generally where 'O' Power is applied savings of 1 to 3 percent per year are reported?

MS. LOIS MORRISON: Those are the numbers that they have indicated to us. We have -- we're -- we're somewhat hesitant, given that those savings have to be re-earned every year and also given that we are looking at a number of other initiatives, including conservation rates and such.

Our concern was related to double counting and -- and what -- where -- where do you start assigning those savings into what programs and that. And I understand that 'O' Power is very good at doing the analytics and such, but in our discussions with them we were a little bit hesitant still just because of some of the initiatives we were looking at. And they weren't -- we didn't have definitive answers at that time from the -- from that supplier.

MR. BYRON WILLIAMS: And -- and just so I -- I understand your evidence and I -- and I -- I appreciate it, you -- you've confirmed that in -- 'O' Power has advised you that they're, on an annual basis, achieving savings of 1 percent to 3 percent. You're not quite at the stage where -- where you're accepting that as an expectation for Manitoba.

Is that fair?

MS. LOIS MORRISON: It's one (1) of the initiatives that we feel is subject to a little more investigation. And that investigation would have to be in consideration of the other initiatives that are being undertaken.

MR. BYRON WILLIAMS: Okay. And just so I understand your evidence, Mr. Kuczek, I believe you said there's some money in the budget for 'O' Power?

MR. LLOYD KUCZEK: Or another program, but there's -- there's a contingency line for -- in the doll -- dollars. And that was one (1) of the opportunities that we thought we should assess further. And we weren't comfortable including the energy savings associated with that initiative yet to include it in this plan.

MR. BYRON WILLIAMS: Sir, yeah, and I'm sorry I -- I lost attention just for a minute.

So the -- there's some money in the budget, but you -- as of yet you haven't put in the anticipated savings into the plan?

MR. LLOYD KUCZEK: Correct.

MR. BYRON WILLIAMS: Okay.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: And, sir, in -- in conversation either with the Board -- I can't remember any more -- or My Learned Friend, Mr. -- Mr. Hombach, I believe you said earlier today, Smart meters, we think there is a business case.

Do you recall that statement, sir?

MR. LLOYD KUCZEK: Yes.

MR. BYRON WILLIAMS: Currently within Power Smart 2014 are anticipated savings from powers -- from smart meters built into the forecast?

(BRIEF PAUSE)

MR. LLOYD KUCZEK: We -- we don't -- we -- we don't have any dollars or energy estimated that could be saved through AMI within this plan at this point.

MR. BYRON WILLIAMS: Okay. Now, just so I understand the terminology that all you DSM brilliant experts thrown around, if I use -- if you use the term 'smart meters' and I use the term 'smart thermostats', i.e. Nest or Honeywell products, are using -- are we talking the same thing?

MS. LOIS MORRISON: No, we are not.

MR. BYRON WILLIAMS: Okay. Well, let's

go to smart thermostats, then.

If I were to look through your list of energy efficiency programs would I -- in the 2014 Power Smart program, would I see smart thermostats there?

MS. LOIS MORRISON: No, those were not one (1) of the initiatives included within the 2014 plan. But the home monitors and the smart thermostats and that were one (1) of the measures that were included in the DSM Potential Study.

MR. BYRON WILLIAMS: Okay. Am I right in suggesting to you that smart thermostats, as offered by -- by firms such as Nest and Honeywell, the early experience is suggesting savings between 5 and 15 percent?

(BRIEF PAUSE)

MS. LOIS MORRISON: Subject to check, that is their claim. But I would -- I would state that we would probably want to do further analysis before we were to accept their projection for savings in -- in our own marketplace.

MR. LLOYD KUCZEK: And just to add to that. Anytime we're dealing with salespeople trying to sell a program, whether it's 'O' Power or Nest, you're

generally -- you're likely getting a projection that's on the high side.

So it's the same thing with the geothermal industry. When we -- the industry's out selling the geothermal units we -- our feeling is, is they're suggesting the savings is greater than really what's been achieved in the marketplace. And that's what we've observed with geothermal, as well. So one has to be a little careful with those numbers.

MR. BYRON WILLIAMS: Okay. Mr. Kuczek, I -- I can show the reference if you would like.

But would it be fair to say that in the general rate application last year, Manitoba Hydro was suggesting that the DSM targets presented in the 2011 Power Smart Plan were declining but was suggesting that it was a reflection of Hydro's consistent long-term engagement in DSM and the diminishing availability of economic energy efficiency opportunities remaining in the Manitoba market?

MR. LLOYD KUCZEK: That was our statement.

MR. BYRON WILLIAMS: Okay.

(BRIEF PAUSE)

MR. BYRON WILLIAMS: This can go to either Mr. Kuczek or -- or Ms. Morrison. Leaving aside the Manitoba specifics, when we talk about -- when you see the term 'conservation rates', would it be fair to say that, as used generally, it might include inclining rate structures, it might include time of use, or -- and it also might include incentive programs?

MS. LOIS MORRISON: Traditionally, when we've referred to conservation rates, what we refer to are the inclining block structure, time of use rate, critical peak pricing. It's not traditionally, as far as we're aware, is referred to an incentive-based program for rates --

MR. BYRON WILLIAMS: And the answer was better --

MS. LOIS MORRISON: -- unless you...

MR. LLOYD KUCZEK: I do believe some utilities have offered incentives for customers to stay -- or to reduce their consumption by 10 percent over a period of time, so there are some of those programs out there.

MR. BYRON WILLIAMS: And -- and thank you. And -- and the -- the answers were better than the question. I apologize for the quality of the question.

But, Mr. Kuczek, what you're telling me is that in some jurisdictions you're aware of -- after normalizing for weather, there are incentives offered to consumers if they achieve savings beyond a certain threshold?

MR. LLOYD KUCZEK: I just recall Ontario Hydro offering a program like that for a period of time, and I'm not sure if it was over a long period or just a specific period. So in our case, we're looking for energy conservation -- or energy savings that would last over an extended period as opposed to just a temporary period.

MR. BYRON WILLIAMS: And in terms of conservation rates as contemplated in Manitoba, it's based upon an inclining rate -- rate structure.

Is that correct?

MR. LLOYD KUCZEK: Yes.

MR. BYRON WILLIAMS: And without getting into the specifics of Manitoba yet, just notionally one would pay a certain level for, let's say, the first certain number of kilowatt hours, and then a higher rate for the next level of kilowatt hours?

MR. LLOYD KUCZEK: That's correct.

MR. BYRON WILLIAMS: And is -- now

moving to Manitoba, are we anticipating that the inclining rate structure would be applied equally to homes that both light and heat their homes with electricity?

MR. LLOYD KUCZEK: That would not be the way I would approach it. And we've had discussions internally about that then, as well as I -- I believe at the hearings here. Our general rate in --

MR. BYRON WILLIAMS: That's probably my wife, Mr. Kuczek. And -- and if you have room on your couch for the next month. No?

MR. LLOYD KUCZEK: I do, but no.

MR. BYRON WILLIAMS: So, sir, you're saying that as currently contemplated in Manitoba, you wouldn't anticipate -- maybe you can give us some insight into what you're looking at.

MR. LLOYD KUCZEK: I'll -- I'll give you some background. So -- so what we did last time is we did offer it and there was no difference between customers that heated with electricity and natural gas. And I was a proponent in the company not to do that. So I -- I seen where there were issues, and we had some customers that came before the -- the Board here and explained those same issues and why we shouldn't be doing that.

But generally speaking, the threshold for natural gas customers, or people that heat with natural gas and electricity, are different. So you -- if you want to incent customers to conserve energy, you have to have different thresholds for it to be meaningful for those customers. So if you had too high of a level for electric heated customers, the natural gas customers aren't going to be incented because they're never going to get there, because they don't use a lot of electricity.

And the other issue that was evidence was -- is there's a fairness issue, in terms of who's going to pay for -- or where we're going to get our revenue. So we need to address -- sorry. Okay.

So -- so we realize that there's issues and -- and we need to address some of those issues as well as who's going to be impacted by whatever we propose. And we need to address that before we come forward with it. But we do believe it's important to address the -- the different types of customers and -- and at least in terms of the heating source.

MR. BYRON WILLIAMS: And -- and with Ms. Desorcy to my right and Dr. Miller at my back, you'll no doubt expect my next question which is: I'm presuming you intend to extend to consult extensively

with community organizations as you consider methods to roll out that plan?

MR. LLOYD KUCZEK: We think it's going to be important to consult with some individuals external to Manitoba Hydro. We haven't decided who those people would be yet, but it certainly would be yourselves and -- and your client and -- and Mr. Miller as well.

MR. BYRON WILLIAMS: If I was sleeping on the couch, Mr. Kuczek, it would be a lot easier to talk about these issues.

MR. LLOYD KUCZEK: Well, we think we have to get your client and Mr. Miller maybe to agree as well, so.

MR. BYRON WILLIAMS: Just a couple of last questions. Ms. Morrison, you will recall we had a discussion of savings with regard to 'O' Power.

And I was suggesting to you they were in the range of 1 to 3 percent annually?

MS. LOIS MORRISON: That's what 'O' Power puts on their literature, yes.

MR. BYRON WILLIAMS: Would you accept, subject to check, that these are independent evaluations -- these figures are based upon independent evaluations conducted for utilities and their

regulators?

(BRIEF PAUSE)

MS. LOIS MORRISON: Yes, subject to check. Recognizing that there may be differences in jurisdictions and differences in -- in the approaches.

MR. BYRON WILLIAMS: And similarly, in terms of smart thermostats, you'll recall we discussed savings between -- of between 5 and 15 percent?

MS. LOIS MORRISON: Yes.

MR. BYRON WILLIAMS: And rather than suggesting their manufacturers' claims, would you agree that they are the results of independent evaluations conducted for utilities and their regulators?

MS. LOIS MORRISON: Yes, I would. But I would also qualify that, that it really does depend on the market that it's being sold into. We previously had a Programmable Thermostat Program that we offered. And what we found is, and through our residential energy use surveys and through other surveys, found that there's a large number of people who already had them. And then there's a large number of people who manually set back their thermostats.

And so when we did our independent --

our own evaluations, sorry, of -- of that program we found that there were -- there -- the savings were limited because of this preexisting behaviour in our marketplace, being that we're quite climatically challenged.

MR. BYRON WILLIAMS: And just to finish, you mentioned -- you almost mentioned independent evaluations.

And, Mr. Kuczek, you'll recall in prior General Rate Applications you've had some conversations with me about independent evaluations, not just at the program level but at the portfolio level?

MR. LLOYD KUCZEK: Yes.

MR. BYRON WILLIAMS: And in discussion with My Learned Friend, Mr. Hombach, you -- you made the statement that they can be expensive.

Do you recall that?

MR. LLOYD KUCZEK: Yes.

MR. BYRON WILLIAMS: And, sir, just ballpark when you use the term 'expensive' to describe a portfolio independent evaluation, one would assume, first of all, that one wouldn't do one every year.

MR. LLOYD KUCZEK: My discussions were referring to just individual program evaluations. I never contemplated doing an overall portfolio

evaluation.

(BRIEF PAUSE)

MR. LLOYD KUCZEK: Maybe I should just add some clarification to that. We did hire Mr. Dunsky to -- to undertake an overall -- overall a review of our portfolio. You don't drill down into the evaluations. This was an evaluation of our -- our plans and so slightly different there than evaluating the results you achieve.

MR. BYRON WILLIAMS: Yeah. And the -- again the -- your answer is better than the question. Focussing on the evaluation of individual programs, can you give me -- actually, I'm going to scratch -- scrap that question, because I'm thinking we'll get in -- we might be getting into some commercial arrangements, so I'm going to scrap that question.

And I will thank the panel for the time this evening. It's much appreciated. And Manitoba Hydro, as well.

THE CHAIRPERSON: Okay. Dr. Miller, have you got any questions for this panel? No? Thank you.

Me. Hacault, any questions at all?

(BRIEF PAUSE)

THE CHAIRPERSON: Thank you for that. I just have one (1) very set -- set of questions I want to address, which is related to the testimony that we heard from Mr. Dunsky. Specifically we were talking, he and I, about what makes for success in energy efficiency programs and DSM programs, and so on.

And, you know, he mentioned having a suitable framework in place to -- to ensure success, and he mentioned independent evaluation programs we just talked about, and oversight mechanism which is not clear it exists in this -- in Manitoba. And he also talked about manded obli -- mandated obligations.

I combine that with a report that was tabled by Manitoba Hydro that was produced by the American's Council for an Energy Efficient Economy, and it referred to one of the major -- major reasons for success is for the utilities or the states to have an energy efficiency resource standard, a mandate or standard.

And I guess the question is, you know, from my perspective, and given that we're expected to give advice to the government, I'm asking the question whether or not the framework that's in place in

Manitoba is adequate to ensure success for DSM programs by Manitoba Hydro?

And I -- I put that question out there because obviously given the evidence that we've heard from Mr. Dunsky, and given the report that I've -- that all of us -- all the panel members have read, I think, it's pretty clear that -- that there has to be a suitable framework in place. And I -- that's the question that I think we need to address at some point, whether it's now or it's through closing arguments. But I -- we need to hear from Manitoba Hydro what its views are about the notion of a -- of a changed framework that would ensure success.

And I think the reason why we've spent so much time in DSM is, you know, in -- in addition to the issues around, you know, its importance to a portfolio and its importance to meeting future needs and so on, there's also the -- the harsh reality, which I've addressed already, which is the notion that people are facing significant rate increases. And -- and it seems to me we have to an array of tools available to them that will allow them to mitigate some of that exposure that they're having to deal with in the future -- exposure to increased rates.

And so I -- I think that I would like to

hear from Manitoba Hydro its views about what I've just proposed and what we've heard as a panel from -- from Mr. Dunsky and -- and what we've read, as well, so I -- I wonder if that you -- you can address it now, or we can address it later and give you an opportunity to think about that.

(BRIEF PAUSE)

MR. LLOYD KUCZEK: I'll -- I'll provide a few comments with regards to that, and so I'd been involved on the demand-side management side at Manitoba Hydro since about 2000, so. And I've talked to other utilities -- I monitor market sim -- similar to what Mr. Cormie does on the export market, and so I used to monitor it a lot closer when I had more concerns.

Generally speaking, I think it's important that Manitoba Hydro pursue all economic oppor -- DSM opportunities. I think that's very important, but in that context, we also have to consider some considerations associated with some of those opportunities, like a rate design. Is it really worth pursuing or having a -- a rate structure -- a conservation rate structures, because there's other issues that need to be considered?

So I don't think just looking at it from an -- being an economic opportunity alone, it makes sense. You have to look at that from a broader perspective.

Fuel switching, I think government policy comes into play with that particular opportunity. So that has to be looked at from a broader perspectives, as well.

So I think the framework in Manitoba with the legislation that they have in place deals with -- deals with the issues from the government's perspective at least, and the -- and the Utility's perspectives. The hearings allow for other parties to present their views, as well, and I think that is good.

In terms of the evaluations that Mr. Dunsky's suggestion -- suggesting that we do, I -- we have concluded a few times in the past that we should -- probably should do some third-party evaluations of programs. We did do the overall portfolio with Mr. Dunsky. We'd seen some value in doing that, so.

With the third-party evaluations, what's been a barrier in the past, and I don't mean this in a negative way, has actually been the regulatory hearings. We -- we seem to be here more than -- or just as often as we are in the office, but I had

instructed our evaluation team to actually undertake a third-party evaluation of at least one (1) program, and this has got to back two (2) or three (3) years ago.

And a year would go by and we would never get to it because of other interference with the regulatory hearings. And -- and again, I don't mean that in a bad way, but that's what's happened.

But even as I sat here and we talked about it, I did text the supervisor resp -- or the manger responsible for the program, and I said, We -- we really need to do this to provide people with some comfort. So I think that is probably necessary for everyone here.

THE CHAIRPERSON: I guess I'm -- I'm concerned about the disincent -- the disincentive facing Manitoba Hydro when it comes to DSM programs, because if you manage to -- if I save a few kilowatt hours, it's costing you seven (7) or eight (8) cents a kilowatt hour -- costing Manitoba Hydro. You take a -- you turn around and you take that kilowatt and sell it in the US for four (4), five (5), six (6) cents, perhaps.

I'm not talking about the -- the reliable energy. I'm talking about the energy that would be freed up short-term from DSM programs. I -- I

-- guess it's a built in disincentive for Manitoba Hydro to -- to sort of really take hold of this DSM program and really sell that to Manitoba -- 'sell' is probably the wrong word, but make sure that Manitobans are given ample opportunity to take advantage of that.

And -- and I guess -- could you comment on that issue?

MR. LLOYD KUCZEK: We -- we actually don't view it from the short-term perspective, so, you know, when I did my presentation I talked about the resource cost test that we used that filter.

So we're not looking at -- and -- and I also caution the Board about that proxy number for the marginal value, because the marginal value -- that proxy number is just one (1) number. The value's different in the winter, it's different in the summer, it's different into the future.

So what we do is we look at -- we have a -- a spreadsheet that -- that takes that into account, and when we're looking at the opportunity with DSM. We input the energy that we're projecting to be saved and you capture that, then you do your analysis.

So our perspective is not to look at it from that short-term perspective, but to look at it from a long-term perspective, to use the marginal

value, measure that against the resource cost. And if that resource cost is lower than the marginal value -- if the resource cost is lower than the marginal value we should be pursuing that.

Then the question is: How aggressive and what is the design in terms of how we do that? So that's our philosophy at Manitoba Hydro in terms of pursuing economic opportunities.

MR. ED WOJCZYNSKI: And then maybe just to support that, when we evaluated the different levels of DSM, we don't just use opportunity costs for the surplus energy, we do use the -- the firm prices as well.

THE CHAIRPERSON: Thank you. I think that completes the proceedings for today. So thank you all -- everyone for having stayed for such a long period of time, but it was with intended -- with the objective of making sure we didn't have to sit on Saturday, so.

So have a good evening everyone. We'll see each other again tomorrow morning at a quarter to 9:00, some of us at least.

--- Upon adjourning at 7:45 p.m.

Certified correct,

_____

Cheryl Lavigne, Ms.

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PRESENTATION FOR

The Public Utilities Board

MANITOBA HYDRO NFAT REVIEW

DIRECT TESTIMONY OF PHILIPPE DUNSKY

April 28, 2014



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ENERGY CONSULTING

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DUNSKY OVERVIEW

CLIENTS (sample from among >100)



EXPERTISE

- Energy Efficiency and Demand-Side Management
- Renewable Energy and Emerging Technologies
- Greenhouse Gas Reductions

SERVICES

- Design and evaluation of programs, plans and policies
- Strategic, regulatory and analytical support
- New opportunities assessments

CLIENTELE

- Utilities
- Governments
- Solution Providers
- Large consumers
- Non-profits

DUNSKY **EXPERTISE**

We assist our clients in the following areas:

RESIDENTIAL

- ✓ New Construction
- ✓ Retrofit (able-to-pay & low-income)
- ✓ Advanced HVAC (incl. controls)
- ✓ Lighting & Appliances
- ✓ Behavioural, Plug Load, Others

BUSINESS & GOVERNMENT

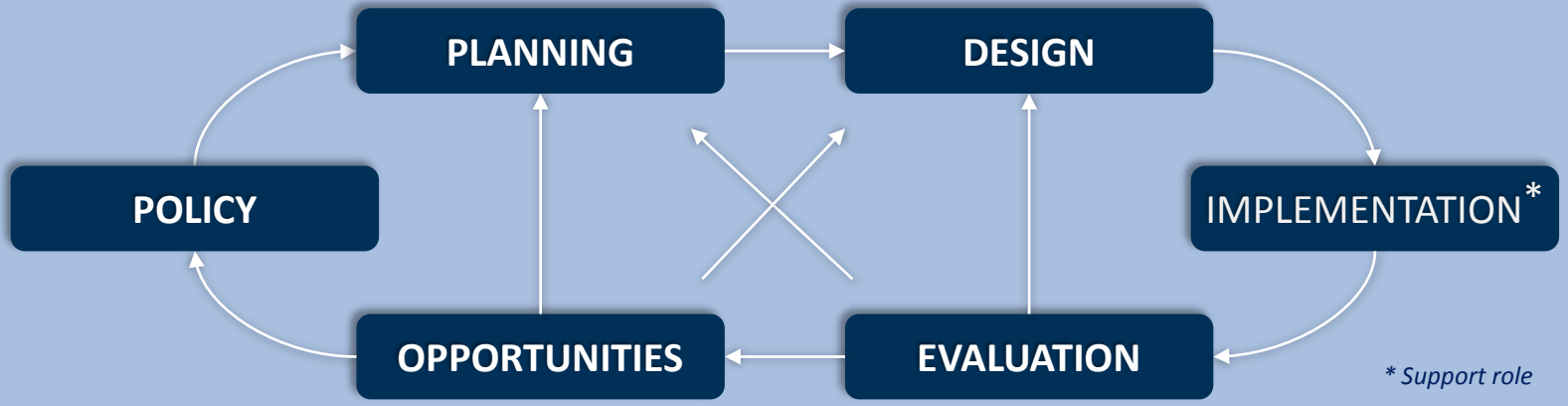
- ✓ Existing Buildings (custom, direct install, continuous optimization)
- ✓ New Construction (small and large)
- ✓ Equipment (Lighting, Controls, HVAC, Motors)
- ✓ Innovative Solutions

CROSS-SECTORAL

- ✓ Policies and Comprehensive Plans
- ✓ Regulatory Frameworks
- ✓ Innovative Financing
- ✓ Building Labelling & Benchmarking
- ✓ Rate Structures & Options
- ✓ Demand Response & Load Control
- ✓ Smart Meters / Grids
- ✓ Customer-sited Renewables
- ✓ Next-Generation Technologies
- ✓ Codes and Standards

DUNSKY **SERVICE AREAS**

PRIMARY AREAS



SUPPORT SERVICES

STRATEGIC & MARKET

- Comprehensive Plans
- Program Design
- Best Practice reviews
- Gap Analyses
- Business Plans
- Strategic Evaluations
- Process Evaluations
- Benchmarking
- Market Research
- Stakeholder Engagement
- Regulatory Frameworks
- Regulatory Support

TECHNICAL & ECONOMIC

- Potential Studies
- Technology Assessments
- Measure Characterization
- Savings Algorithms
- Modelling
- Impact Evaluations
- Cost-Effectiveness Screening
- Financial Analysis
- Energy System Modelling
- Carbon Markets

BUILDING SERVICES

- Building Assessments & Modelling
- Building Performance Optimization
- Building Certifications (LEED, BOMA, ESPM, etc.)
- Related services

My Qualifications

23 YEARS OF EXPERIENCE

- 10 leading my firm (advising N.A. govts, utilities, others)
- 8 as Executive Director of energy think tank
- 5 working with government and non-profits

PAST APPOINTMENTS

- GOVT: Canadian GMF ($650m); Quebec EE Agency, Quebec Energy Commission, NRTEE
- PRIVATE: Venture cap (FIDD), EIG investment fund, Enbridge DSM Audit Comm., others…
- Non-profit: FAQDD, PlanetAir, BC Green Landlords Project, Daphna Foundation, others…

CURRENT PROJECTS

- **Comprehensive Plans**
  - *MB (CAC/GAC): review NFAT filing*
  - *NB (NBP): design RASD plan (EE+DR)*
  - *VT: long-term energy planning / modelling*
- **Program Design and C&S**
  - *SK: solar finance design*
  - *ON (TAF): innovative finance model (C&I)*
  - *MB (MH): low-income program review*
  - *OEE: home retrofit strategies*
  - *OEE: new LVT standards*
- **Program Evaluation**
  - *CA (CPUC): impact evaluations (lead)*
  - *CA (IOUs): process evaluations*
- **Potentials and Opportunities**
  - *NB (NBP): potential studies*
  - *MA (CLC): potential study*
  - *MA (NU): smart thermostats*
  - *MA (NU): new gas savings opportunities*
- **Economic & Technical Analysis**
  - *AESP: Trainer – DSM Economics (Advanced)*
  - *GM: incorporation of non-energy benefits*
  - *CA: Methodologies for finance programs*
  - *ENSC: Frameworks for planning and IRP*
  - *NBP: Technical Resource Manual (TRM)*
  - *ON (OPA): advanced lighting TRM*

CURRENT OTHER CONTRIBUTIONS

- NESP (cost-effectiveness): Advisor
- NEEP-AHP (Cold Climate): Member
- NEEP-AHP (Policy): Member
- Others (ACEEE, AESP, CEEA, AQME)

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1. Hydro's DSM Scenarios

2. The Problem with a Static View of the Future

3. How Others Address the "Planner's Dilemma"?

4. Preferred DSM Assumptions & Implications for NFAT Review

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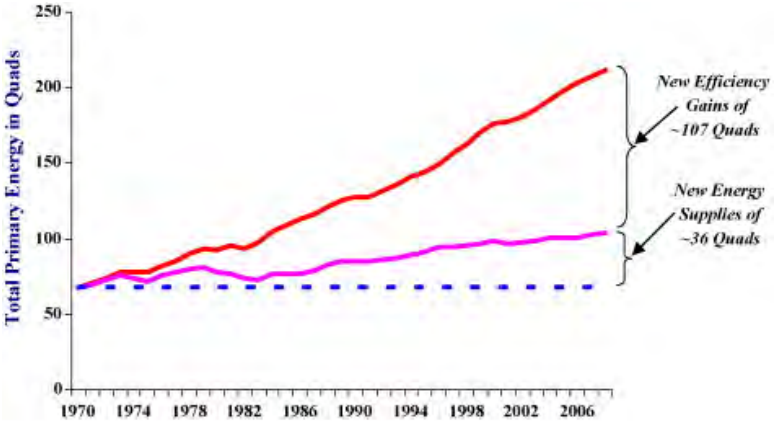
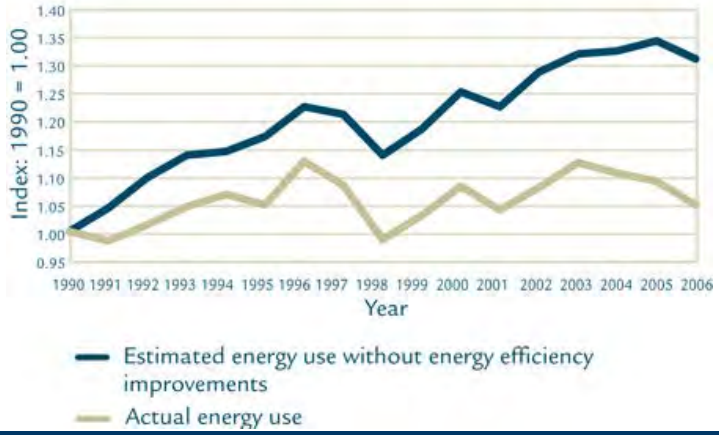
Demand-Side Management (DSM)

- **Two options to ensure sufficient supply**
  - Increase Supply
  - Increase Efficiency (reduce demand)
- In U.S., since 1970 energy efficiency has supplied 75% of growth in demand
  - Increased supply: 25%
  - **Increased efficiency: 75%**
- In Canada, from 1990 to 2006, energy efficiency (DSM) supplied majority of residential growth in demand for energy services
  - Increased supply: 15%
  - **Increased efficiency: 85%** or $6.6B

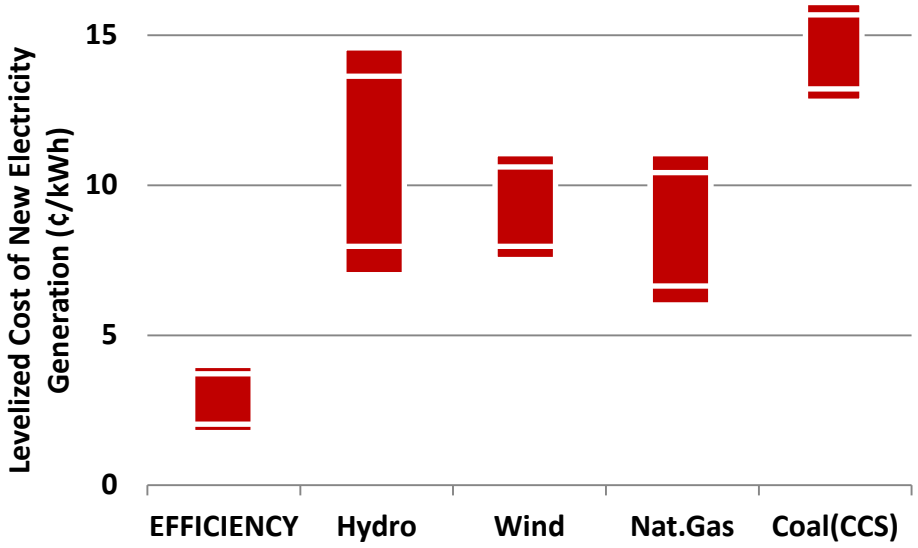


Residential Energy Use, Actual and Without Energy Efficiency Improvements, 1990 to 2006



EFFICIENCY'S BUSINESS CASE

- ✓ **CHEAP**
  - 2-8 times cheaper than new supply (power plants)
  - Also lower risk
- ✓ **JOBS**
  - ~2-10 times more jobs per million dollars invested
- ✓ **CLIMATE**
  - 1st priority in reducing CO2 emissions
- ✓ **ECONOMIC BENEFIT**
  - Increases household disposable income
  - Frees business capital for productive use
- ✓ **CUSTOMER SATISFACTION**
  - Opportunity to reduce bills and secure other benefits



MANITOBA HYDRO

- **Strong history with energy efficiency**
  - A+ ratings
  - Awards

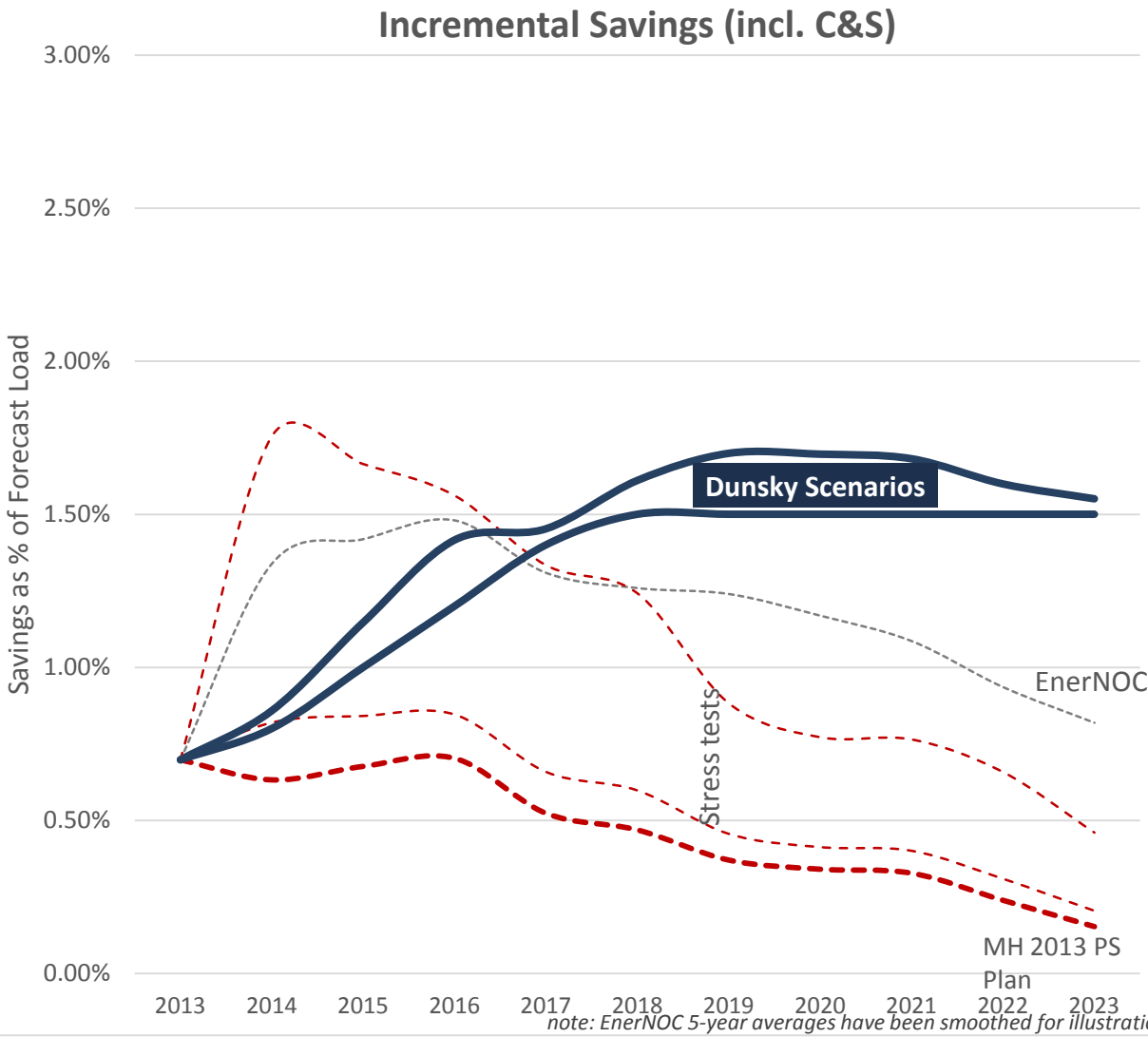
- **Unique strengths to deliver DSM**
  - ✓ Full territorial coverage
  - ✓ Electric-Gas Integration
  - ✓ History of DSM *incl. relationships with market channels, experienced/capable staff*
  - ✓ Billing integration
  - ✓ Data integration
  - ✓ Others

DSM & NFAT

- INTRO
  - DSM critical resource for balancing supply & demand
  - Hydro: great strides in 6 months
  - Remaining steps to ensure long-range planning is as accurate as possible
- MY PRESENTATION
  - Seek to answer Q: **“What role should DSM be assumed to play for proper long-run planning?”**
  - Focus here on energy only; can speak to capacity – and demand response needs – upon request; other issues as well

Original Values (to 2023)

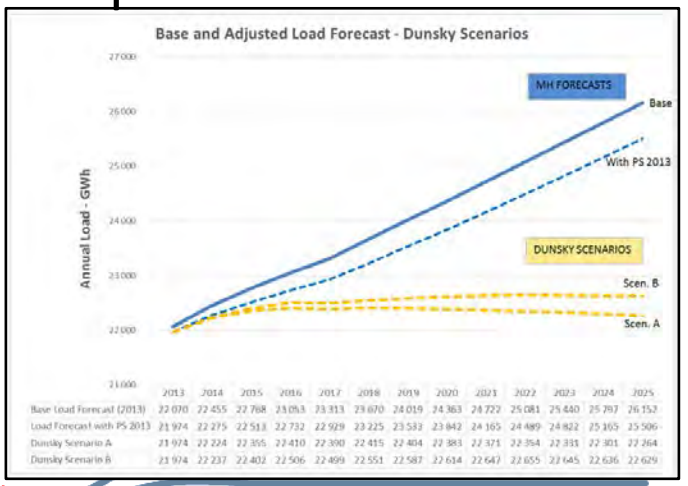
- MH 2013 Plan: ~0.4%/yr (avg)
- EnerNOC Mkt. Pot.: ~1.0%/yr (avg)
- Stress Tests (2013 x1.5 /x4.0)
- Dunsky scenarios: 1.3% and 1.1%



New MH "Levels" (to 2023)

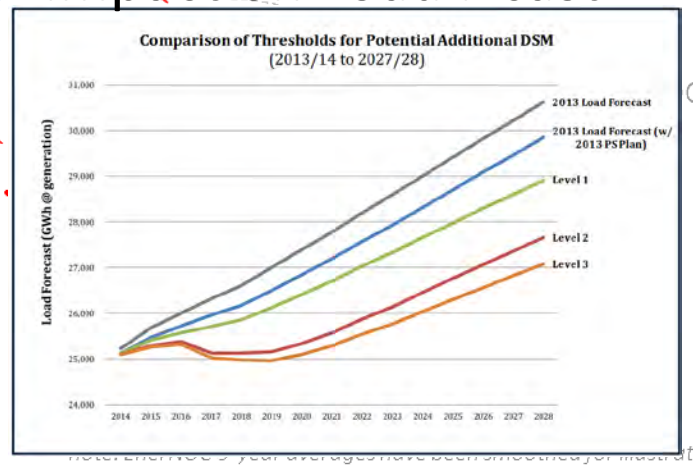
DUNSKY DSM Scenarios → Impact on Load F'cast

		2014	2015	2016	2017	2018	2019	2020 ++	10 YEAR AVG 2014-2023 (programs only)	10-yr Avg. 2014-2023 (prog's + C&S)
Scen. A (1.3%)	%/yr:	0.6%	0.8%	1.0%	1.2%	1.4%	1.5%	1.5%	1.3%	1.5%
	GWh/yr:	135	182	231	280	331	360	365	3,013 GWh/yr (cumulativ	3,534 GWh/yr (cumulative
Scen. B (1.1%)	%/yr:	0.5%	0.7%	0.8%	1.1%	1.3%	1.3%	1.3%	1.1%	1.3%
	GWh/yr:	122	149	181	267	305	312	317+	2,634 GWh/yr (cumulative)	3,220 GWh/yr (cumulative



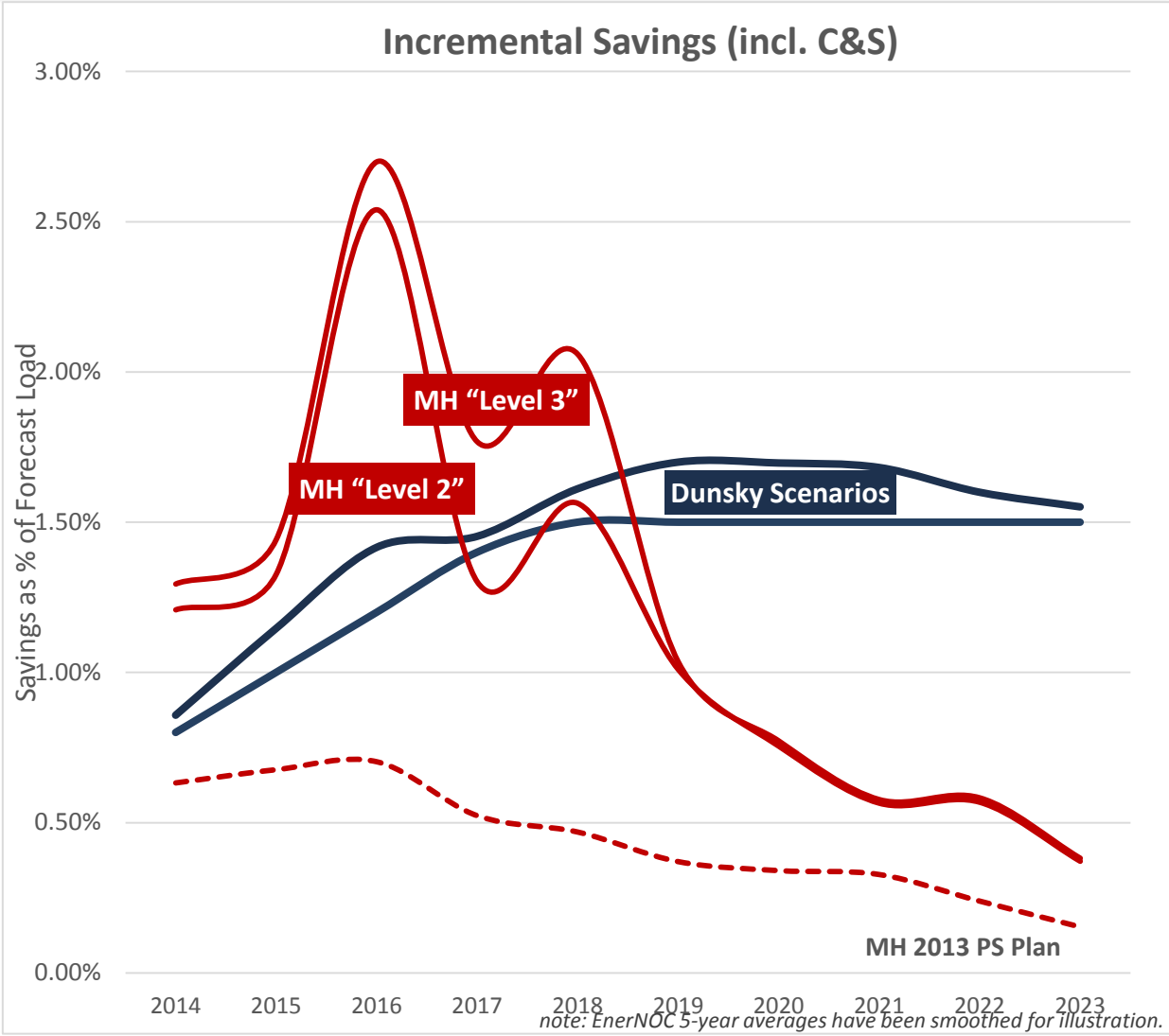
MANITOBA HYDRO DSM Scenarios → Impact on Load F'cast

		2014	2015	2016	2017	2018	2019	10 YEAR AVG 2014-2023 (programs only)	10 -yr Avg. 2014-2023 (prog's + C&S)
Level 1 0.5%	%/yr:	0.4%	0.6%	0.7%	0.6%	0.5%	0.5%	0.5%	0.7%
	GWh/yr:	110	160	170	167	138	137	1,272 GW.h/yr (cumulative)	1,918 GW.h/yr (cumu
Level 2 1.1%	%/yr:	0.5%	1.0%	1.0%	2.1%	1.3%	1.6%	1.1%	1.3%
	GWh/yr:	138	244	255	559	352	445	2,459 GW.h/yr (cumulative)	3,104 GW.h/yr (cumulative)
Level 3 1.2%	%/yr:	0.6%	1.0%	1.1%	2.3%	1.5%	1.8%	1.2%	1.5%
	GWh/yr:	141	266	285	601	403	499	2,833 GW.h/yr (cumulative)	3,478 GW.h/yr (cumulative)



New MH "Levels" (to 2023)

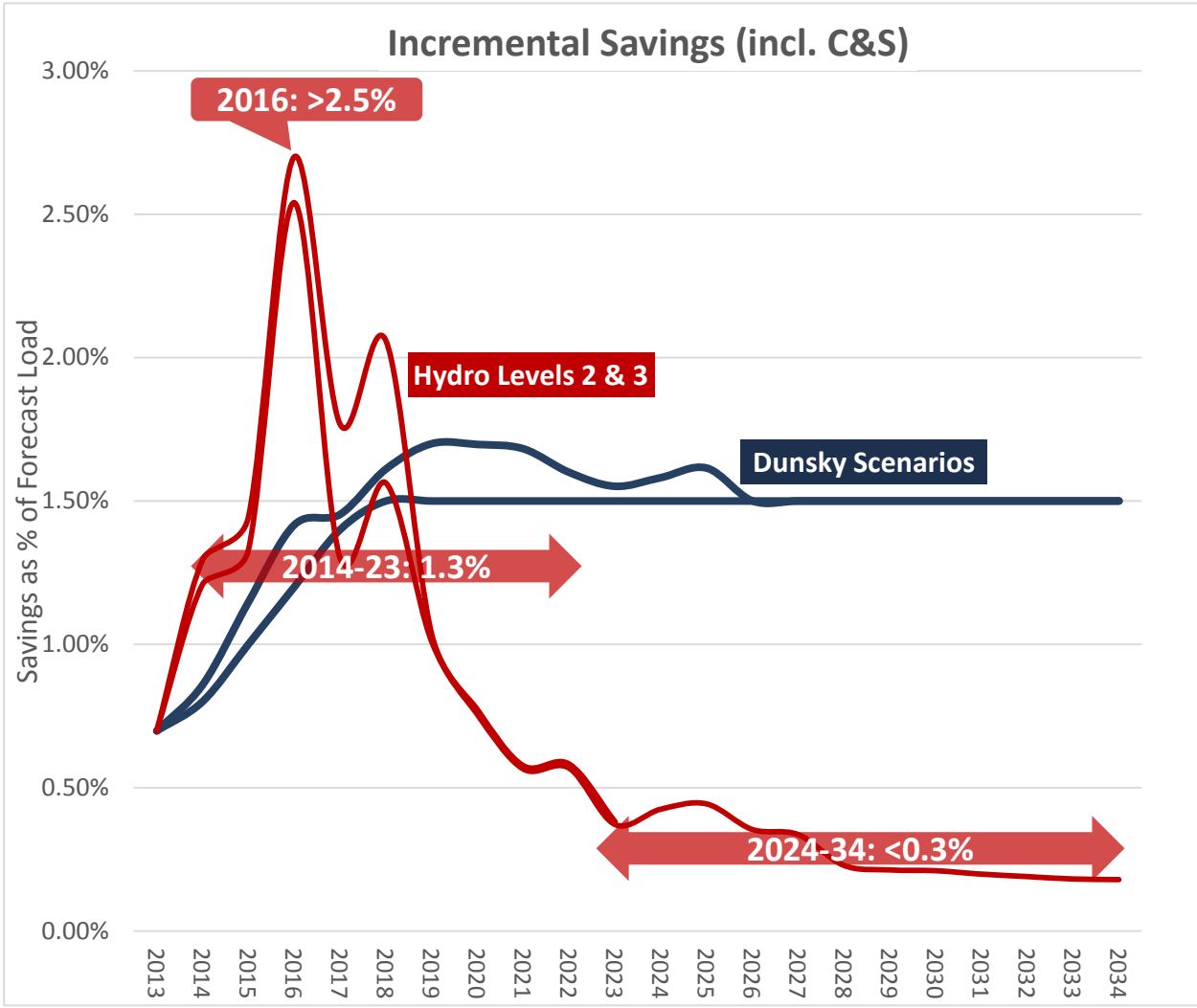
- Dramatic change in MH's DSM plan
- **2013-16:** Extremely aggressive ramp-up
- **> 2018: Rapid decline**



note: EnerNOC 5-year averages have been smoothed for illustration.

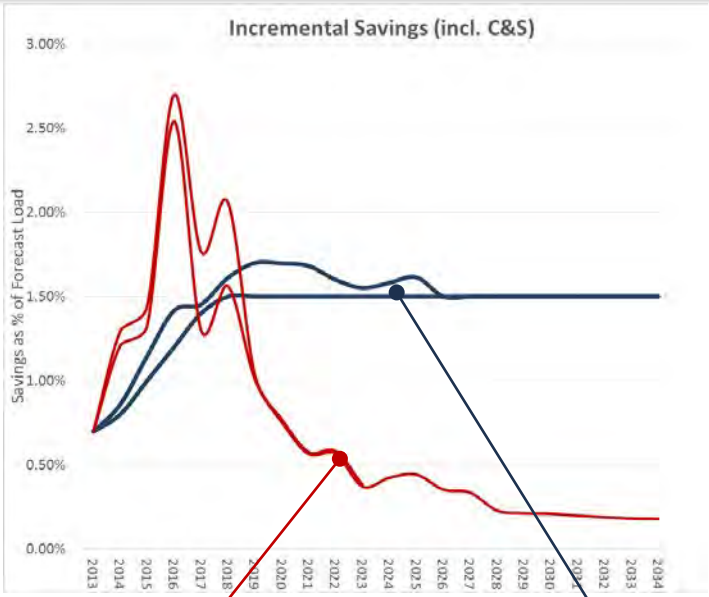
New MH "Levels" (to 2034)

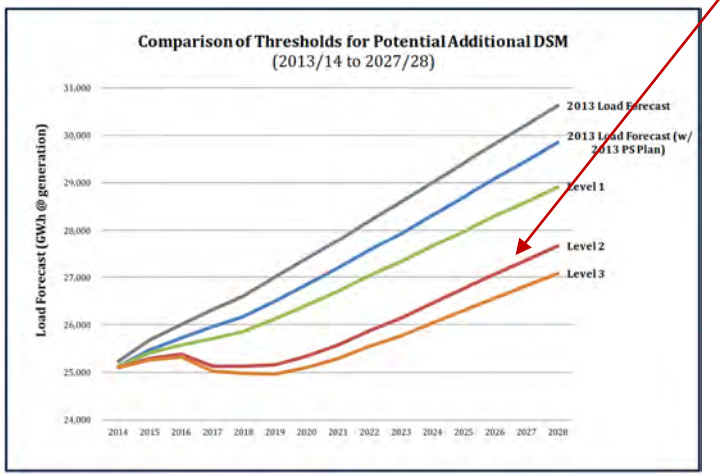
- Dramatic change in MH's DSM plan
- **2013-16:** Extremely aggressive ramp-up
- **> 2018: Rapid decline**
- **≥ 2023: 0.28%/yr (avg) = 90% below Level 2 peak**

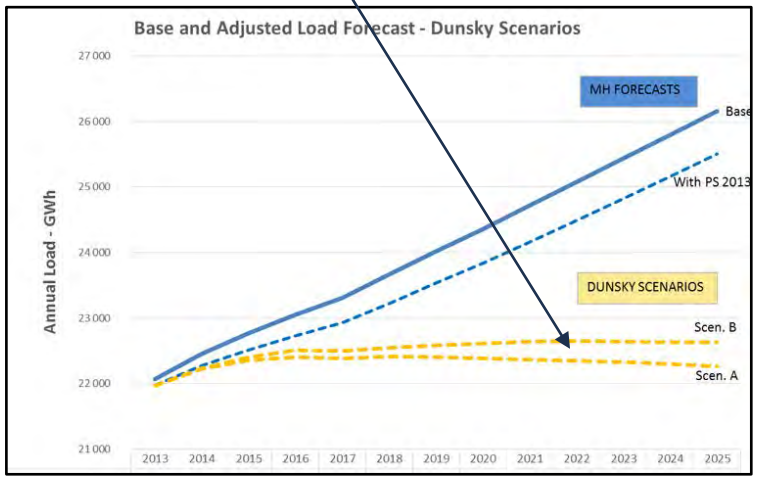


RECAP OF DIFFERENCES

- New MH Levels maintain "static" view of DSM
- = unrealistic assumption of few if any opportunities beyond what we now know







In the near-term, Hydro's Levels 2 and 3 represent a dramatic – and commendable – change in DSM planning and target-setting.

In the long-term, planning-level inputs quickly revert back to previous assumptions. These grossly understate DSM's future contributions – assuming Hydro maintains its "pursuit of all economic DSM" policy – and undermine the credibility of the domestic net load forecast.

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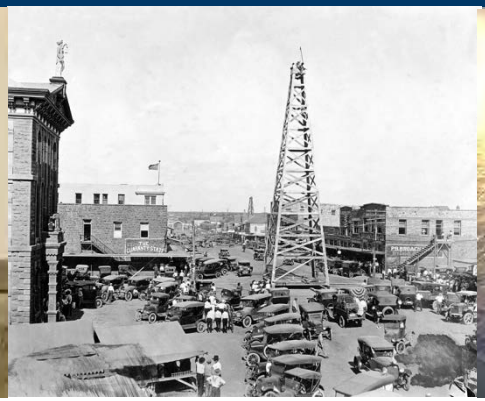
4. Preferred DSM Assumptions & Implications for NFAT Review

DSM RESOURCE = INNOVATION



- Like mining, or oil & gas “drilling”, the more we want, the more we look, and the more we find
- Innovation does not stop; it strengthens over time
- Unprecedented capital flowing to energy innovations; will transform energy markets over coming 10-20 years

MANITOBA HYDRO'S RECOGNITION

"**Manitoba Hydro recognizes that the targets in this plan are conservative** as some programs and opportunities which could reasonably be expected to be achieved within the planning horizon were excluded (e.g. LED applications for Roadway lighting, residential and commercial applications; load displacement opportunities, fuel switching opportunities and energy conservation rates). **These and other programs are expected to be added in future Power Smart Plans"**

"To reflect DSM targets for resource planning purposes, the Corporation intends to forecast its expectation of DSM savings which will most likely be achieved, and therefore may include energy savings from emerging technologies or other initiatives such as load displacement, energy conservation rates and fuel switching."

(Rebuttal, page 28)

SAMPLE INNOVATIONS

Below are five sample areas where we *already know* that innovation will significantly impact demand for grid power in the coming years

i. **New efficiency standards**
   to secure savings from recent innovations

ii. **New: LED Lighting**

iii. **New: Heat Pumps**

iv. **New: Data-Driven Analytics**

v. **New: Solar PV**

i. Codes & Standards

Building Codes and "Appliance" Standards secure adoption of DSM innovations

- **CODES**
  - Specific to geography
  - Canada recently adopted far more stringent model codes
  - MB historically a leader
- **STANDARDS**
  - Typically Canada-wide; federal govt chose to follow U.S. lead
  - Obama admin.: unprecedented overhaul of EE standards
    - ***approx. 300 TWh/yr of savings expected by 2030***
    - *More to come (150 TWh more?)*
  - **= >10% of total U.S. electricity consumption**

New U.S. Standards Adopted Under Obama

Product	Final Rule Date	Effective Date	Cumulative Electricity Savings Through 2030 (billion kWh)[iii]	Cumulative CO_2 Reductions Through 2030 (MMT)[iii]	Net Present Value of Savings (billion 2012$)[iv]
EISA[v] - General Service Lamps (GSLs)	March 2009	2012-2014	1,510.9	704.4	168.7
EISA (excluding GSLs)	March 2009	2008-2013[vi]	472.5	234.6	50.5
Ranges and Ovens	April 2009	2012	--	3.9	1.3
Commercial Boilers	July 2009	2012	--	6.1	1.5
General Service Fluorescent Lamps	July 2009	2012	414.6	193.2	17.6
Incandescent Reflector Lamps	July 2009	2012	98.3	46.1	6.7
Beverage Vending Machines	August 2009	2012	16.5	7.7	1.2
Commercial Clothes Washers	January 2010	2013	2.7	2.7	0.8
Small Motors	March 2010	2015	175.5	81.4	9.9
Water Heaters	April 2010	2015	118.1	74.8	6.3
Direct Heating Equipment	April 2010	2013	--	0.4	0.05
Pool Heaters	April 2010	2013	--	0.5	0.05
Clothes Dryers	April 2011	2015	21.9	10.6	2.7
Room Air Conditioners	April 2011	2014	40.2	18.7	3.1
Central A/C and Heat Pumps	June 2011	2015	112.6	52.2	8.8
Refrigerators and Freezers	September 2011	2014	248.7	115.4	15.7
Fluorescent Lamp Ballasts	November 2011	2014	318.1	147.6	30.9
Clothes Washers	May 2012	2015	115.5	59.3	29.9
Dishwashers	May 2012	2013	0.0	1.3	0.3
Distribution Transformers	April 2013	2016	58.6	27.2	8.7
Microwaves	June 2013	2016	26.1	12.1	3.0
Metal Halide Light Fixtures	February 2014	2017	13.0	6.8	1.3
External Power Supplies	February 2014	2016	28.3	23.6	1.2
Commercial Refrigeration Equipment	March 2014	2017	112.5	48	9.7
Total	--	--	**3,905**	**1,879**	**380**

Ref: http://www.appliance-standards.org/sites/default/files/Progress_toward_3_billion_CO2_reduction_0.pdf. *Feb. 18, 2014*

i. Codes & Standards

- Canada now playing catch-up
  - Strong push to harmonize with U.S.
  - **32 energy efficiency standards currently proposed for adoption**
  - Vast majority electric
- More to follow?

Canada 2014 Proposed Standards

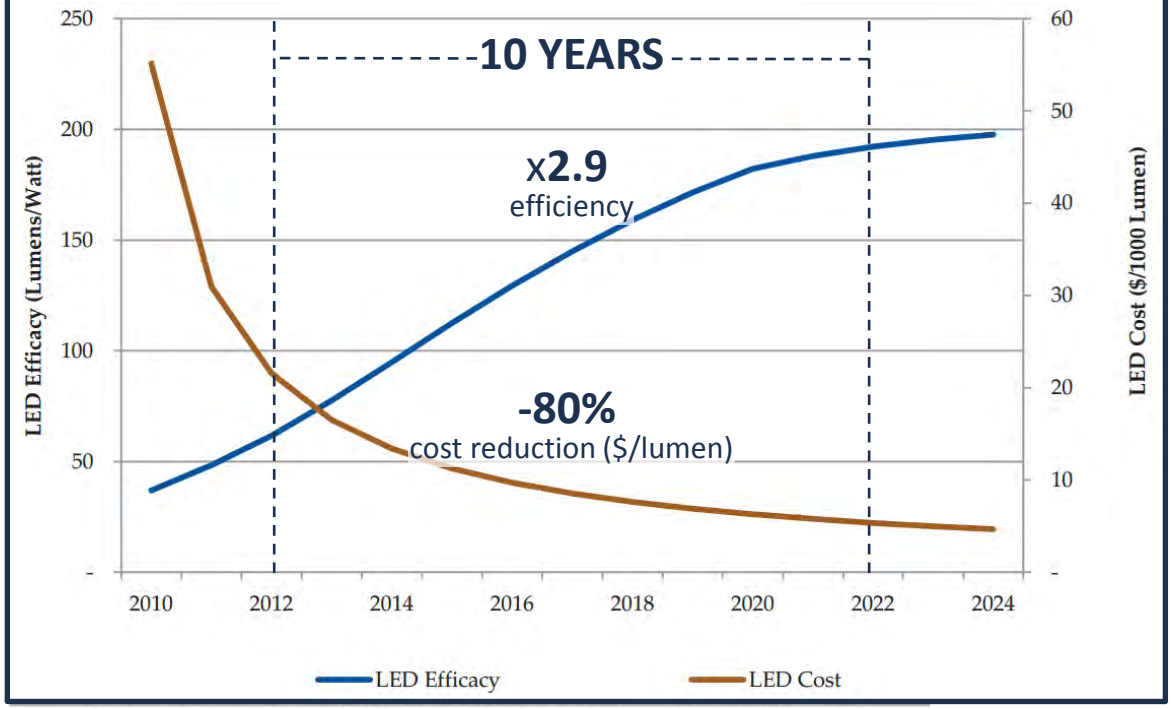
(to harmonize with new U.S. standards)

1. Chillers
2. Commercial self contained refrigeration products
3. Gas water heaters
4. General service incandescent reflector lamps
5. General service fluorescent lamps
6. Oil fired water heaters
7. Packaged terminal air-conditioners and heat pumps
8. Room air-conditioners
9. Residential refrigerators
10. Residential freezers
11. Residential dishwashers
12. Residential clothes washers
13. Residential clothes washer-dryers
14. Commercial clothes washers
15. Residential clothes dryers
16. Central air-conditioners and heat pumps
17. Vending machines
18. Oil furnaces
19. Fluorescent lamp ballasts
20. Dry-type transformers
21. Large air-conditioners and heat pumps
22. Metal halide ballasts
23. Commercial boilers
24. Line Voltage Thermostats
25. Pre-rinse spray valves
26. Tankless gas water heaters
27. Commercial water heaters
28. Commercial refrigeration with remote condensing unit
29. Small electric motors
30. Microwave ovens
31. Walk-in refrigerators
32. Pool heaters

ii. LED Lighting

- Rapid improvements on their way
  - 3x more efficient in 10 years
  - 80% cheaper for same light output
  - Anticipate dramatic savings across all sectors
- Note re. MH:
  - EnerNOC: LEDs not included until 2020 because too costly
  - MH: LEDs already promoted today

LED Lighting | Efficiency & Costs 2010-2024

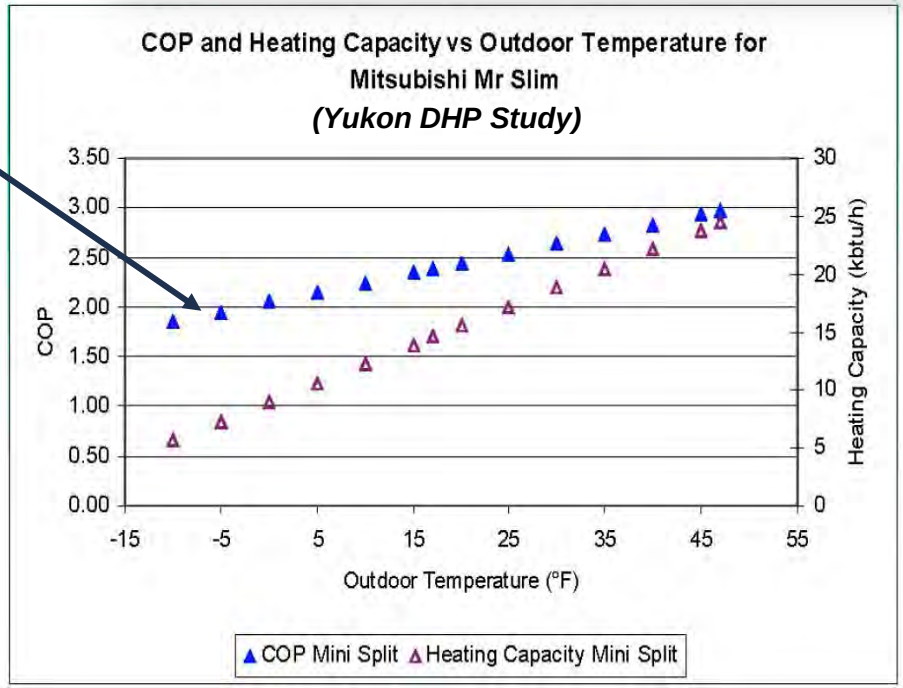


Source: Navigant. Energy Savings Potential of Solid-State Lighting in General Illumination Applications. Prepared for the U.S. Department of Energy. January 2012.

iii. DHPs (Ductless Heat Pumps)

- **DHPs transforming heating options in colder climates**
  - **Excellent opp for baseboard heated homes** (no internal heat distribution system)
  - Inverter-driven models can achieve 200% efficiency at *minus 20° C*
  - Can supply **30-60% of Manitoba home heating needs**
  - Improved customer value: air quality in winter; zonal control; AC in summer

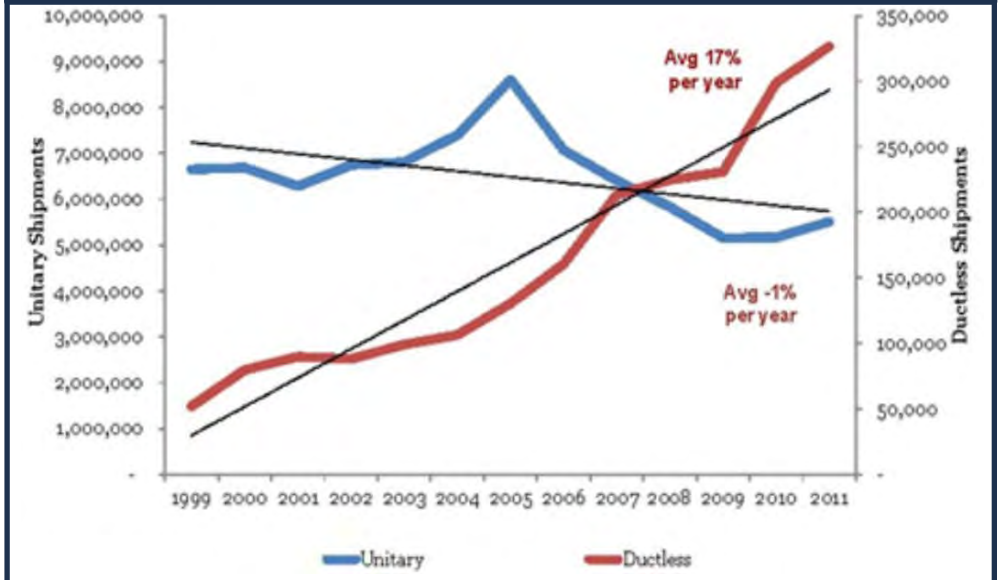




iii. DHPs (Ductless Heat Pumps)

- DHPs posting strong growth across North America
  - U.S.: x2 every 4 yrs
  - Canada: anecdotal evidence suggests very strong growth

DHPs | U.S. Sales 1999-2011

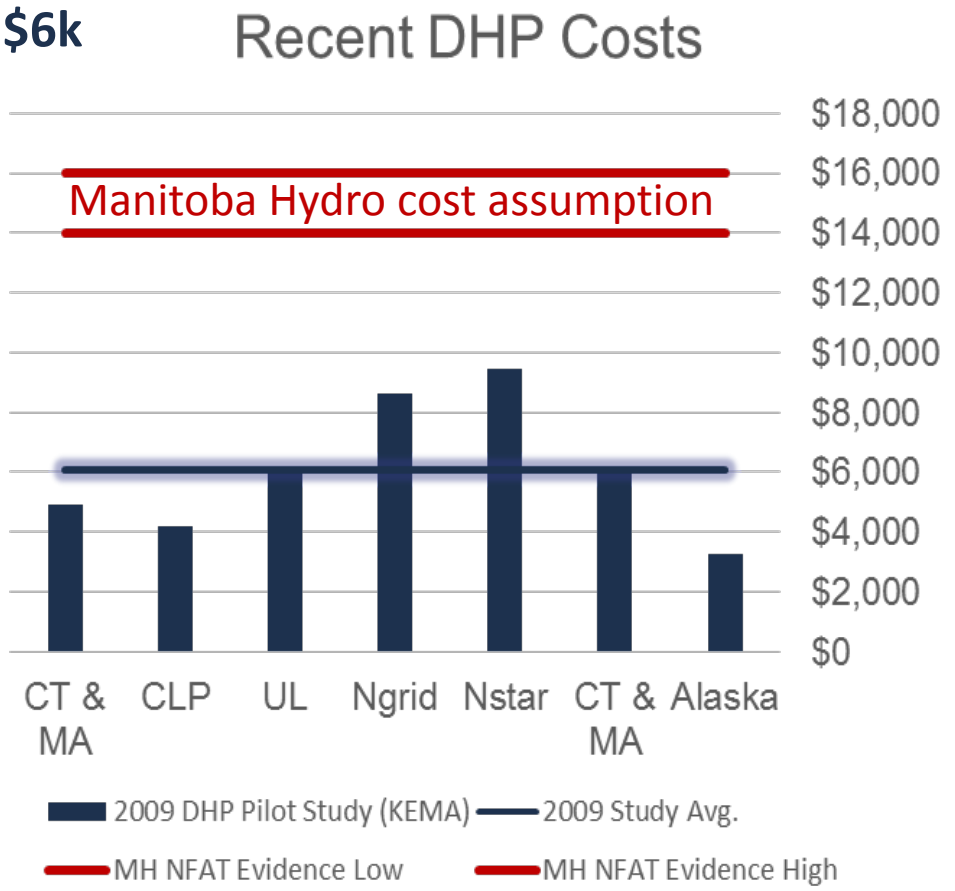


Source: AHRI, cited in NEEP, Mid-Atlantic Air Source Heat Pump Market Strategies Report, Jan. 2014.

DHPs (Ductless Heat Pumps)

- **High-efficiency DHPs now affordable**
  - Typical: $4k +$2k install = **$6k**
  - Less for smaller homes

- **MB notes:**
  - **MH assumes "$14-16k" cost** (rebuttal, p.37)
  - Excluded from EnerNOC study



iv. Data-Driven Analytics

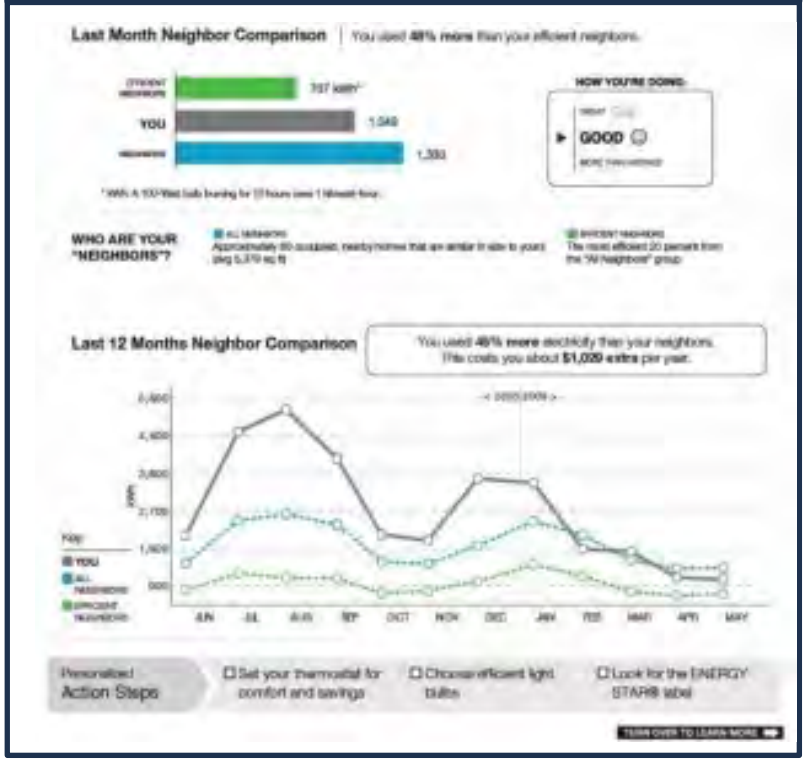
- Combination of computing power and prevalence of wireless communications capabilities is driving unprecedented innovation in three areas:
  - **Residential "behaviour"**
  - **C&I facilities operations**
  - **Utility control of end uses**

iv. Data-Driven Analytics

CASE STUDY: **OPOWER**

- Simple concept: Neighbour comparisons
- Driven by deep analytics and strong social science research
- Educates and motivates change
- 1-3% savings across multiple regions and timespans (independent evaluations)
- Very successful IPO last month

Home Energy Report | Sample



iv. Data-Driven Analytics

CASE STUDY: **SMART THERMOSTATS**

- Dozens of new entrants incl. Nest (Google), Honeywell, Ecobee…
- Wide array of functionalities including:
  - Assisted programming
  - Nudges and automated setting changes
  - Touchless home energy assessment and automated suggestions
  - Predictive start-to-temp set algorithms
  - Distance-based user controls
  - Distance-based *utility* controls (voluntary)
  - Furnace alerts, weather, photos, music, etc.
- Very large recorded savings to date (5-15%)



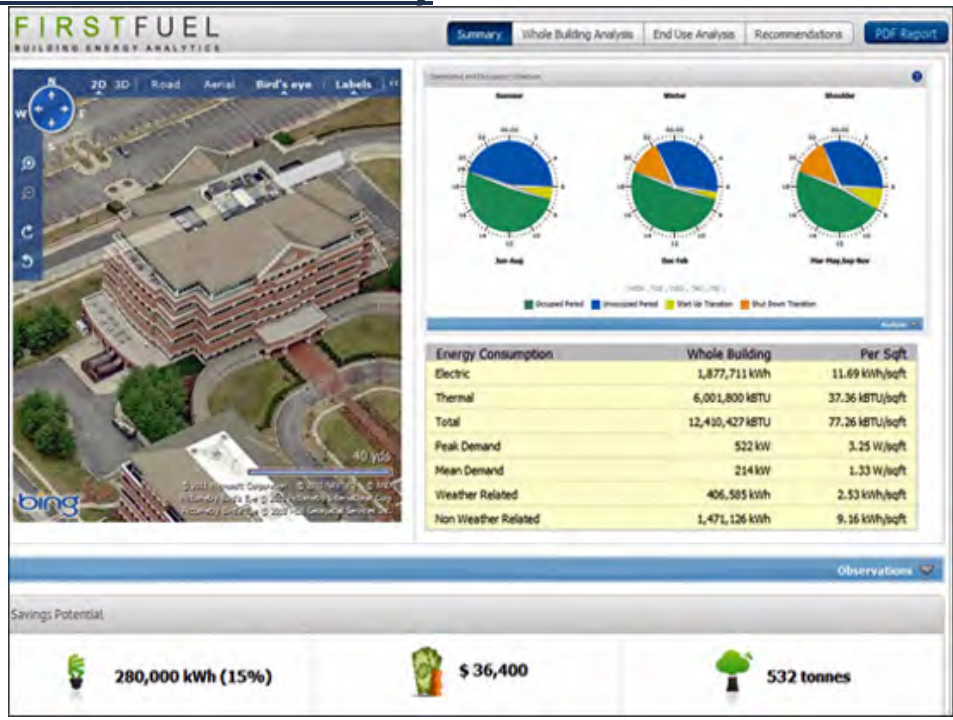




iv. Data-Driven Analytics

CASE STUDY: **FIRST FUEL (BLDG DIAGNOSTICS)**

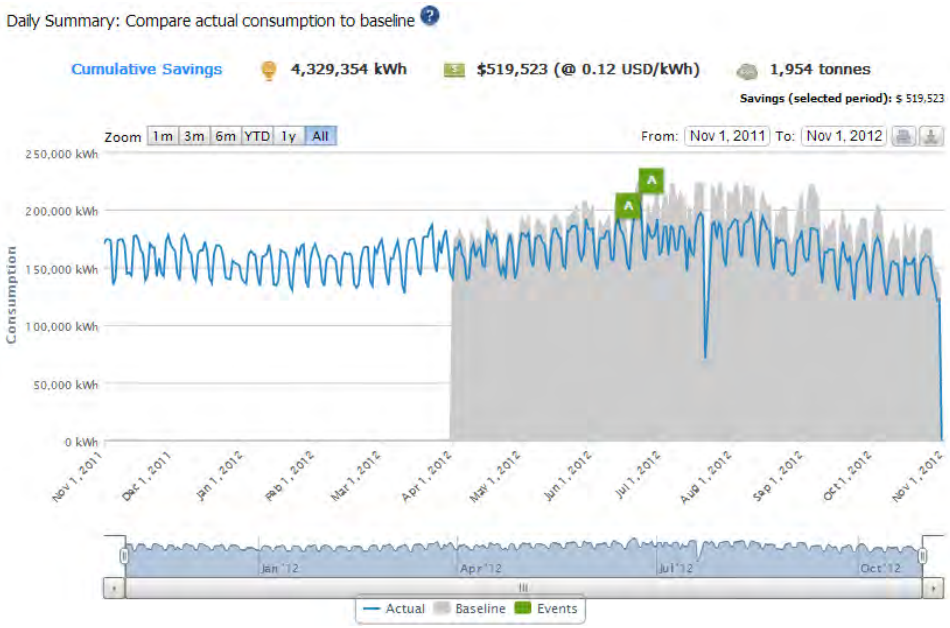
- Powerful use of new data streams to conduct "touchless audits"
  - Real-time meter data
  - Matched localized weather data
  - High-quality satellite imagery
  - Skilled back-office analysts
- Cost: 1/3 of traditional audits

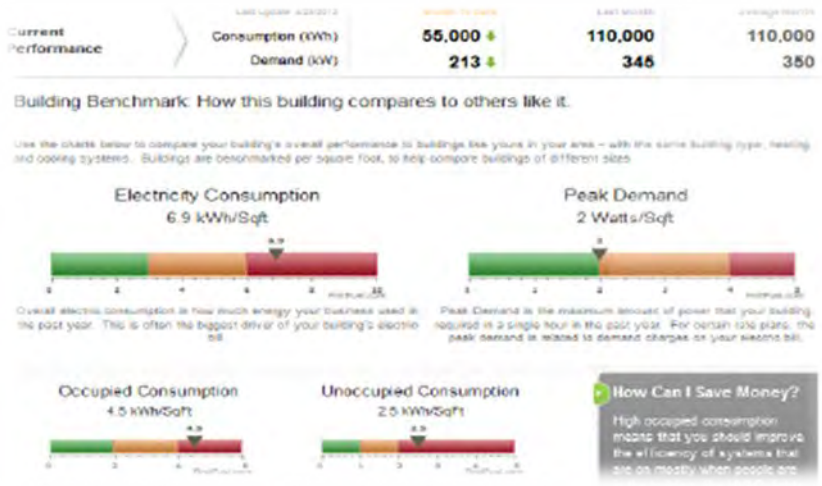


- ASHRAE Level 2 quality + web platform facilitates continuous improvements
- **Scale: 100s and 1000s replace one-offs**

iv. Data-Driven Analytics



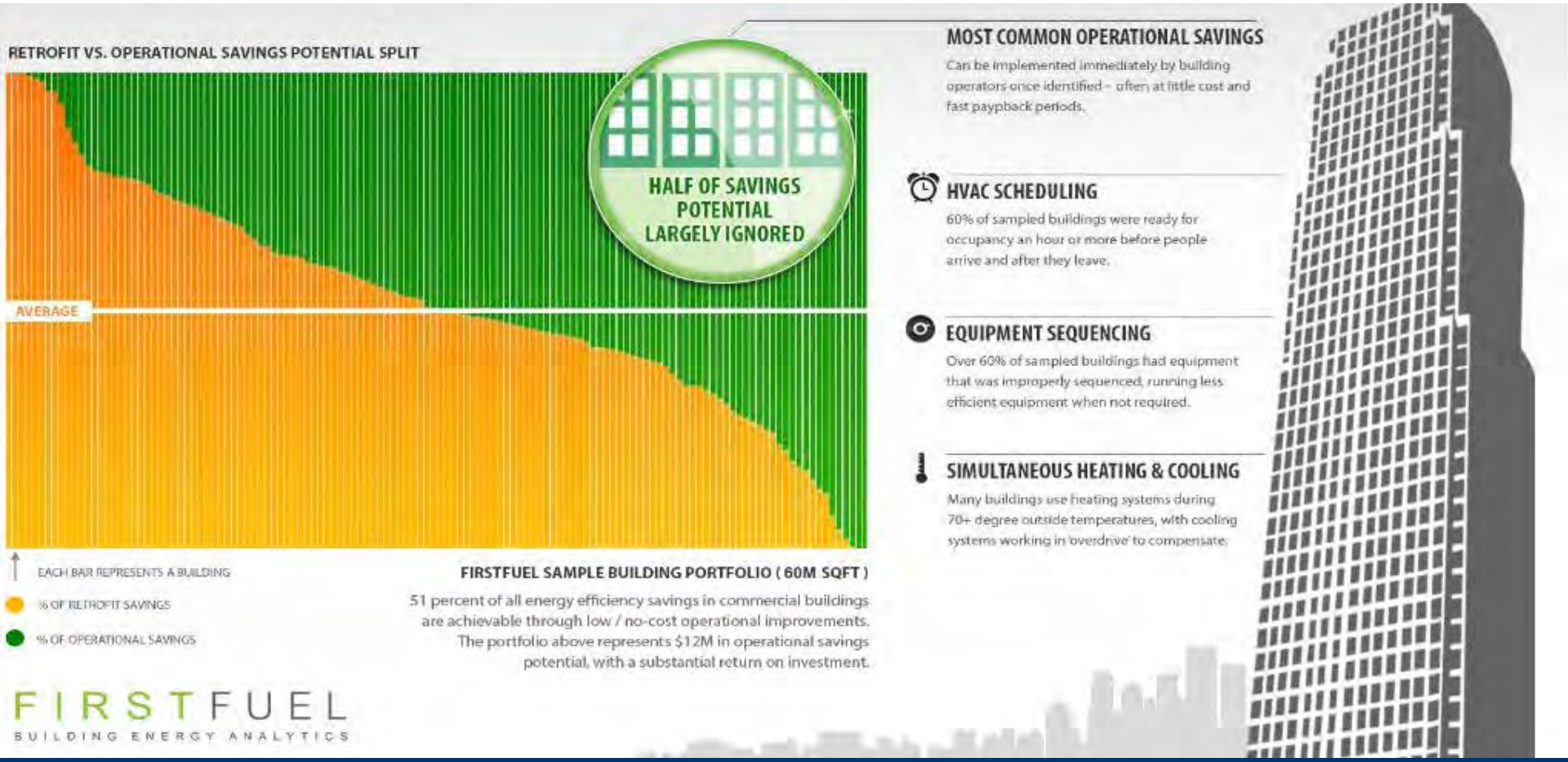




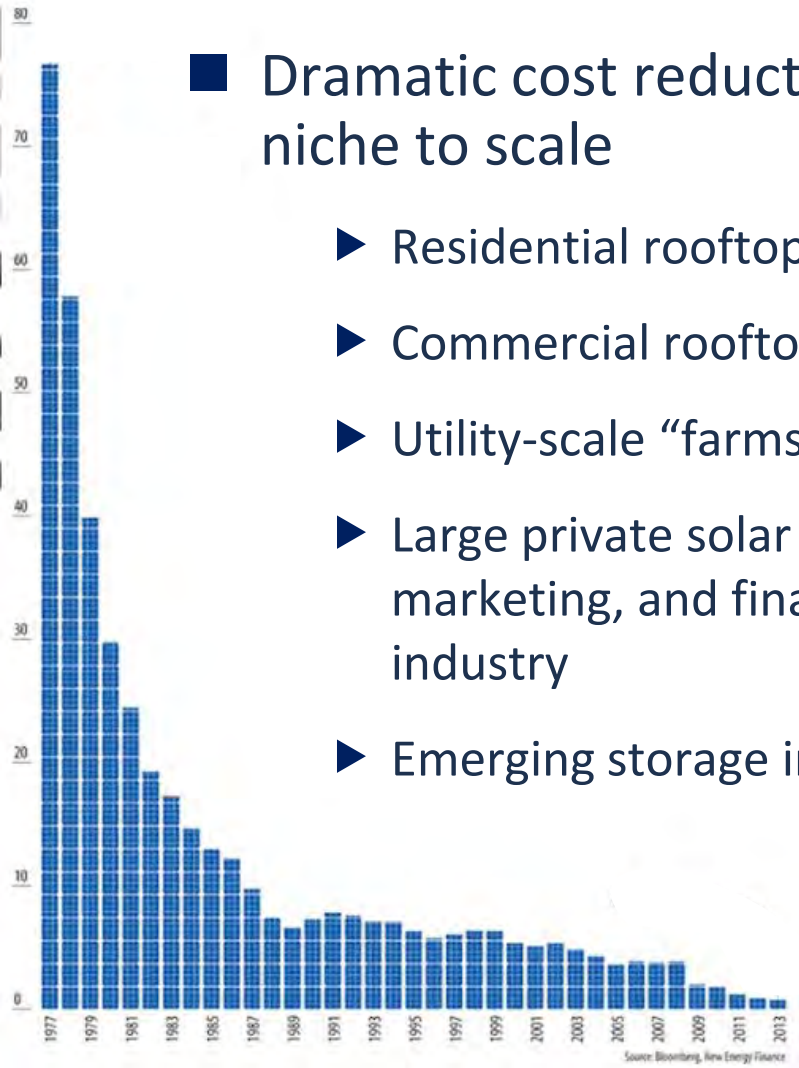


iv. Data-Driven Analytics

- Large savings from previously missed opportunities

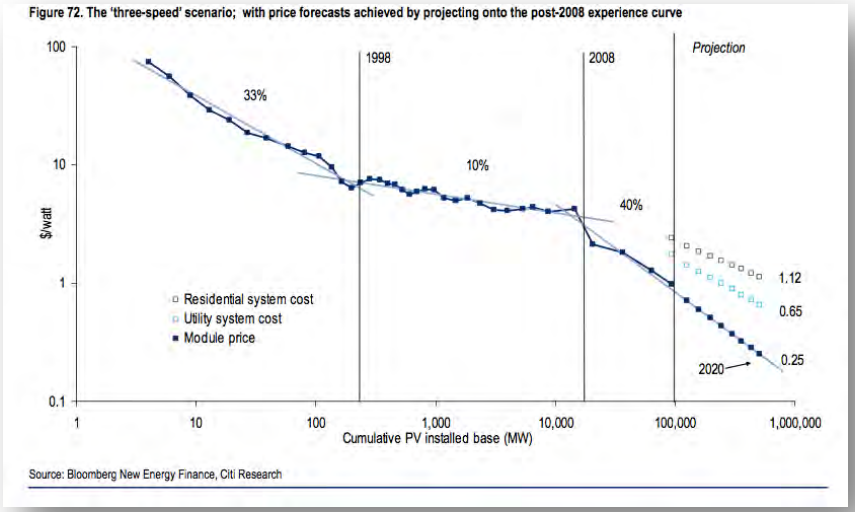


v. Solar Photovoltaics (PV)



- Dramatic cost reductions have led solar to move from niche to scale
  - Residential rooftop
  - Commercial rooftop
  - Utility-scale "farms"
  - Large private solar install, marketing, and financing industry
  - Emerging storage industry (private and utility)

PV COST F'CAST FROM MB HYDRO'S FILING

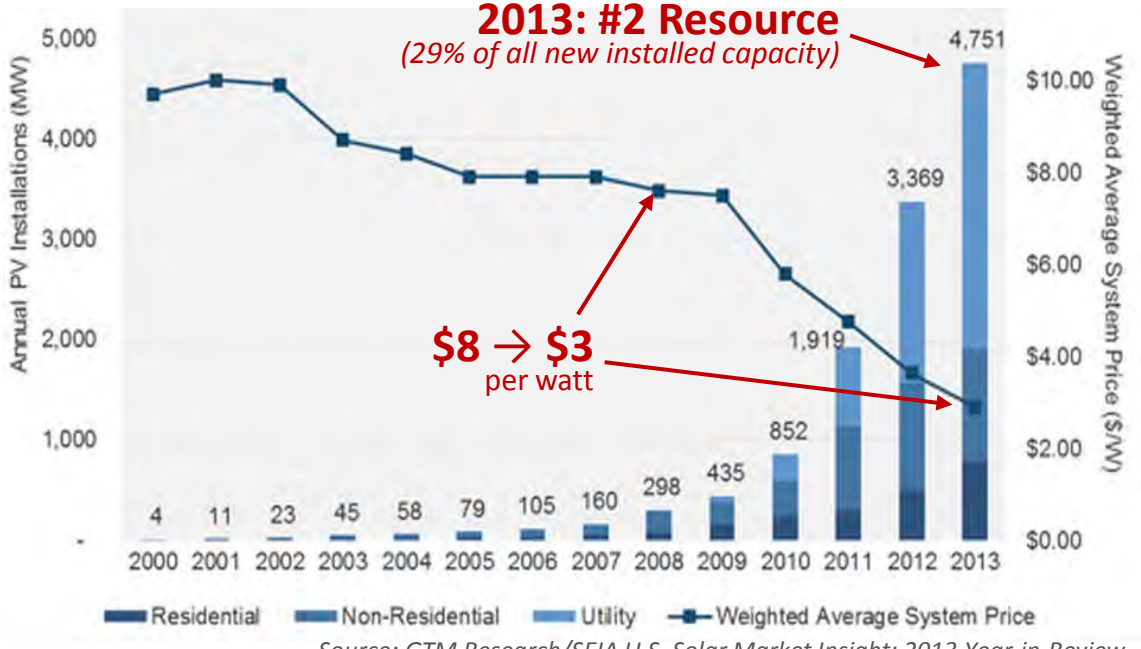


Module Cost | Installed System Cost`

v. Solar PV

- **Recent history (5yrs)**
  - PV module cost down ~80%
  - PV installed cost down ~60%
  - Annual installs up >15x (U.S.)
  - 30% U.S. market share in 2013 (#2 resource)

SOLAR PV | U.S. Installations & Prices 2000-2013



Source: GTM Research/SEIA U.S. Solar Market Insight: 2013 Year-in-Review

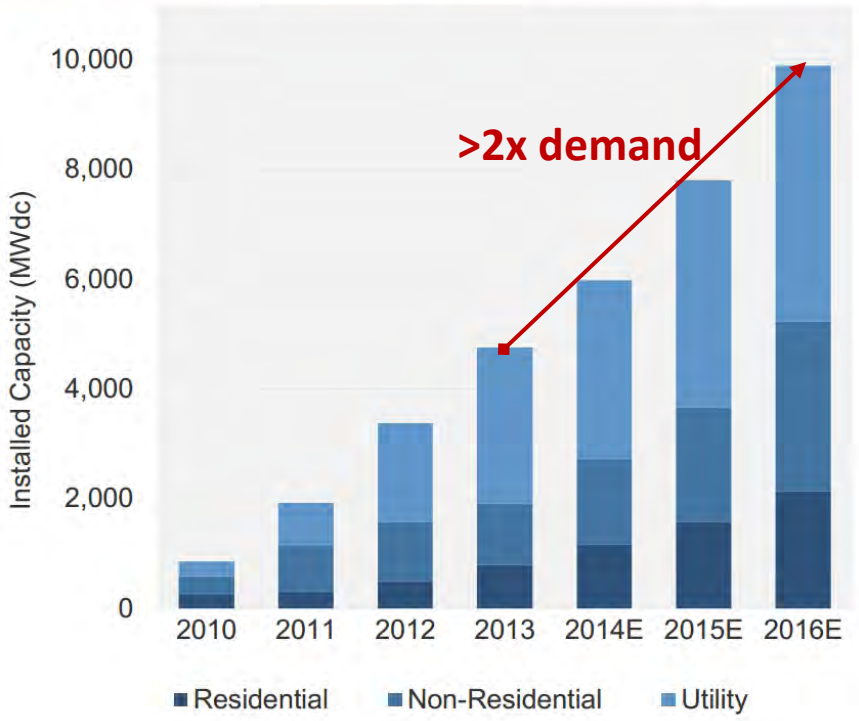
v. Solar PV

Near Future



- Continued cost declines
  - *Modules: -25% over 4yrs due to automation*
  - *Installation: savings from new plug-play designs*
  - *Financing: reductions with growth and strong track record (Solar City <1% defaults)*
- 3x manufacturing capacity anticipated over 5 yrs
- Continued demand growth (2x annual U.S. installs over coming 3 yrs)

Figure 2.14 U.S. PV Installation Forecast, 2010-2016



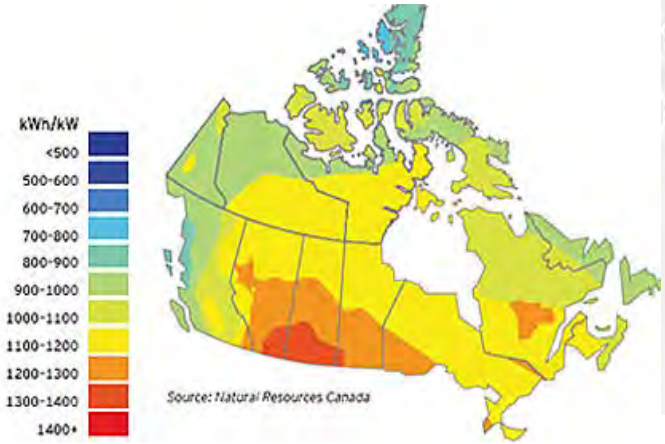
Source: GTM Research, PV Technology and Cost Outlook, 2013-2017

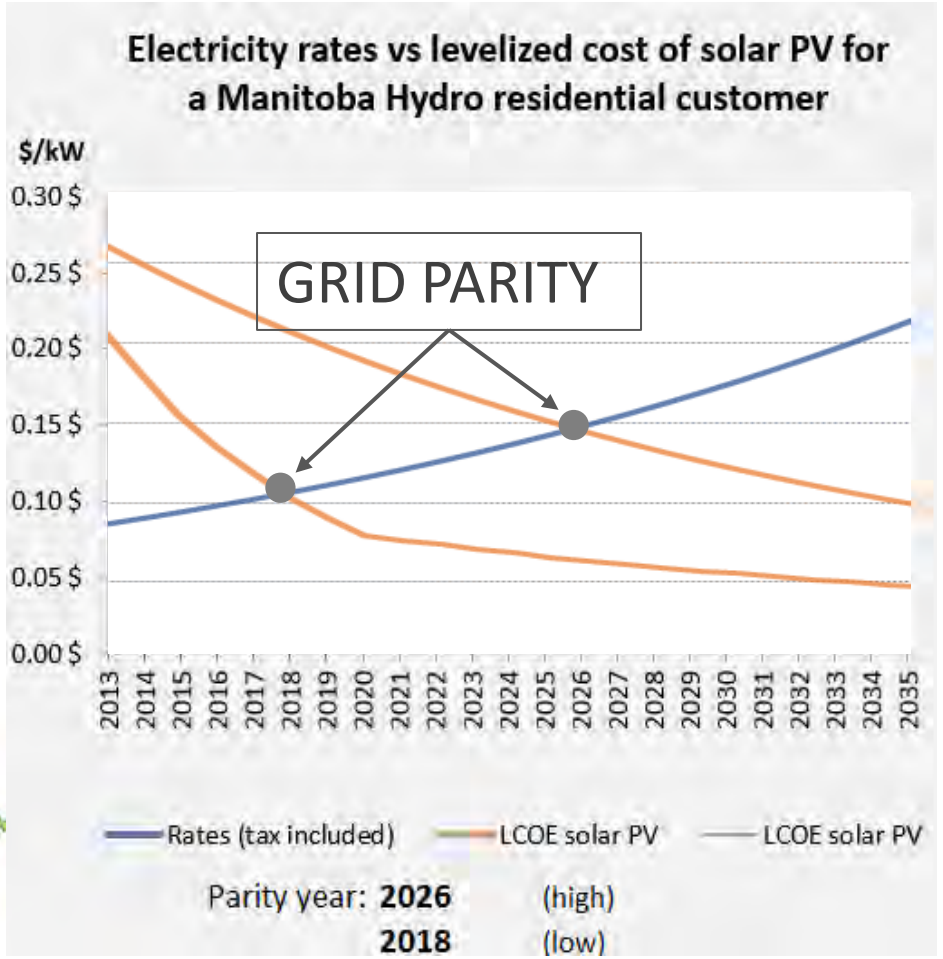
v. Solar PV

- **Implications for MB**
  1. Growing DSM opportunity
  2. Breakout demand suppression “threat” (locally or in export markets)?
  3. Low-cost Utility-scale power supply option/competitor



Germany





v. Solar PV

"Investors beware: Distributed generation could kill utilities as we know them today."

"Distributed Generation: The Death Spiral", February 2014. MORNINGSTAR®

Energy innovations are moving faster than at any time in recent history. New DSM opportunities abound – including several "game changers" that have already landed in market, with many more to come.

Not accounting for them exposes long-run investment plans to significant risk.

CONTENTS

1. Hydro's DSM Scenarios

2. The Problem with a Static View of the Future

3. How Others Address the "Planner's Dilemma"?

4. Preferred DSM Assumptions & Implications for NFAT Review

Planner's Dilemma

- Dilemma: How to account for the not-perfectly-known?
- How do Leaders Address This?
  - Past: truth is, many used to ignore future savings
  - Now: Then they took a closer look to improve planning precision and avoid over-committing to new supply
  - Three case studies:
    - ***New England ISO: EE Committee***
    - *California ISO: EE Committee*
    - *Nova Scotia Power*

ISO New England

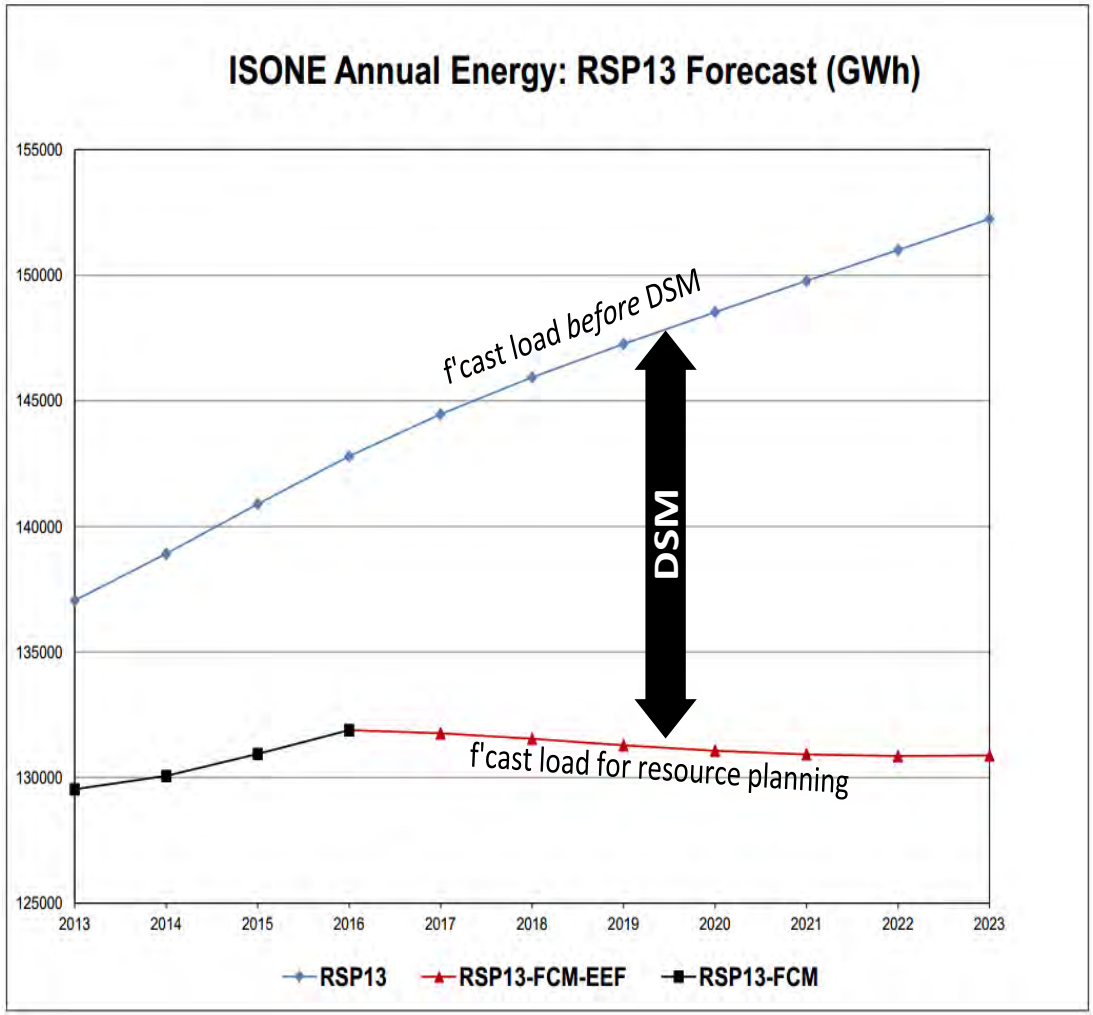
Mandate: ensure reliable supply of electricity across the six-state region



- Three basic tasks:
  - Day-to-day operation of bulk power system
  - Oversight and administration of regional wholesale market
  - **Management of comprehensive power planning process**
- Previous approach accounted only for approved EE plans
  - Committee struck to examine issue
  - Regional consultations of key market stakeholders
- New approach: long-term assumptions critical to planning

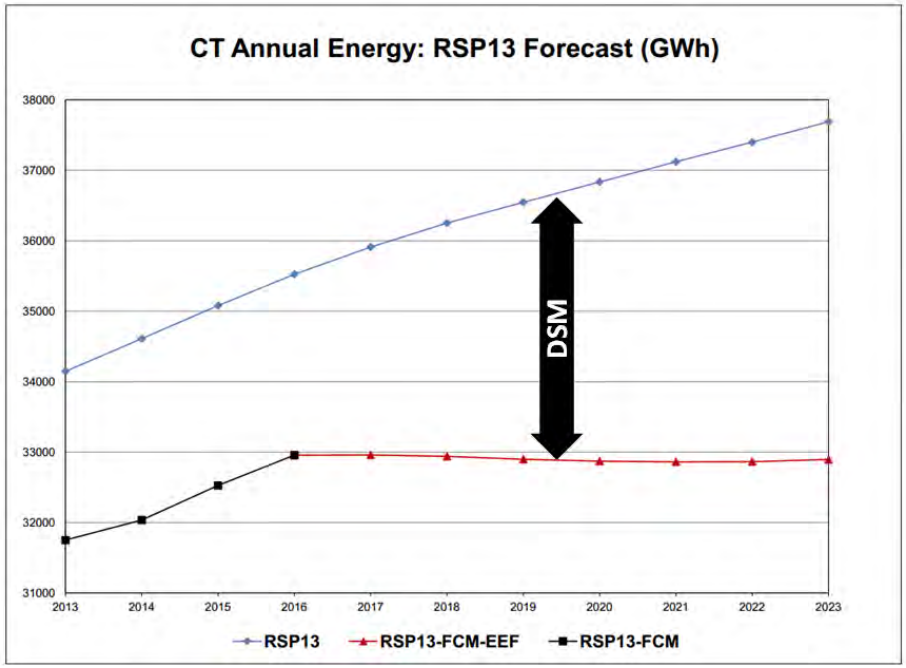
ISO-NE (New England)

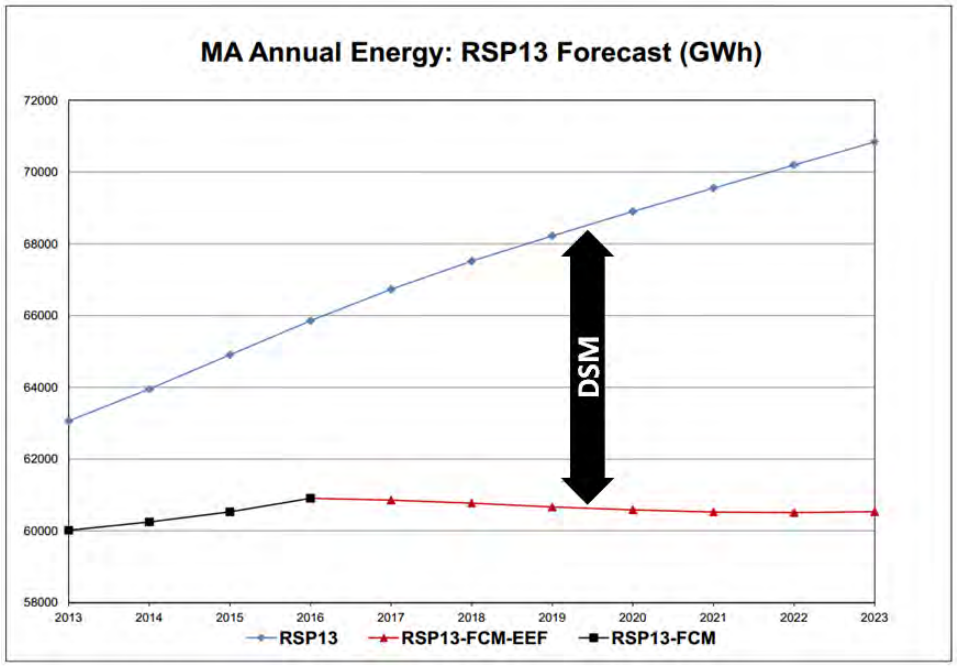
- Key Finding: sufficient evidence that DSM potential *replenishes itself* at roughly the same cost
- 100% of assumed DSM accounted for
- **Result: new plans anticipate zero net load growth** across the region



ISO-NE (New England)

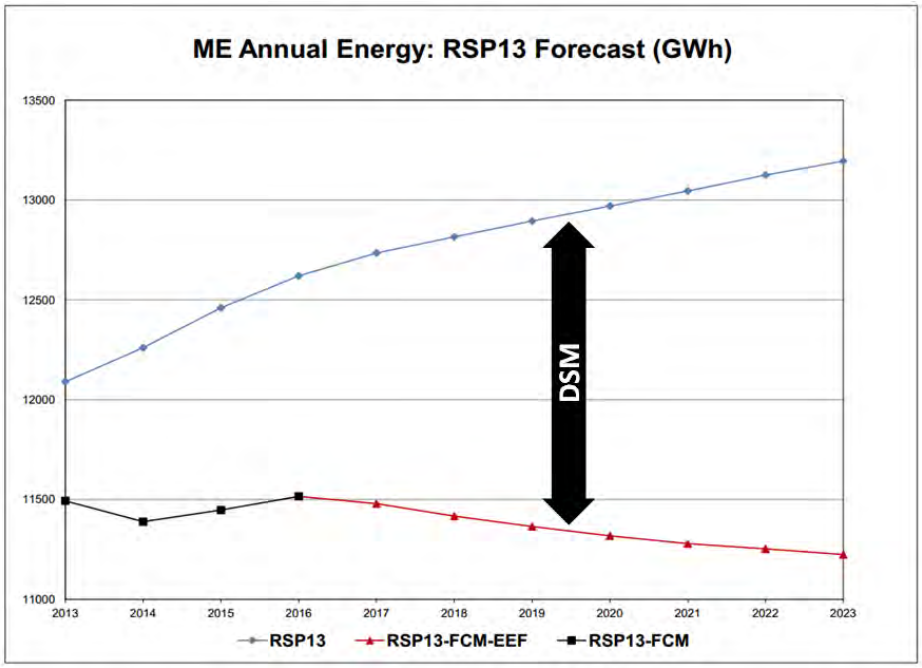
- Connecticut and Massachusetts are among the continent's leaders in DSM

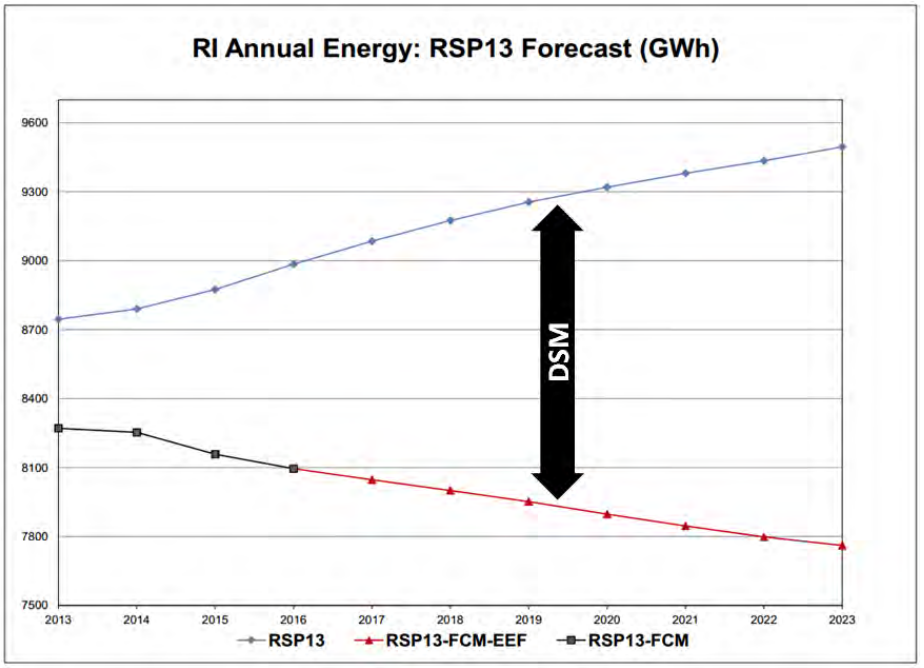




ISO-NE (New England)

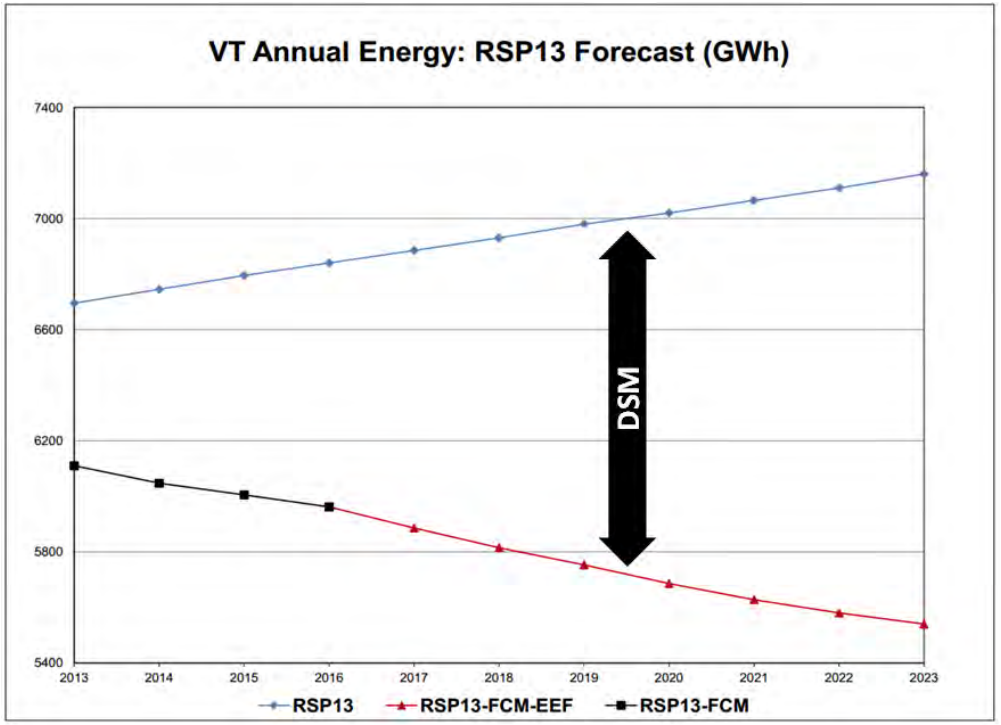
- Maine and Rhode Island have recently emerged as very strong DSM players





ISO-NE (New England)

- Vermont is the historic leader in DSM.
- VT is currently considering increasing from ~2%/yr to an unprecedented 3%/yr (proposal of the independent DSM administrator)
- For the state's longer-term energy planning, 2%/yr is assumed to be the baseline… for the next 35 years



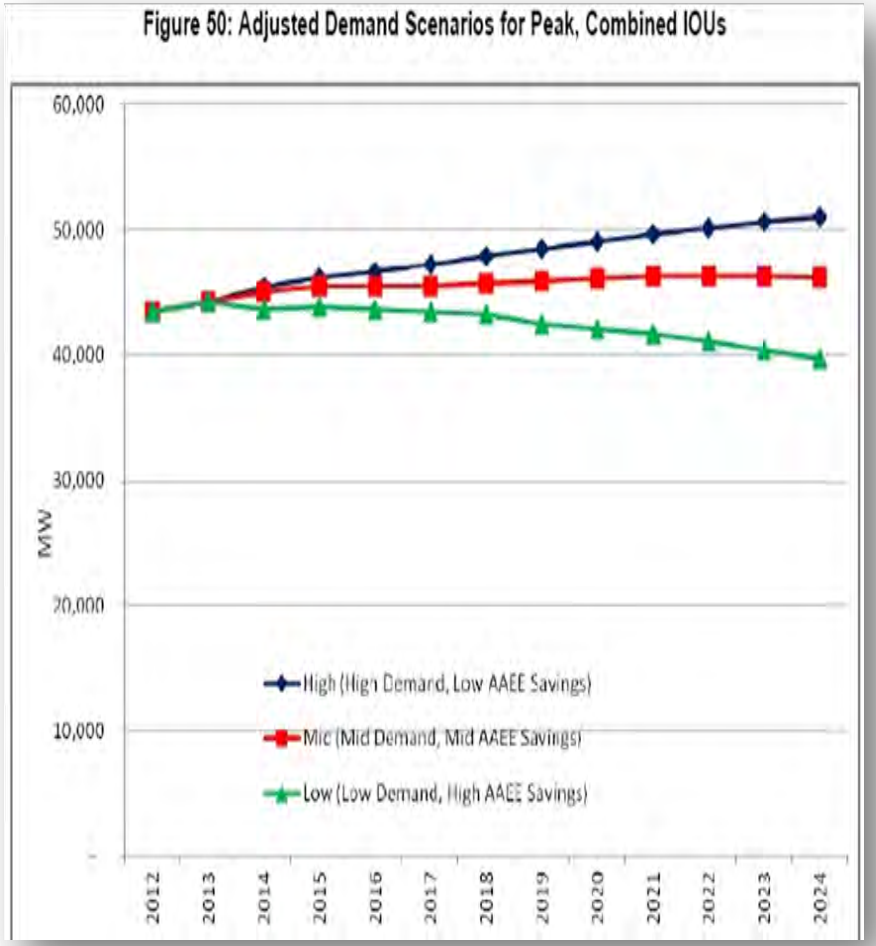
CalISO (California)

Mandate: ensure a reliable, efficient and affordable bulk power system while upholding the State's energy goals

- Includes planning function similar to ISO-New England
- Previous approach accounted only for approved EE plans
  - Multi-agency agreement to jointly examine issue: CEC / CPUC / CalISO
  - Statewide consultations of key market stakeholders
- New approach: long-term assumptions critical to planning

CalISO (California)

- Key Finding: sufficient evidence that DSM potential *replenishes itself* over the long-term
- Approach: adapt long-run DSM potential model to account for future savings opportunities
- Scenario analysis assumes actual savings may be higher or lower than anticipated
- 100% of DSM potential accounted for in mid scenario
- **Result: new plans anticipate near-zero net load growth** across the State



Others: Nova Scotia

- NSPI 2007 IRP examined long-run DSM potential study
- Incorporated 100% of study results
- Outcome: declining demand forecast
- *Note: N.S. went on to ramp up DSM from near-zero in 2009, to 1.5% savings/yr by 2012*

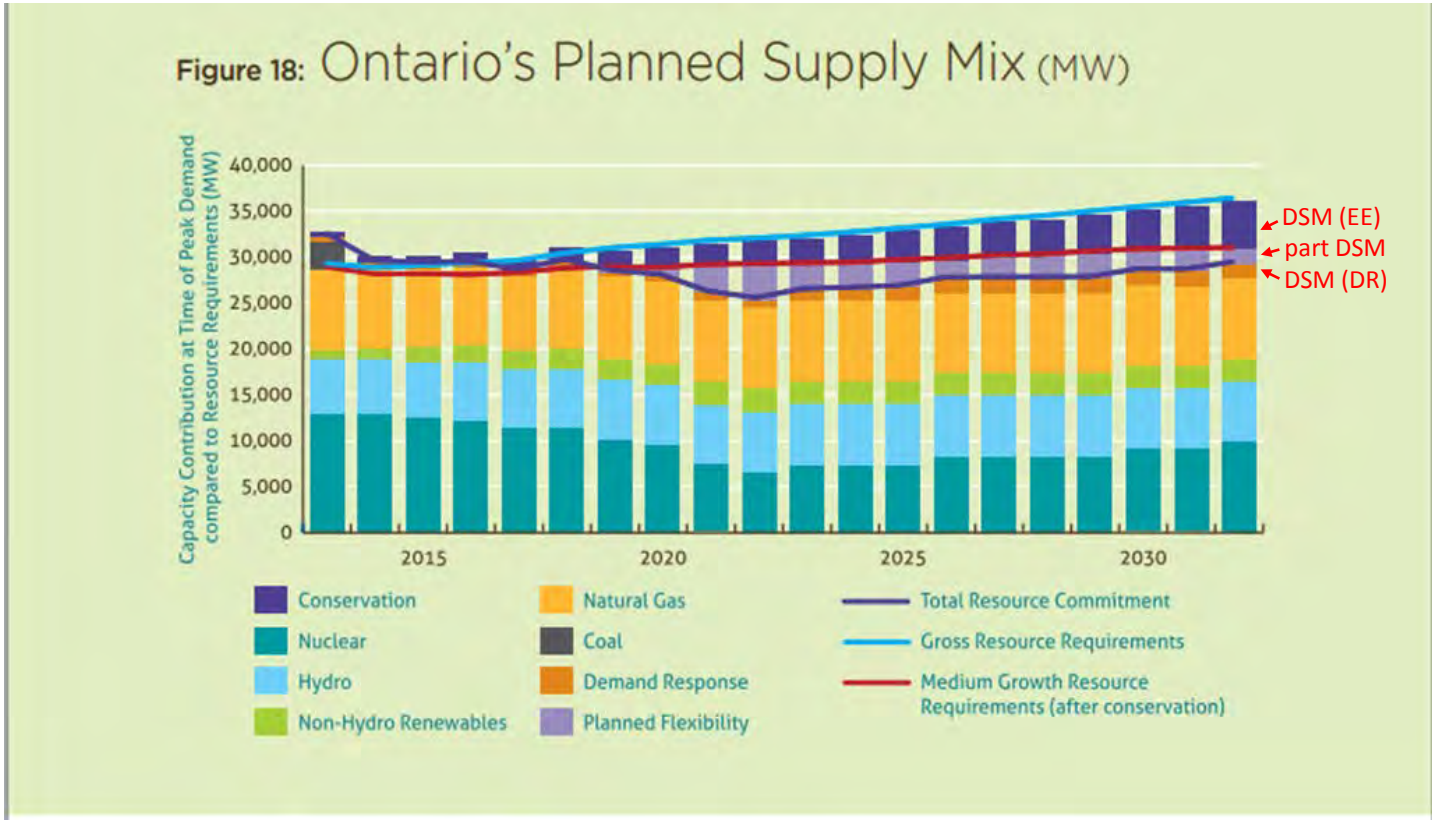
Table 1 – Total Energy Requirement with Future DSM Program Effects[2]

Year	Net System Requirement (GWh)	Annual Change (%)
2003	12,009.1	4.4
2004	12,387.7	3.2
2005	12,338.2	-0.4
2006	10,946.2	-11.3
2007	12,638.9	15.5
2008*	12,538.3	-0.8
2009*	12,073.1	-3.7
2010*	12,157.7	0.7
2011*	11,906.8	-2.1
2012*	10,475.4	-12.0
2013F	11,003.3	5.0
2014F	10,917.2	-0.8
2015F	10,919.9	0.0
2016F	10,853.2	-0.6
2017F	10,776.8	-0.7
2018F	10,707.4	-0.6
2019F	10,733.1	0.2
2020F**	10,710.1 [9,569.1]	-0.2 [-10.8]
2021F**	10,663.1 [9,522.1]	-0.4 [-0.5]
2022F**	10,595.8 [9,454.8]	-0.6 [-0.7]
2023F**	10,563.8 [9,422.8]	-0.3 [-0.3]

* Results for the years 2008 to 2012 contain the effects of past DSM programs

** Bracketed numbers represent the low load scenario without Port Hawkesbury Paper load.

Others: Ontario



Others

- Several regions have examined the issue of risk raised by Elenchus
- As noted by Elenchus, no state or province in North America has concluded the need to discount DSM savings projections
- Some have concluded the opposite
  - **Northwest U.S. applies 10% reduction to DSM costs** to account for net risk benefits when compared with supply resources
  - **Vermont and other states apply 10% risk premium to supply** options when compared with DSM
  - *Note: Vermont, the Northwest U.S., and California represent the three most experienced regions when it comes to DSM*

System planners who have been tasked with shining a light on DSM have concluded that, rather than seeing its potential depleted, it renews itself through innovation. They also conclude that it is a dependable, low-risk resource.

As a result, they have concluded that it would be **imprudent to *not* assume continued DSM improvements**, for planning purposes.

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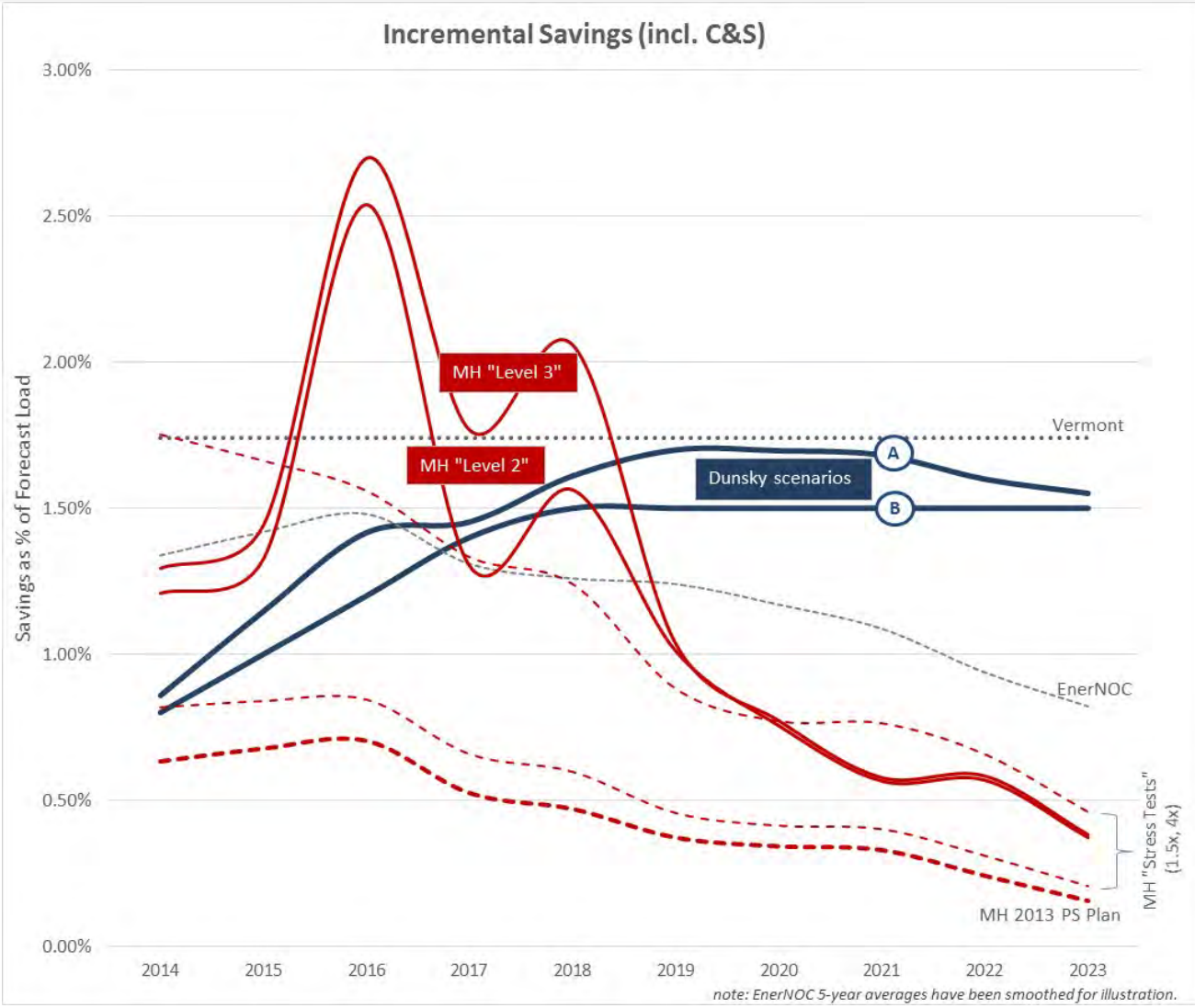
4. **Preferred DSM Assumptions & Implications for NFAT Review**

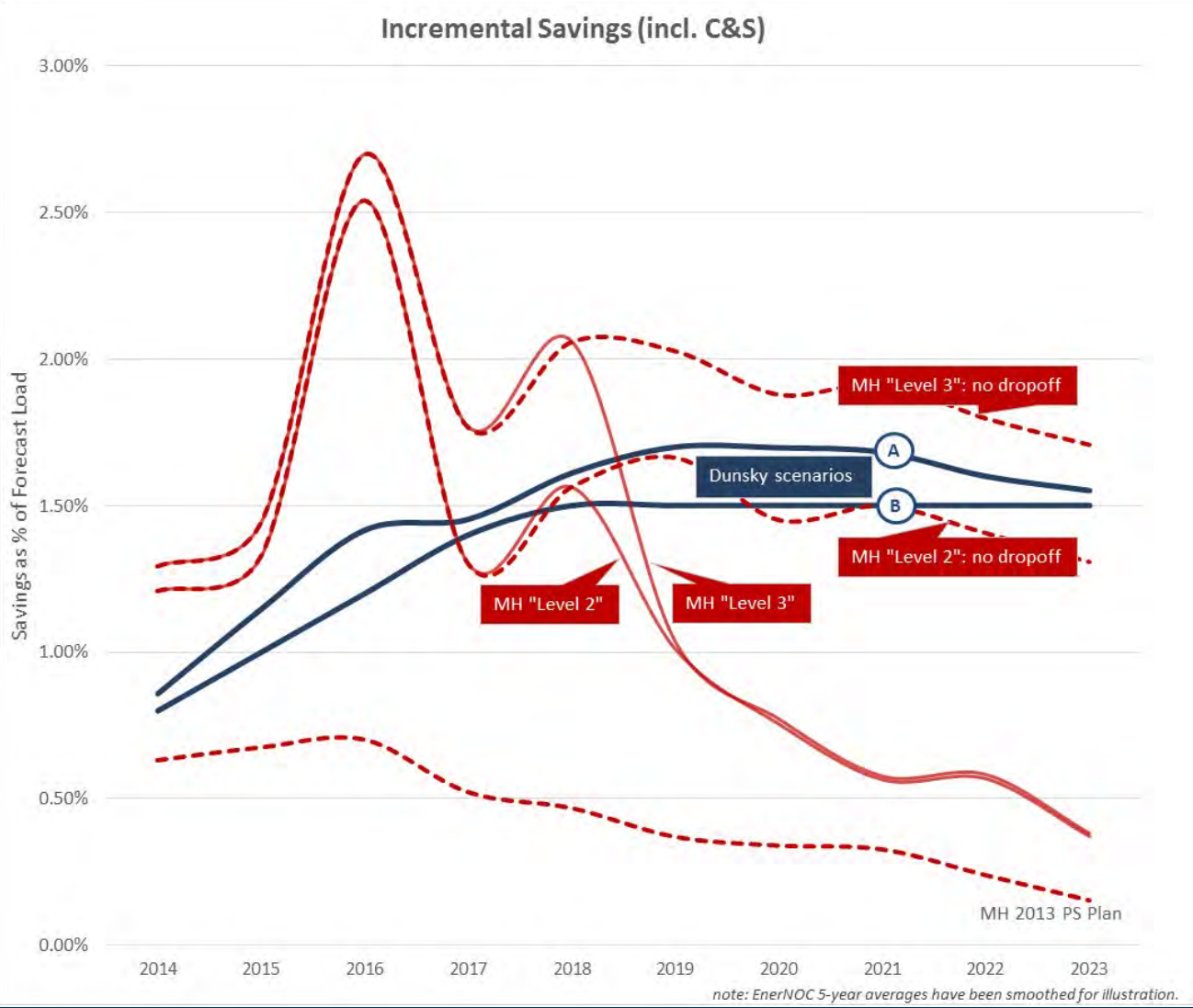
DSM Scenarios (from previous slide)

- Original written evidence included two long-run DSM scenarios
- Below: new effort to build from MH's "Levels 2 & 3"
  - Extend savings >2018
  - Rolling 3-year average



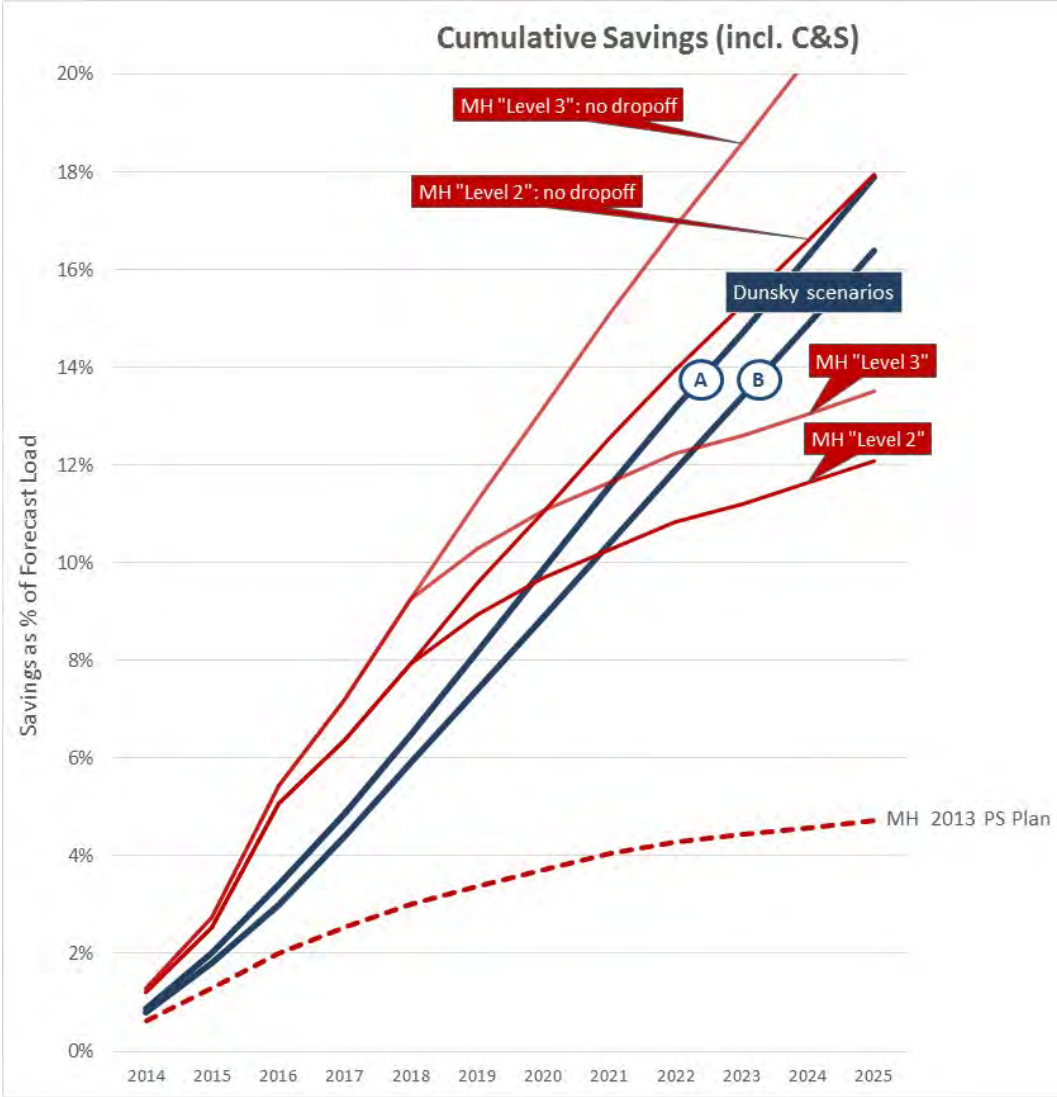
DSM Scenarios *incl. extended version*

- Extended versions of Levels 2 and 3 assume sudden no dropoff after 2018
- Results similar (both higher and lower) to our original Scenarios A and B

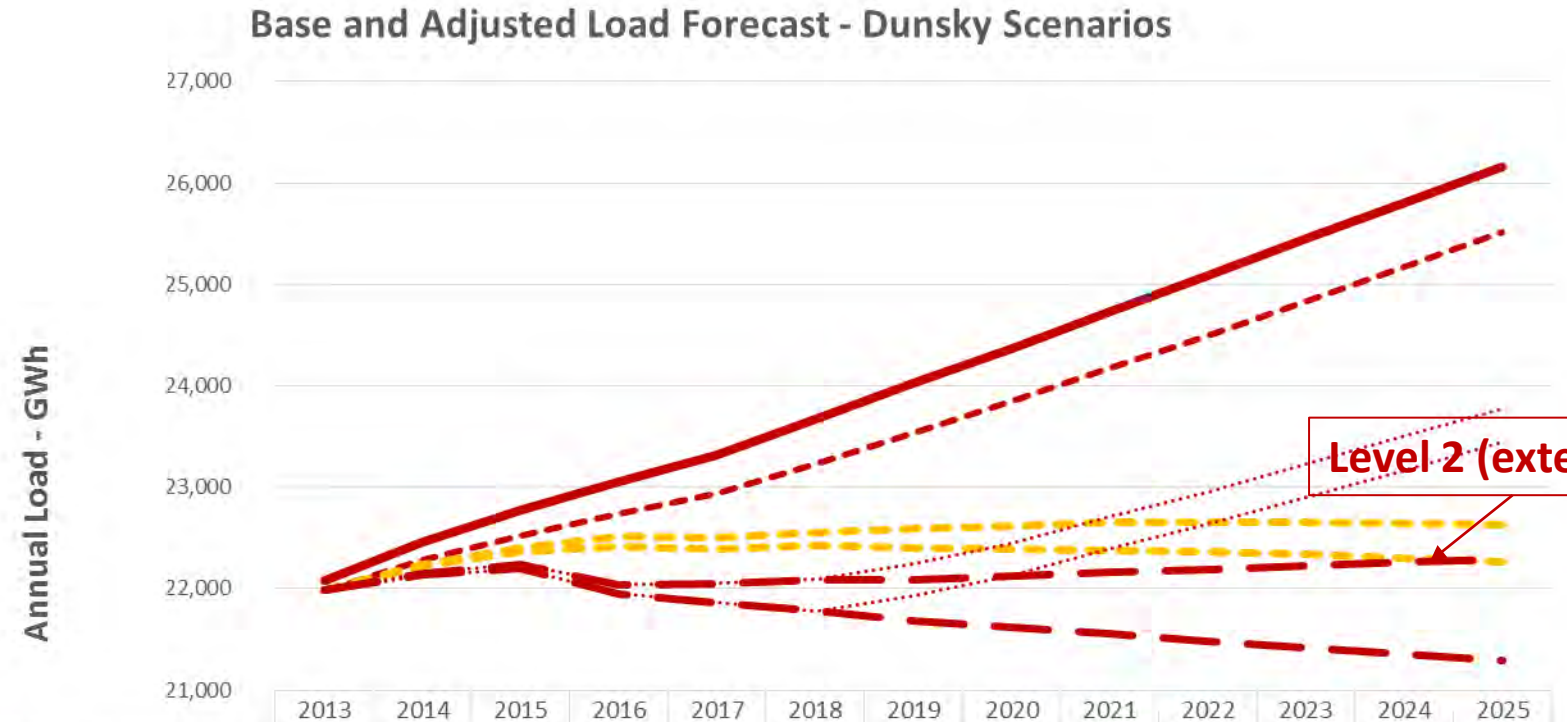


DSM Scenarios *incl. extended version*

- **Same results, but viewed in *cumulative annual* savings** *(as opposed to incremental annual)*

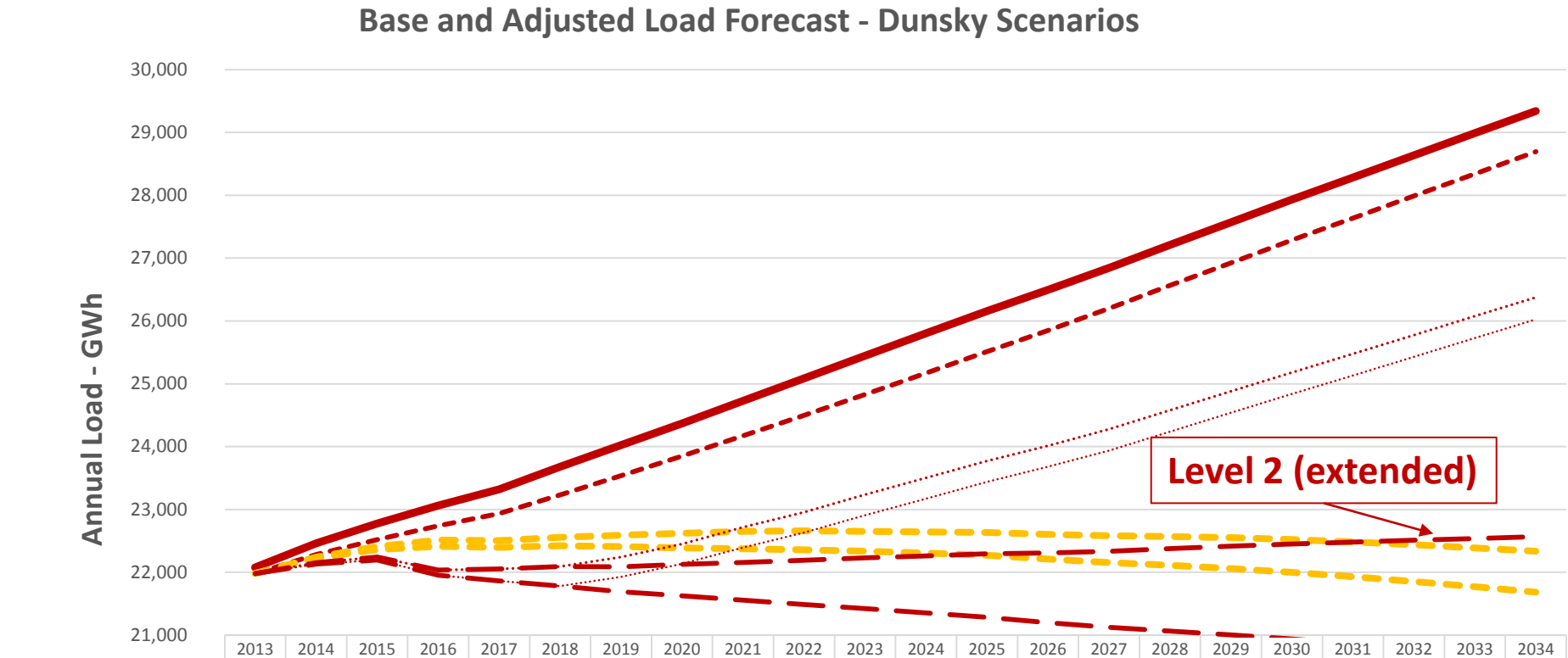


Impact on Load Forecast (to 2025)



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Base Load Forecast (2013)	22,076	22,460	22,774	23,059	23,319	23,677	24,024	24,369	24,728	25,087	25,446	25,802	26,158
Load Forecast with PS 2013	21,980	22,280	22,519	22,738	22,935	23,232	23,538	23,848	24,171	24,495	24,828	25,170	25,512
Dunsky Scenario A	21,980	22,229	22,361	22,415	22,396	22,422	22,409	22,388	22,376	22,359	22,336	22,305	22,269
Dunsky Scenario B	21,980	22,242	22,408	22,512	22,504	22,557	22,592	22,619	22,652	22,660	22,650	22,640	22,634
MH Level 2	21,980	22,151	22,241	22,037	22,052	22,090	22,242	22,451	22,716	22,957	23,235	23,502	23,772
MH Level 3	21,980	22,131	22,196	21,954	21,861	21,782	21,928	22,133	22,394	22,632	22,907	23,172	23,439
MH Level 2: no dropoff	21,980	22,151	22,241	22,037	22,052	22,090	22,085	22,125	22,158	22,190	22,229	22,261	22,293
MH Level 3: no dropoff	21,980	22,131	22,196	21,954	21,861	21,782	21,689	21,624	21,554	21,487	21,424	21,354	21,286

Impact on Load Forecast (to 2034)



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Base Load Forecast (2013)	22,076	22,460	22,774	23,059	23,319	23,677	24,024	24,369	24,728	25,087	25,446	25,802	26,158	26,495	26,846	27,210	27,571	27,931	28,283	28,636	28,988	29,340
Load Forecast with PS 2013	21,980	22,280	22,519	22,738	22,935	23,232	23,538	23,848	24,171	24,495	24,828	25,170	25,512	25,849	26,200	26,564	26,925	27,285	27,637	27,990	28,342	28,694
Dunsky Scenario A	21,980	22,229	22,361	22,415	22,396	22,422	22,409	22,388	22,376	22,359	22,336	22,305	22,269	22,208	22,156	22,113	22,061	22,001	21,929	21,852	21,770	21,682
Dunsky Scenario B	21,980	22,242	22,408	22,512	22,504	22,557	22,592	22,619	22,652	22,660	22,650	22,640	22,634	22,604	22,583	22,570	22,550	22,522	22,483	22,438	22,389	22,335
MH Level 2	21,980	22,151	22,241	22,037	22,052	22,090	22,242	22,451	22,716	22,957	23,235	23,502	23,772	24,015	24,276	24,578	24,880	25,181	25,477	25,775	26,075	26,375
MH Level 3	21,980	22,131	22,196	21,954	21,861	21,782	21,928	22,133	22,394	22,632	22,907	23,172	23,439	23,679	23,937	24,237	24,538	24,837	25,132	25,428	25,726	26,024
MH Level 2: no dropoff	21,980	22,151	22,241	22,037	22,052	22,090	22,085	22,125	22,158	22,190	22,229	22,261	22,293	22,307	22,334	22,376	22,414	22,450	22,479	22,508	22,538	22,567
MH Level 3: no dropoff	21,980	22,131	22,196	21,954	21,861	21,782	21,689	21,624	21,554	21,487	21,424	21,354	21,286	21,199	21,125	21,065	21,002	20,937	20,866	20,794	20,722	20,650

IMPLICATIONS

- **For planning purposes, a near-flat, long-run demand curve is the most prudent assumption for *domestic needs***
  - Note: not a *prediction*; rather a **likeliest scenario assuming MH pursues its stated policy of securing all economically achievable demand side management opportunities**
- Implies that Keeyask and other supply investments will **primarily or exclusively serve export opportunities**

= MERCHANT PLANT PERSPECTIVE

DISCUSSION: MERCHANT PLANTS

- **Preferred Plan *may* still be preferential**
  - ✓ Initial export contracts to secure part of investment
  - ✓ Additional export opportunities down the road
  - ✓ Added reliability benefits
- **But value is heavily dependent on key risk factors**
  - How will natural gas prices evolve?
  - How quickly will solar PV costs continue to drop?
  - Will U.S. adopt more aggressive CO_2 reduction requirements?
- **PUB decision would benefit from assessment rooted in this perspective**

For planning purposes, it may be more prudent to assume MH Level 2 *extended after 2018.*

This suggests a *nearly* flat domestic demand curve to 2034, which in turn suggests that Keeyask and other supply investments should be assessed primarily as merchant plants.

QUESTIONS?

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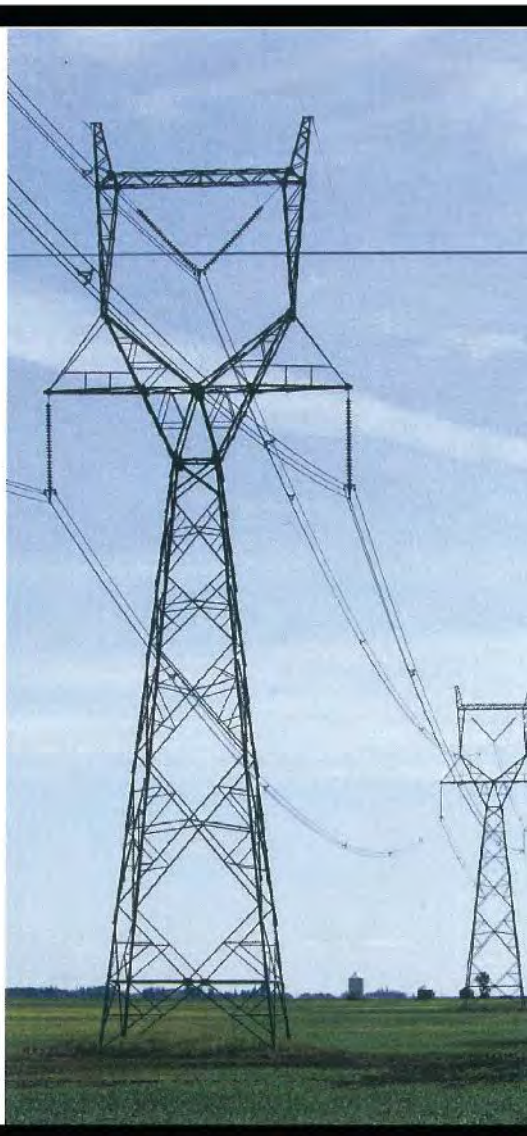
Tab 106







Source: Manitoba Hydro

NEEDS FOR AND ALTERNATIVES TO MANITOBA HYDRO'S PREFERRED DEVELOPMENT PLAN: SOCIO-ECONOMIC REVIEW

Prepared for: Public Utilities Board of Manitoba
Prepared by: TyPlan
Date: January 2014

TYPLAN
Planning & management

10275

NEEDS FOR AND ALTERNATIVES TO MANITOBA HYDRO'S PREFERRED DEVELOPMENT PLAN

INDEPENDENT REVIEW OF SOCIO-ECONOMIC BENEFITS

FINAL REPORT

Prepared for:

MANITOBA PUBLIC UTILITIES BOARD

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January 2014

Manitoba PUB 1

NEEDS FOR AND ALTERNATIVES TO MANITOBA HYDRO'S PREFERRED DEVELOPMENT PLAN

INDEPENDENT REVIEW OF SOCIO-ECONOMIC BENEFITS

FINAL REPORT

Prepared for Manitoba Public Utilities Board

Prepared by TyPlan Planning & Management

January 2014

Lead Author: Russ Tyson, Project Director

Executive Summary

Introduction and Purpose

The Manitoba Public Utilities Board (PUB) regulates a number of Manitoba Public Utilities, inclusive of Manitoba Hydro (MH). The Ministry of Innovation, Energy and Mines, Government of Manitoba requested the PUB conduct the Needs for and Alternatives to (NFAT) for Manitoba Hydro's (MH) Preferred Development Plan (PDP), using an independent body.

The proposed expenditure of approximately $20 billion dollars on the PDP will have a significant economic impact on the Province of Manitoba, northern Manitoba communities, impacted First Nations as well as other jurisdictions in Canada. The NFAT review requires that the PUB Panel examine the socio-economic impacts. TyPlan Planning and Management (TyPlan) has been retained to review the findings presented in the NFAT Business Case prepared by MH, and comment on the reasonableness of the assumptions and findings. The scope of work (SOW) undertaken by TyPlan is provided in the main report.

The PDP consists of the Keeyask Generating Project (695MW), the Conawapa Generating Project (1,485MW), North-South transmission upgrade project with an in-service date to correspond with Conawapa, the Manitoba-Minnesota Transmission Project, and simple gas thermal units. MH has incorporated a number of lessons learned from both historic hydroelectric developments and recent construction projects (Wuskwatim Generating Station) that have influenced MH's approach to project delivery, and correspondingly, the resultant socio-economic benefits. Lessons learned include: establishment of partnerships with First Nations, early start of construction for supporting infrastructure (developed via first Nations partnership agreements), engineering costs and constructability inputs, and human resource attraction and retention strategies.

Key Observations

Economic Impact Assessment

Interpreting the Results of the Input Output Model for various alternative plans

The Manitoba Bureau of Statistics Input Output Model (IOM) was used to compare the expected economic impacts associated with the PDP and other alternatives such as a Simple Gas Turbine and a Combined Gas Turbine project. While varying detail was provided regarding construction costs for the gas options, we note that IOM's are linear and therefore scalable. Scaling the gas options to reflect the Keeyask Generating Project construction costs ($2.2 billion) enables a comparison of economic impacts. The Keeyask Generating Project (and the PDP) creates significantly greater economic benefits than that of the gas turbine projects.

Interpreting the Results of the Input Output Model for the PDP

Specific to evaluating the overall economic benefits of the PDP, our review commented on the key steps and related assumptions required to preparing the model, namely:

- the level detail related to construction costs;
- allocation of construction costs into input output categories;

- removal of expenditures with no provincial economic benefit and other leakages from the provincial economy; and
- treatment of labour.

MH provided detailed costs as inputs into the model, and has for the most part, allocated cost input data to the corresponding IO expenditure categories based on an understanding of the expenditures involved. MH has removed expenditures with no provincial economic benefit and identified leakages from the provincial economy. The results of which are also reflected in the treatment of labour.

It is observed however, that the treatment of many purchases as leakages may tend to understate the impact of the PDP in Manitoba, while overstating the impact in the rest of Canada. This is due to the fact that the margins embedded in the purchase cost of these goods and services (treated as leakages), may not have been attributed to Manitoba producers who may be providing services such as transportation or wholesaling.

The extent of the leakages can be explained by a number of factors such as the relatively small manufacturing base of Manitoba economy compared to the rest of the provinces in Canada (Ontario and British Columbia), as well as the extensive experience of MH regarding recently constructed projects that would verify the of out-of-province purchases.

The extent of the out of province expenditures may be reasonable, but MH should have explicitly commented on this as part of reporting.

The issue pertaining to whether the impacts to the rest of Canada are overstated, whereas the impacts to Manitoba are understated remains, and is discussed below.

Canadian vs. Provincial Benefits

A generally accepted principle of input output modelling is that the "direct" benefits of any project are incurred in the jurisdiction in which the project is located. The approach used in the Statistics Canada Interprovincial Input-Output Economic Impact Simulation model (catalogue no. 15F0009XDB) focused on the expenditures (purchase of goods and services) and the location where these expenditures took place. This approach ensures that the results generated from the model show the entire direct impact in Manitoba. It should be noted however that when the expenditure approach is used with the Statistics Canada model, the model estimates where the goods and services purchased are supplied from.

The key difference in the MH IOM approach was that MH made decisions, based on local experience and knowledge, on where the goods and services originated from. Although such an approach is reasonable, one must be careful in how to interpret the direct and indirect impacts, as the production (supply) of goods and services might generate a direct impact in the jurisdiction where the production took place, but in reality, this production should be interpreted as indirect impact, because these goods and services were produced to satisfy the demand associated with the project.

The results of both the MH IOM and the Statistics Canada Interprovincial model are presented for comparison purposes in the main body of the report for the Keeyask Generating Station.

The analysis suggests that the allocation of impacts between Manitoba and the rest of Canada in the MH study is significantly different from what the normal allocation, based on the structure and characteristics of Manitoba's economy would be, according to the Statistics Canada model.

Based on the results of the Statistics Canada model one would expect the economic impact in Manitoba to be higher than what was suggested in the MH study (employment, labour income and GDP), while the impact in the rest of Canada would be lower.

Regardless, the results confirm that the PDP creates the greatest economic impacts, and if the Statistics Canada Interprovincial model is considered, the benefits to Manitobans is greater than what was reported.

Determining gross provincial financial benefits by examining benefits over the life of the project

The economic lives of hydroelectric facilities are much greater than those of other resource options. Based on the timing and value of replacement costs and net production costs based on MH Splash modeling, the PDP creates the greatest value over the economic life of the asset. The longer-term life (past the economic life) of hydroelectric facilities represents a consideration worth noting in this review. Referred to by MH as bequest value, is difficult to ascertain how long such facilities can be maintained and operated. Literature suggests over the longer term (past the economic life) hydroelectric facilities continue to contribute to the provincial economy well past the economic life of the facility evaluated in the NFAT.

Northern and Aboriginal community based impacts in terms of employment opportunities, incomes, community tax base, skills development and community based opportunities

Our review identified ten (10) provincial utility criteria/measurers, specific to optimizing economic benefits for First Nations and northern communities. It is noted MH has met and exceeded such practices.

Community Access Improvements related to Health, Education and Culture

Community access improvements and their implications (environmental setting, effects assessment, mitigation, and residual effects) related to health, education and culture are discussed in the Environmental Impact Statement (EIS) for the Keeyask Generating Project. The assessment followed standard environmental impact assessment process and all identified issues were evaluated.

On-going monitoring throughout construction, operation and beyond will be critical to ensure success of the identified mitigation.

Economic Displacement Impacts and Effects on Consumer Spending

Global Canadian and Provincial Electricity Rates

Manitobans (as of 2013) have one of the lowest residential electricity rates in Canada, and correspondingly, Canada has one of the lowest residential rates in the world (2009). In the literature

reviewed, continued pressure to increase rates throughout Canada is evident and is expected to continue into the next decades.

Review of Increased Energy Costs on Consumers

Literature suggests that the displacement effects of rate increases predominantly affect the poor and those with low income or fixed incomes. The middle and upper class are not as affected as such costs are absorbed through greater disposable income.

Energy Efficiency and Reduction Initiatives

The literature also suggests that best means of mitigating such affects on those most affected will be to aggressively pursue energy efficiency and reduction initiatives. While MH is known for such programs, continued emphasis on such programs is suggested, along with on-going monitoring, in light of the proposed rate increases.

Optimizing demand side management (DSM) will be critical moving forward to manage impacts to ratepayers.

Socio-economic Impact of Key Alternative Scenarios

Evaluation of Alternative Plans

The use of Multiple Account Benefit Cost Analysis (MA-BCA) to ascertain socio-economic benefits focuses on the identification of net benefits from a broader social perspective. It also enables comparisons of the distributional advantages and disadvantages of various plans over the stated life cycle of the plan. MA-BCA is a methodology utilized to evaluate options and used to assist in program and policy decision-making.

The MA-BCA assesses the preferred and three alternative resource development plans, and include:

- the Preferred Development Plan;
- the Smaller Interconnection Plan (K19/Gas 24/250MW Interconnection);
- Keeyask with No Interconnection (K2/Gas); and
- Gas Thermal with on new Interconnection (all Gas).

The MA-BCA was based on the reference scenarios assuming a 78-year net present value metric. It is noted that while sensitivity analysis was undertaken for all of the alternatives, there still remains key assumptions within the economic, financial and sensitivity analysis (future load forecasting, the effect of demand side management, drought exposure, export sales and provincial revenues etc.), that would materially affect the outcome of this review.

Market Valuation

The key assumption effecting results is the discount rate utilized. The discount rate is a critical parameter in cost benefit analysis especially when costs and benefits differ in distribution over time. This is especially important when they occur over a long period of time. The 6% real discount rate chosen for the PDP, based on a social cost of capital, is reasonable based on literature reviewed.

The results are correspondingly reasonable.

Manitoba Hydro Customer Account

Pressure on rate increases is expected to continue globally and throughout Canada, and residential users should expect to pay for increasing rates. While the PDP has the greatest annual projected rate increases proposed in all plans, it will require residents of Manitoba to pay higher rates in the short term (until year 2031). The cumulative rate increases of all plans are not substantially different, with the benefits of the PDP incurring over the longer term as inflationary costs are reduced with the PDP limiting rate increases over the longer term. The key observation is pay now, benefit later regarding rates. Flexibility regarding MH objective to achieving the 20-year 75:25 debt/equity ratio is one means of dealing with rate issues.

Further discussion regarding the short to medium term rate increases associated with the MH plans should be clearly outlined and understood by the people of Manitoba as part of this process.

From a system reliability perspective, the PDP is preferred; however all of the development plans can handle load requirements under the majority of adverse conditions.

Manitoba Government Account

This account focuses on the net benefits to government over the term of the PDP. The results are based on identifying only direct incremental taxes and fees paid by Manitoba Hydro, net of incremental Government cost or risks. The key driver for revenues to the Provincial government in this account is represented by the capital taxes and water rentals. The account also assumes a "wash" for various taxes, such as coal tax and carbon charges taxes, discussed in the environmental review of the NFAT, and the debt guarantee fund, while substantial, is balanced between what MH owes and what the government of Manitoba secures. The approach the MA-CBA takes regarding the other total charges to government, such as the provincial debt guarantee is reasonable.

Manitoba Economy Account

The Manitoba account is specific to the employment and wages generated by the project in each plan, and estimates the potential incremental income that employment (wages) offers for Manitobans. The assumptions regarding proportioning the net economic rent (the additional wages earned net of) that would be derived, is based on project location and the employment/unemployment characteristics in that region. Northern regions with greater unemployment would result in greater net benefits, and the PDP is preferred. The assumptions made are reasonable.

Social Account

The societal benefit of hydroelectric projects outlined in the PDP should be considered in context to the $1 billion dollars in sunk costs incurred for the Keeyask Generating Project, and the $300 million in sunk costs for the Conawapa Generating Project, during project development. Such costs are not considered in the evaluation undertaken to justify the PDP. From a socio-economic perspective, while the investment of the $1 billion invested for KGP as sunk costs, is substantial, the corresponding socio-economic benefits derived from some of the sunk cost expenditures, such as the Joint Keeyask Development Agreement and related project benefits as well as Keeyask

Infrastructure Project support the optimization of socio-economic benefits for First Nations and northern communities.

The MA-BCA is a reasonable approach to ascertain socio-economic benefits, and based on the reference scenarios provides insight into the distributional benefits of the alternative plans studied. Considerable risk and uncertainty remains. To address such issues the concept of pathways is introduced.

The Significance of Pathways

To deal with risk and uncertainty over the period of the plan, the concept of pathways were identified in the PDP. The decision pathways enable MH the flexibility to modify the PDP to address risk and uncertainty and the ever-changing market characteristics over the longer term of the plan. From a socio-economic perspective the critical decision point within the pathways, if the PDP is pursued, is decision specific to the construction of Conawapa, which does not have to be made until 2018.

Between 2014-2018, the risk and uncertainty factors should be studied in detail and reported back to the PUB prior to the decision date, to enable the government of Manitoba to make an informed decision regarding its future energy policy decisions. The Government of Manitoba should provide the PUB direction enabling the PUB to work directly with MH as such risk and uncertainty is addressed.

High-level review of approaches to optimizing Provincial economic benefits of large-scale resource projects

The utilities benchmarked (Québec Hydro and Nalcor) have benefited from lessons learned from previous hydroelectric developments and incorporated initiatives to optimize local and regional benefits, specifically for northern and indigenous populations. Provincial and Canadian wide benefits are driven for the most part from construction benefits (employment) and a lesser extent operational employment jobs which are local. Such economic impacts are derived from IOM's. Provincial revenues are secured from export sales and on-going government tax revenues from water rentals etc.

Legal or quasi-legal agreements with First Nations have been secured in all jurisdictions. Cooperation with other Federal and local agencies involved in employment training and social services has also been pursued and resulted in successful economic optimization strategies. Equity ownership and management and administrative assistance also help in building capacity within the organization, as outlined in the MH example via the Joint Keeyask Development Agreement.

Manitoba Hydro's approach to optimizing provincial economic benefits reflects industry practices. On-going monitoring of the success of all of the related socio-economic optimization strategies should be pursued; lessons learned identified and implemented going forward.

Summary

From a socio-economic perspective, the approach assumptions and findings MH has presented are reasonable. Overall the PDP exhibits the greatest socio-economic benefits to the people of Manitoba, northern communities and First Nations compared to other plans based on the reference plans evaluated.

Use of the Statistics Canada Interprovincial IOM in this review suggests that, based on MH assumptions that the Manitoba related economic impact benefits may have been understated while the rest of Canada benefits overstated, making the PDP more attractive to Manitobans as greater benefits are derived. The Statistics Canada Interprovincial model confirms the overall benefits derived from the PDP are reasonable.

Planned investments are significant over the next decade (as outlined in the proposed PDP), placing increased pressure on the provincial debt and rates, in the short and medium term. The PDP is intended to contribute to the growth of the Manitoba economy, strengthen relationships with First Nations and create a lasting legacy for future generations. By doing so the PDP supports Manitoba Hydro's Corporate Strategic Plan (MCSP) 2012-13 and goals of the corporation, with two corporate goals in the MCSP being highlighted, supporting Aboriginal people and Provincial economic development.[1]

Throughout the short/medium term the Keeyask Generating Project would generate significant socio-economic benefits for the people of Manitoba, First Nations and northern communities and if not pursued such benefits would be forgone, inclusive of the sunk costs already allocated to the Keeyask Generating Project.

Over the longer term considerable uncertainty and risk remains and the introduction of pathways in the decision making process enables such risk and uncertainty to be studied prior to a decision being made on Conawapa.

Both Keeyask and Conawapa are capital intensive projects, creating significant employment throughout construction, and on-going operational benefits. Monitoring issues related to access, health, education and the cultural implications of project development, while identified, should be monitored aggressively, and lessons learned implemented on an annual basis to ensure sustainable capacity building within First Nations and northern communities.

[1] Needs for and Alternatives to: Appendix H - Corporate Strategic Plan 2012-2013

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1 INTRODUCTION AND SCOPE OF WORK

1.1 Background

The Manitoba Public Utilities Boards (PUB) regulates a number of Manitoba Public Utilities, inclusive of Manitoba Hydro (MH). In January of 2011, the Government of Manitoba notified MH of its intention to carry out a public needs for and alternatives to (NFAT) review and assessment of MH's preferred development plan (PDP), consisting of both the Keeyask and Conawapa hydroelectric projects and Canada-USA Interconnection facilities. In November of 2012, the Ministry of Innovation, Energy and Mines announced that the government of Manitoba asked PUB to conduct the NFAT for the PDP, using an independent body.

The proposed expenditure of approximately $20 billion dollars on new hydro generation and transmission assets will have a significant economic impact on the Province of Manitoba, northern Manitoba communities, impacted First Nations as well as other jurisdictions in Canada and the USA. A component of the NFAT review requires that the PUB Panel examine what these specific socio-economic impacts are to the Northern and Aboriginal communities as well as the benefits to Manitoba as a whole.

TyPlan Planning and Management (TyPlan) was retained to comment upon the reasonableness of the assumptions and results of the NFAT Business Case prepared by Manitoba Hydro available at (http://www.hydro.mb.ca/projects/development_plan/nfat_business_case.shtml)

1.2 Scope of work[2]

The scope of work (SOW) undertaken by TyPlan, as defined by the PUB, includes the following:

1. Perform a critical analysis of the socio-economic impacts and benefits of Manitoba Hydro's PDP and alternative plans. This should include examination of potential effects to the people of Manitoba, especially Northern and Aboriginal communities, including employment, training and business opportunities, infrastructure and services, personnel family and community life and resource use, including:
   a) Economic impact assessment to determine sector economic impacts, impacts to provincial GDP, long term and short term indirect and induced employment opportunities;
   b) Determining gross provincial financial benefits by examining benefits over and costs over the life of the project;
   c) Determining Canadian benefits;
   d) Northern and aboriginal community-based impacts in terms of employment opportunities, incomes, community tax base, skills development and community business opportunities; and

[2] NFAT Scope of Work, (http://www.pub.gov.mb.ca/nfat/terms_reference.pdf)

e) Community access improvements and related health, education and cultural benefits.

2. Consider the economic displacement impacts and effects on consumer spending to the extent consumers will face due to increased electricity rates as a result of the PDP.
3. Identify and evaluate the socio-economic impact of key alternative scenarios, and provide a comparison table between the PDP and such scenarios.
4. Provide high level analysis on how other Canadian jurisdictions maximize provincial economic benefits from the development of large-scale resource projects, and assess if the PDP provides the highest level of socio-economic benefit to Manitobans.

1.3 Key Reports Referenced

Key reference material sourced from the NFAT Business Case submission and other MH reports are referenced in Appendix A.

MH provided Typlan with additional support information necessary to undertake the independent review of the economic impact analysis and the multiple account evaluation. Data containing Commercially Sensitive Information (CSI) is not referenced in our reporting.

1.4 Report Outline

The report is presented in the following sections:

Section 1: **Introduction and Scope of Work**; provides an introduction and scope of work outline, reference materials and a report outline.

Section 2: **Manitoba Hydro's Preferred Development Plan and Lessons Learned from other Hydroelectric Projects**; provides a description of the PDP, as defined in Manitoba's filing and lessons learned from recent hydroelectric developments (Wuskwatim) that have impacted how MH has dealt with project delivery and related socio-economic benefits.

Section 3: **Socio-economic Impact Review**; provides, based on Manitoba Hydro's economic impact assessment, verification and the reasonableness of, the identified economic sector impacts inclusive of provincial GDP, employment opportunities, gross provincial financial benefits, examining benefits over the costs over the life of the project, Canadian benefits, northern and aboriginal community based impacts (e.g., employment, incomes, community tax base, skills development, community business opportunities), community access improvement and related health, education and cultural benefits.

Section 4: **Economic Displacement Impacts and Effects on Consumer Spending**; provides an evaluation of current trends and comparisons in Global, Canadian, Provincial utility pricing, and considers the extent to which consumers will be faced increased electricity rates as a result of the PDP. The section concludes with a literature review of the key initiatives to reduce such displacement effects, namely energy reduction and efficiency measures.

Section 5: **Socio-economic Impact of Five Key Alternative Scenarios**; provides at a high level, based on the multiple account benefit cost assessment (MA-BCA) framework undertaken by Manitoba Hydro, a comparison of the PDP and alternative scenarios, and concludes with the importance of pathways in managing project risk.

Section 6: **High Level Review of Approaches to Optimizing Provincial Economic Benefits of Large Scale Resource Projects**; provides a comparison of other practices in Canadian jurisdictions, specific to Québec Hydro's Eastmain 1A Rupert River Project and Nalcor (Newfoundland and Labrador) Lower Churchill Project, both of which have similar project characteristics.

Section 7: **Observations**; provides a series of observations pertaining to the key issues identified in the statement of work for consideration by the Public Utilities Board.

2 MANITOBA HYDRO'S PREFERRED DEVELOPMENT PLAN (PDP), AND LESSONS LEARNED FROM OTHER HYDROELECTRIC PROJECTS

2.1 Preferred Development Plan

MH has identified a PDP intended to meet local supply requirements, as well as existing electricity sale commitments and future export possibilities. The PDP consists of the following.[3]

Table 1: Overview of Preferred Development Plan Components

Preferred Plan Infrastructure	Capacity (MW)	Proposed In Service Date (ISD)
Keeyask Project *	695	2019
Conawapa Project	1,485	2026
North-South Transmission Upgrade Project, with an ISD to correspond with Conawapa	185	2026
Manitoba-Minnesota Transmission Project	750	2020
Simple Gas Thermal Units[4]	Not determined nor defined in PDP	2041

Notes: The Keeyask Project consists of three components:

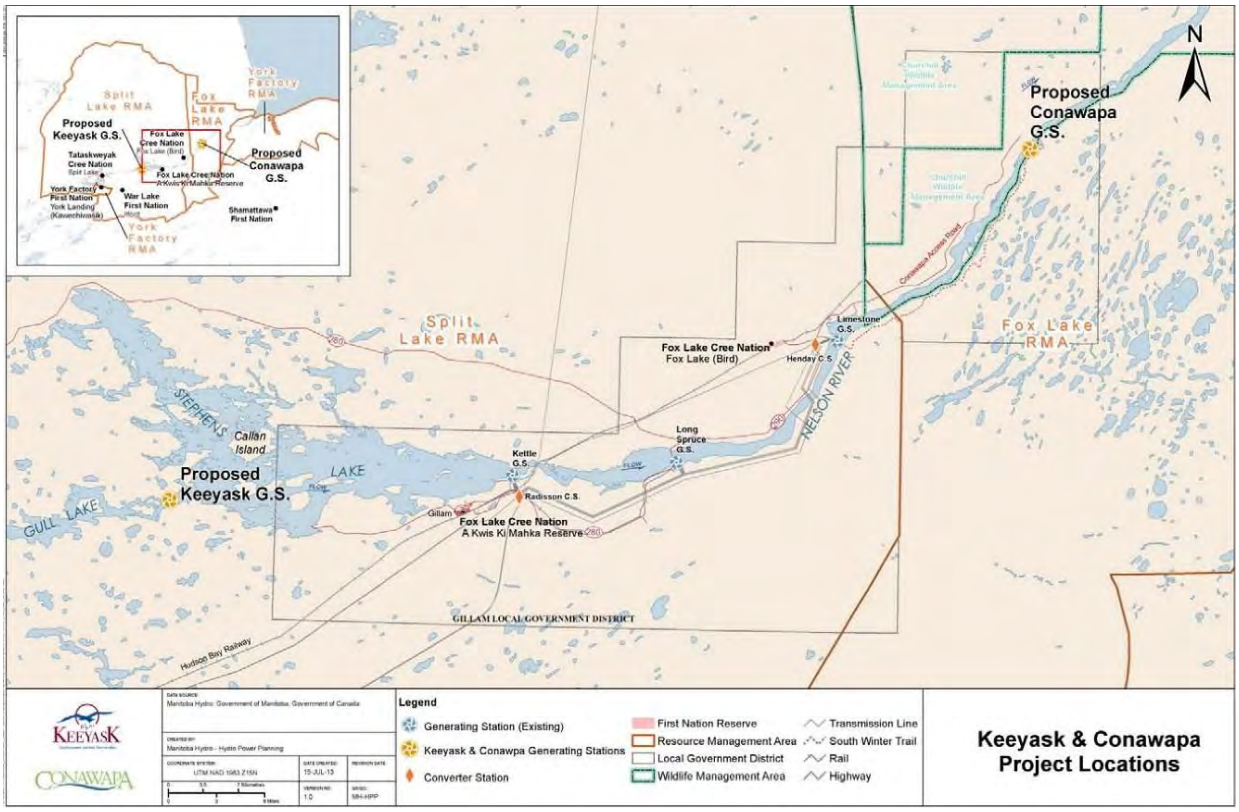
- 695 MW Keeyask Generation Project
- Keeyask Infrastructure Project
- Keeyask Transmission Project

Source: Needs for Alternatives to Chapter 2- Preferred Development Plan

Both the Keeyask Generating Project (KGP) and Conawapa Generating Projects (CGP) are sited on the Nelson River in Northern Manitoba. The Nelson River has historically been developed for hydroelectric development and has three (3) existing hydroelectric plants in operation, the Limestone Generating Stations (GS), Long Spruce GS and Kettle GS. The proposed Keeyask GS and Conawapa GS project locations are illustrated on Exhibit 1.

[3] Needs for and Alternatives to Chapter 2 - Preferred Development Plan Facilities (pg. 1-59)
[4] The simple-cycle gas thermal units towards the end of Manitoba's Hydro's Planning cycle (starting in 2041) to meet currently forecast domestic load growth. This assumption is used consistently in all plans to ensure the forecast load can be met through the end of the planning period without having to bring in additional types of supply. As such, this element of the Preferred Development Plan is not described further.

Exhibit 1: Keeyask and Conawapa Project Location



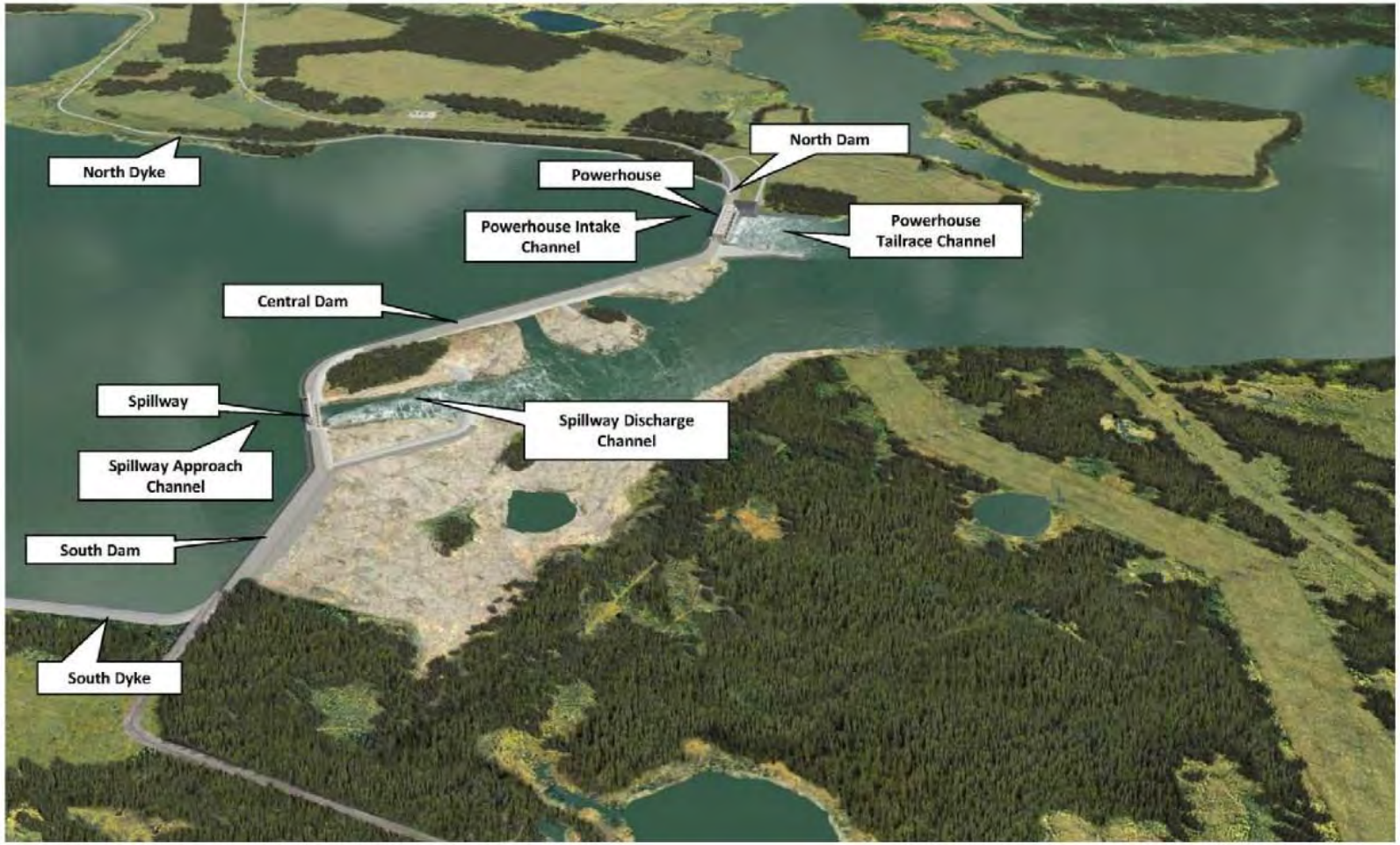
Source: Manitoba Hydro Needs for and alternatives to: Chapter 2 Preferred Development Plan Facilities

The typical works/infrastructure necessary to construct such facilities, inclusive of support infrastructure consists of the following, conceptually illustrated on Exhibits 2 and 3:

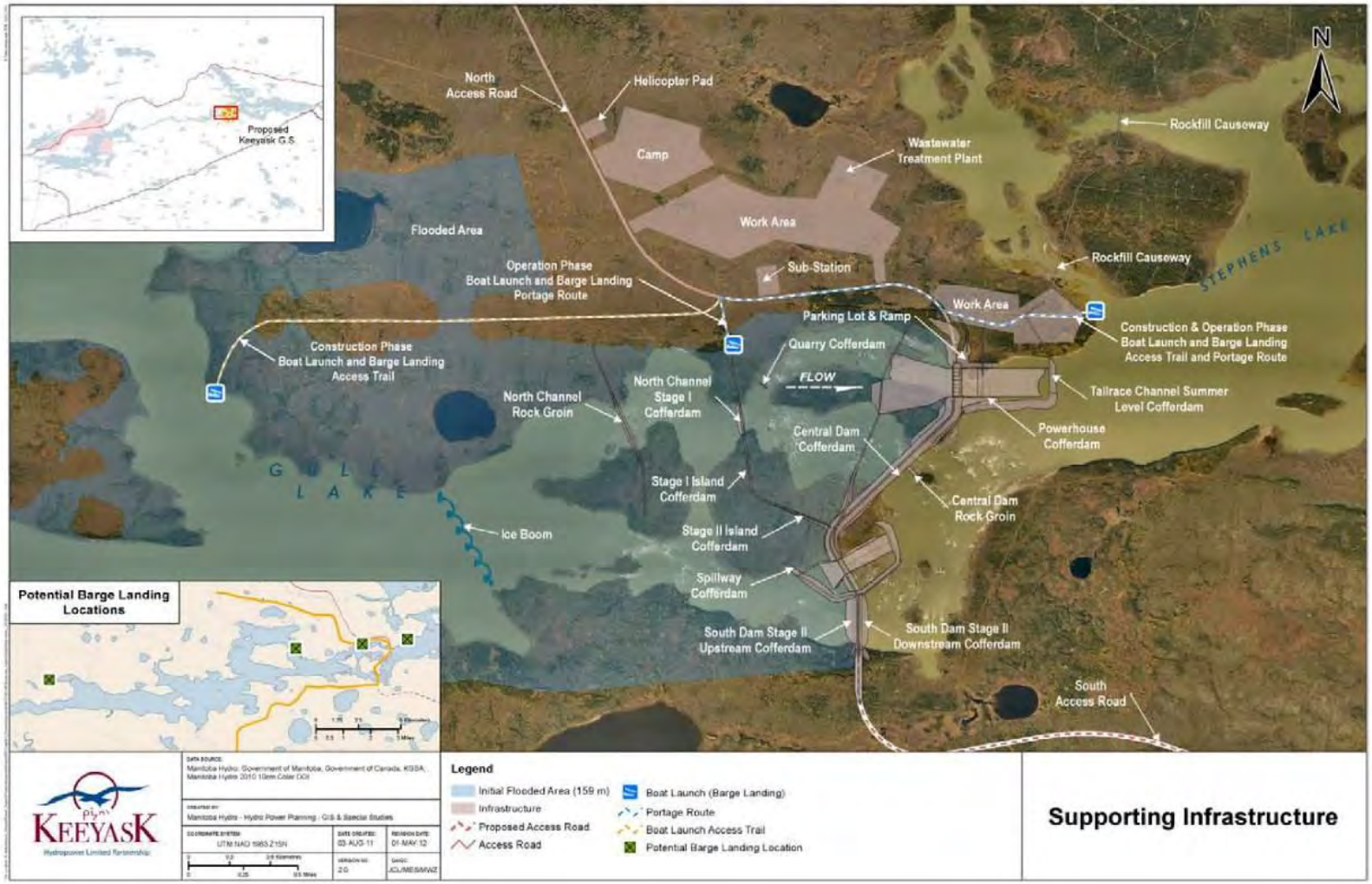
- Earth fill dam
- Spillway
- Powerhouse
- Powerhouse intake channel
- Powerhouse tailrace channel

It is those aforementioned components that represent the key capital-intensive construction activities and key project costs that generate economic benefits (via employment and supporting indirect and induced benefits from suppliers). Accordingly, construction of hydroelectric dams represents in general, the most capital-intensive resource options referenced in the NFAT review.

Exhibit 2: Keeyask Dam Site and Supporting Infrastructure

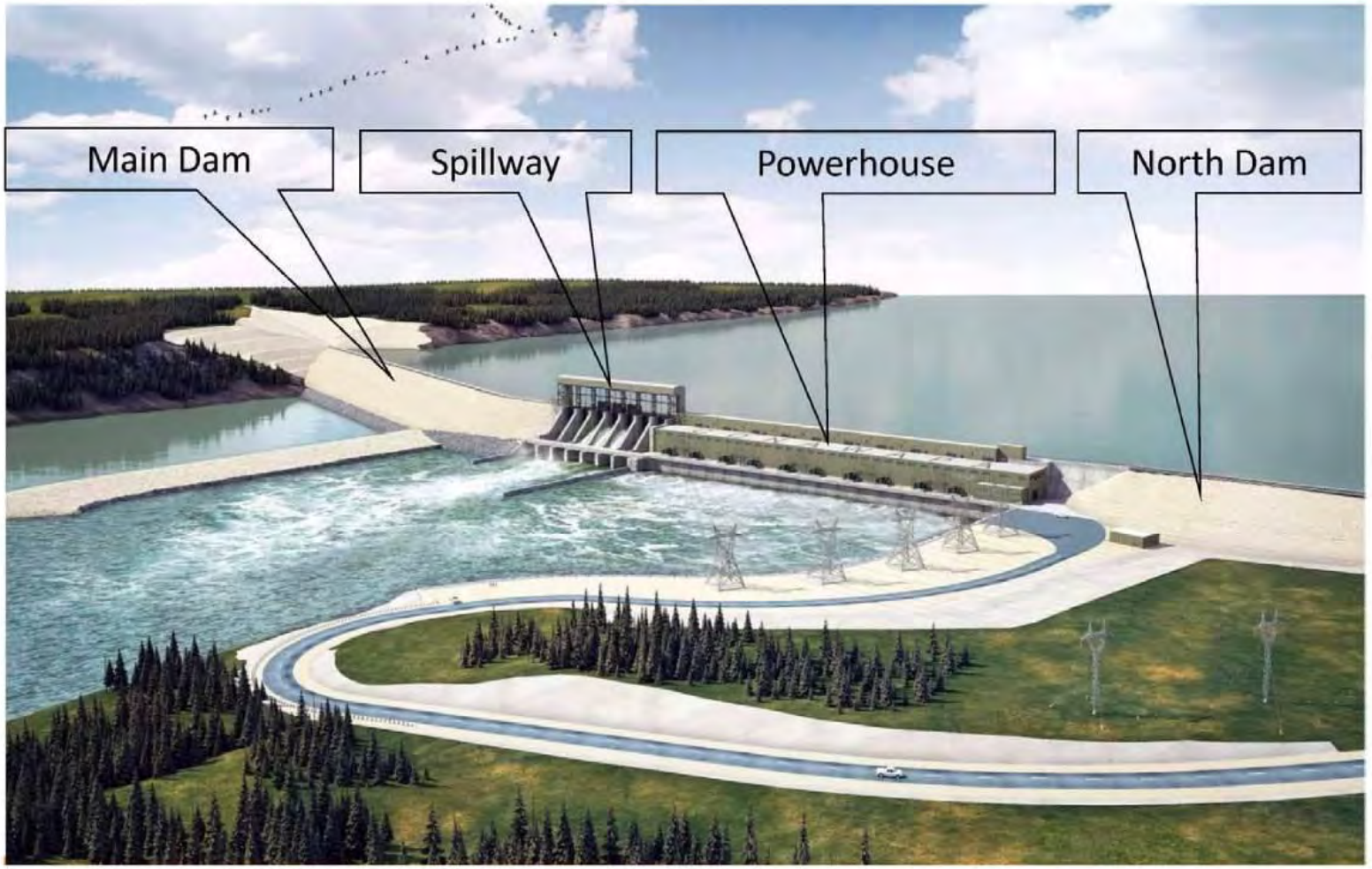


Source: Manitoba Hydro Needs for and alternatives to: Chapter 2 - Preferred Development Plan Facilities

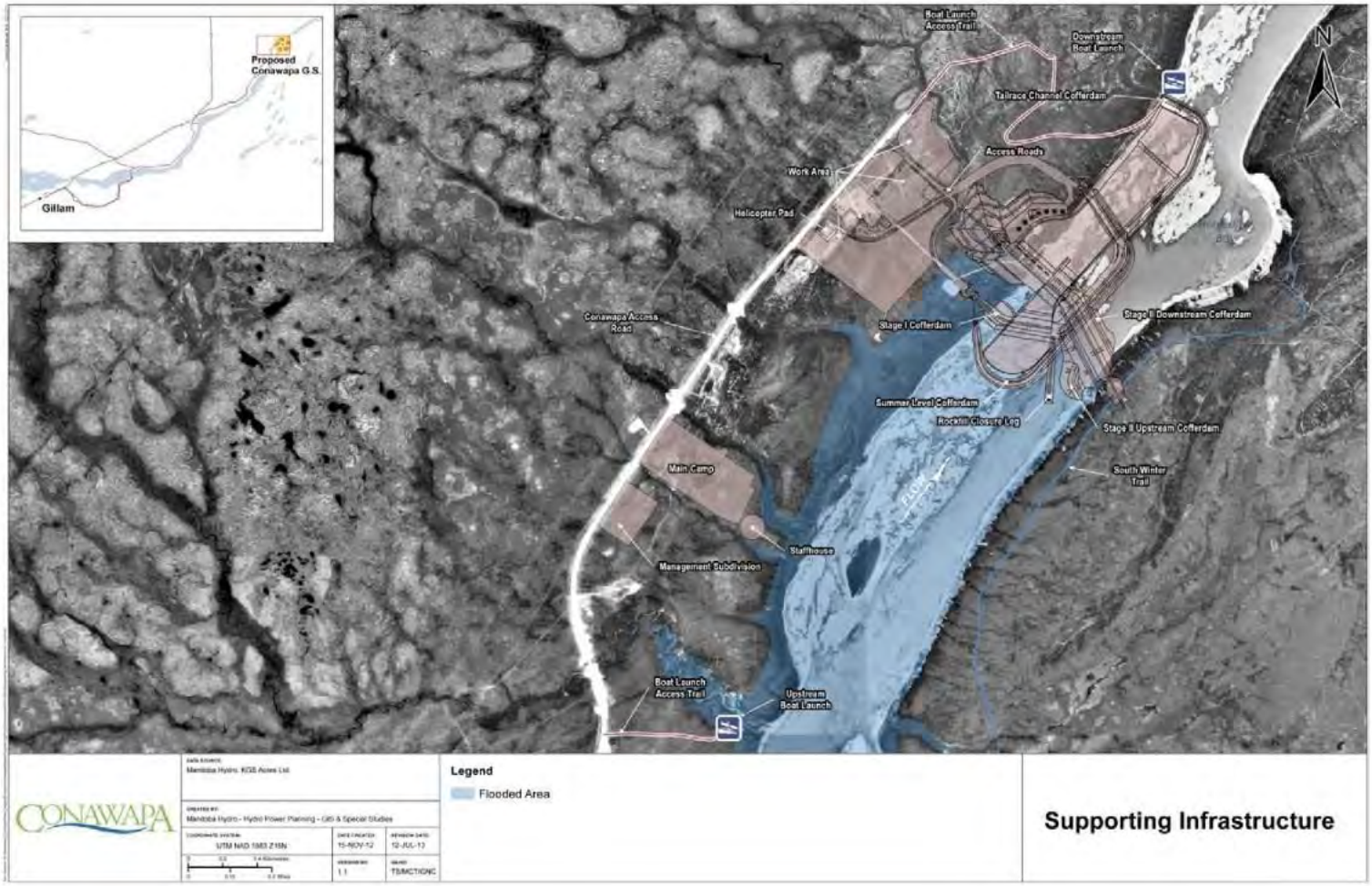


Source: Manitoba Hydro Needs for and alternatives to: Chapter 2 - Preferred Development Plan Facilities

Exhibit 3: Conawapa Dam Site and Supporting Infrastructure



Source: Manitoba Hydro Needs for and alternatives to: Chapter 2 - Preferred Development Plan Facilities

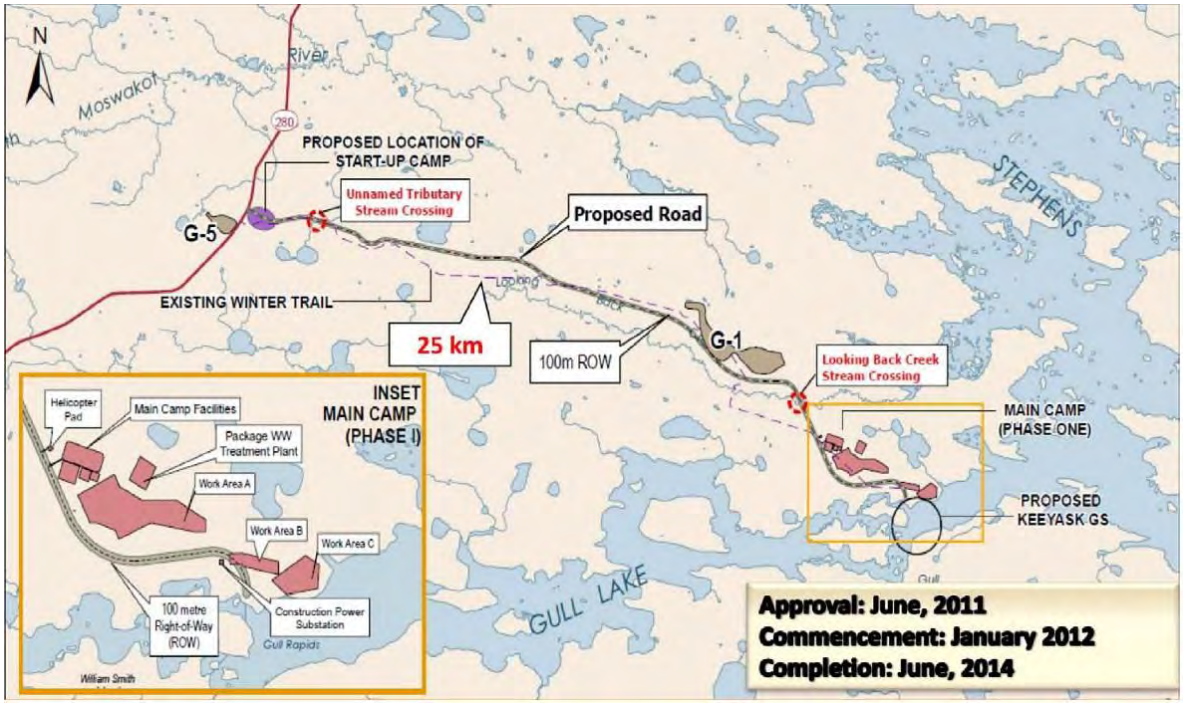


Source: Source: Manitoba Hydro Needs for and alternatives to: Chapter 2 - Preferred Development Plan Facilities

2.2 Keeyask Infrastructure Project

The Keeyask Infrastructure Project (KIP) forms part of the Keeyask Generating Project (KGP), and is currently being constructed prior to approval of the PDP. KIP consists of supporting infrastructure for the KGP, inclusive of a 25 km north access road, 35 km south access road, transmission line spur, communication tower, placement for excavated materials, remnants of some cofferdams and rock groins, boat launches, portage, barge landings, and haul roads. The KIP is an example of one of the lessons learned from Wuskwatim. The project will facilitate schedule implementation and on site readiness for the larger dam site construction. Main camp, work areas, concrete batch plant, water and wastewater and treatment facilities etc. are also part of the plan, illustrated below:

Exhibit 4: Keeyask Infrastructure Project



Source: Needs for and Alternatives to Chapter 2- Preferred Development Plan Facilities

Unique to the PDP, and building upon the Wekwatim Power Limited Partnership (WPLP) agreement, the Joint Keeyask Development Agreement (JKDA), was signed in March 2009 by Manitoba Hydro and each of the four Keeyask Cree Nations (KCN's):

- Tataskweyak Cree Nation (TCN)
- War Lake Cree Nation (WLFN)
- York Factory first Nation (YFFN)
- Fox Lake Cree Nation

The JKDA was established to address pre-construction issues and proactively involve local aboriginal groups to support related socio-economic benefits potentially resulting from the PDP. The Partnership will own the generation project. The total cost of the KIP project is $229.9 m dollars.

2.3 Lessons Learned from Wuskwatim

While not a specific requirement of this socio-economic review, it was important to acknowledge "lessons learned" from recent MH projects, and how those lessons learned have, in turn, influenced the development of the PDP. A number of such lessons learned have influenced and resulted in a number of related socio-economic benefits that are analyzed in this review.

MH completed the Wuskwatim Generating Station (WGS) in 2012. As part of the on-going planning, lessons learned were incorporated to better manage the planning and development of the PDP.

WGS is located on the Burntwood River, in the Nelson House Resource Management Area, approximately 45 km south of Thompson and 35 km southeast of Nelson House. The WGS was developed and is owned by WPLP, a legal entity involving Nisichawayasihk Cree Nation (NCN) and Manitoba Hydro. Manitoba Hydro operates the WGS as part of the Manitoba power grid on behalf of WPLP. WGS represents the first time Manitoba Hydro has entered into a partnership with First Nations community on a generating station project, a lesson learned which has been transferred to the KGP.[5]

The WGS project resulted in significant cost overruns due to two key issues: labour (cost to attract/retain labour and labour productivity) and escalation costs. Manitoba Hydro has been proactive in evaluating the reasons such overruns occurred and has put in place measures to prevent similar issues arising in the proposed PDP. The New Generation Construction Division, Power Supply Group of MH, responsible for construction works, has developed a project execution plan for Keeyask and the Keeyask-Infrastructure and Generating Station[6]. The Project Execution Plan defines and expands on internally accepted project management techniques required for effective project delivery, a key lesson learned from Wuskwatim.

A summary of lessons learned, and what has been done to address such issues, which have implications from a socio-economic perspective, are presented below.

[5] Manitoba Hydro http://www.hydro.mb.ca/corporate/facilities/gs_wuskwatim.shtml
[6] Keeyask-Infrastructure and Generating Station Project Execution Plan (Project Execution Plan -20130314) CSI

Table 2 Lessons Learned Wuskwatim

Key lesson Learned	Manitoba Hydro Response	PDP Response
Establishment of partnerships with First Nations	The WGS was developed and is owned by the Wekwatim Power limited Partnership (WPLP), a legal entity involving Nisichawayasihk Cree Nation (NCN) and Manitoba Hydro. Manitoba Hydro operates the WGS as part of the Manitoba power grid on behalf of WPLP. WGS represents the first time Manitoba Hydro has entered into a partnership with First Nations community on a generating station project, a lesson learned which has been transferred to the KGP as well	The KGP project will be developed with full support of the local area First Nations as outlined in the Joint Keeyask Development Agreement (JKDA) signed by all First Nations
Early Start of construction for supporting Infrastructure	The Keeyask Infrastructure Project represents a $229.9 m investment by MH (identified under the terms of the (JKDA) intended to facilitate job learning and effective construction delivery of the KGS project via developing supporting infrastructure associated with road access and worker accommodation camps. This will facilitate effective and efficient readiness for dam site construction	Construction site readiness for the dam construction will be facilitated via the KIP project currently being constructed. While such costs are assumed "sunk costs" on the project, the KIP will create significant benefits to northern and aboriginal peoples
Engineering – early completion and earlier assessment of constructability inputs	The Keeyask and Conawapa capital cost estimates were developed based on the Association for Advancement of Cost Engineering International (AACEI) recommended practices for estimate development Detailed costing essential to manage potential cost overruns	Accurate costing and lessons learned from WGS provided New Generation Construction Division Power Supply the opportunity to review and clarify project costs in accordance with industry best practices and put in place strategies to deal with labour and cost escalation
Human Resources – attract and retain project staff and Labour	Driven by a proactive approach to skill development and training with First Nations. Employment and training for identified jobs associated with both the KIP and Keeyask Generating Project have been identified and provided for. The construction of a premier construction camp for workers represents a means of attracting skilled labour to the dam sites construction	Retention of skilled labour throughout project construction was identified as a critical issue both from a First Nations perspective and general labour perspective. The creation of a world class construction camp to attract workers and separate workers from local populations to reduce health and cultural conflicts has been established

Key lesson Learned	Manitoba Hydro Response	PDP Response
Project Management Practices[7]	Strong project management practices are required to manage such a multi-disciplinary approach to project delivery. MH has implemented such a program, inclusive of the key project management principles associated with the Project Management Institute (PMI) key knowledge areas, inclusive of the creation of: • Project Integration Plan • Scope Management Plan • Schedule Management Plan • Cost Management Plan • Quality Management Plan • Human Resource Management Plan • Communication Management Plan • Procurement Management Plan • Risk Management Plan • Construction and Commissioning Management Plan • Project Close Out Plan	Larger corporations from an organizational perspective may have difficulties in delivery methods for specific projects, as evident in a number cost overrun issues related to major hydroelectric developments in Québec and Ontario a well as Manitoba.

Source: Capital cost Estimates for Keeyask and Conawapa Generating Stations (Dave Brown, Manager Project Services, presented at the Intervener Presentations September 5/6 2013).

[7] Project Management Institute - A Guide to the Project Management Body of Knowledge

Observations:

MH has adapted lessons learned from the construction of WGS in the development of the PDP that have resulted in how the project delivered, and correspondingly influence the socio-economic benefits identified. A structured project management approach to project delivery has also been incorporated into the PDP.

3 SOCIO-ECONOMIC IMPACT REVIEW

3.1 Resource Options Overview and High Level Development Plan Comparison Table

The NFAT provides an overview of resource supply options and development plans evaluated by MH. The Range of Resource Options inventory consisted of a range of 17 different technologies suitable for utility scale generation.

Specific to Appendix 9.1 of the NFAT, 15 development plans were compared based on technical, environmental, socio-economic criteria. The socio-economic criteria included health and safety concerns, Manitoba business opportunities (% of capital spent in Manitoba), cumulative development plan employment (direct construction, construction at northern work sites, permanent operations and maintenance, permanent O&M at northern work sites), present value royalties (water rental, capital taxes, guarantee fees) and nearby population centers that would potentially benefit from such developments.

Observations:

As part of the NFAT review, Appendix 7.2 - Range of Resource Options identified 16 preferred resource options (that included 12 hydroelectric options, three thermal options and one wind resource option) for further study. Appendix 9.1 High Level Development Plan Comparison reviewed 15 specific development plans. A high level comparison confirms that overall, hydroelectric options that consider both Keeyask and Conawapa provide the greatest socio-economic benefit followed closely by other combination options with just Keeyask.

The resource planning process undertaken by MH regarding the selection of the hydroelectric development plans is reasonable.

3.2 Economic Impact Assessment

The economic impact analysis (presented in Appendix 2.3 of the NFAT) provides an indication of gross provincial benefits, inclusive employment in person years, labour income, and contributions to gross domestic product (GDP), federal, provincial and local taxes. Appendix A provides a description of what an IOM does and produces.

3.2.1 Manitoba Bureau of Statistics Input Output Analysis

The Manitoba Bureau of Statistics IOM was utilized to assess the economic impact of the PDP. The IOM was also utilized to determine the economic impact associated with a simple gas turbine project and a combined gas turbine project.

The IOM was utilized for the following components of the PDP:

1. The Keeyask project (695 MW hydroelectric generating station, three new transmission lines and a switching station).
2. The Conawapa project (1,485 MW hydroelectric generating station and new transmission lines).
3. North-South upgrades.
4. 750 MW interconnection.

MH also used the model to assess the impacts of other resource options including:

- A simple gas turbine project (construction, operation and maintenance);
- A combined gas turbine project (construction, operation and maintenance);
- A 230 KV transmission line (construction, operation and maintenance); and
- A switching station (construction).

Construction and operating costs were considered and resultant outputs (benefits) identified.

3.2.2 Interpreting the Results of the IOM Analysis between the PDP, the Simple Gas Turbine and Combined Gas Turbine

The Manitoba Bureau of Statistics IOM was used to compare the expected economic impacts associated with the PDP and other alternatives such as a Simple Gas Turbine and a Combined Gas Turbine project.

While the information used to calculate economic impacts was available at a detailed level for the PDP, the data used to calculate the economic impact of the gas turbine projects was only available in summary form. For example, construction costs for the simple gas turbine project were broken down into six categories: turbine, iron/steel structural materials, concrete, wages and salaries, electric or other engineering construction and other operating surplus. The expected construction cost was estimated at $157.8 million. Similar categories (turbine, electric power construction, concrete, wages and salaries, electric or other engineering construction and other operating surplus) were used in the economic impact analysis of the combined cycle gas turbine option, with an expected construction cost of $406.3 million. In contrast, the information that was used in the economic impacts associated with the PDP was provided at a much more detailed level. The input data used in the analysis of the KGP, expected to cost $2.2 billion, included expenditure data for 41 different input-output commodities, based on construction costs developed for the project (see Section 3.2.3.1).

Based on the data and results:

1. The gas turbine projects considered as alternatives are expected to represent a much smaller capital investment than the projects included in the PDP. As such, the expected economic impact associated with these projects is significantly lower than for the projects included in the PDP.
2. Since input-output models are linear, the results of impact analyses are scalable. If the simple gas turbine project (expected to cost $157.8 million) is scaled up to represent a level of capital investment similar to the KGP ($2.2 billion), the total expected employment impact (direct, indirect and induced, including Manitoba and Canada) would still be about half (10,750) the 21,144 jobs expected to be supported by the construction of KGP. In other words, even when the difference in the scale of the projects is taken into account, the expected impact of the construction of a hydroelectric dam would be significantly greater than the impact associated with spending the same amount of money building gas turbine facilities.
3. The analysis of the PDP is based on detailed costing estimates, while the analysis of the alternative options is based on high-level cost estimates. Therefore, the results of the economic impact analyses are not strictly comparable. The extent to which the conclusions would differ if more information about the options had been available is unknown.
4. For the gas turbine options, turbines imported into Canada represent more than a third of the total cost of the projects. Purchases of imported turbines do not provide a significant economic benefit to either Manitoba or Canada. In contrast, the imported generators used in the Keeyask and Conawapa projects is expected to account for a much smaller share (about 10%) of the total capital cost. In other words, the extent to which the project uses goods imported from other countries is significantly greater in the case of the gas turbine projects.

5. The PDP is expected to have greater economic impacts in Manitoba as well as Canada than the other options considered.

Observations:

The Manitoba Bureau of Statistics IOM was used to compare the expected economic impacts associated with the PDP and other alternatives such as a Simple Gas Turbine and a Combined Gas Turbine project. While varying detail was provided regarding construction costs for the gas options, we note that the input-output models are linear and therefore scalable. The gas turbine projects are expected to create less economic benefits than that of the PDP. The PDP is expected to have a greater economic impact than the other options considered.

3.2.3 Interpreting the results of the IOM for the PDP

Modeling approaches can vary significantly, and results are dependent upon a number of assumptions and allocations made within IOM's (e.g., how construction inputs are allocated into the IO expenditure categories and the corresponding assumptions modelers utilize). This section comments on the reasonableness and assumptions that appear to have been made in preparing the estimated impacts of the PDP.[8] The following steps associated with preparing inputs into the IOM are commented upon in this review:

- Verification of construction cost estimates;
- Allocation of cost input data into IO categories;
- Removal of expenditures with no provincial economic benefit and other leakages and margins; and
- Treatment of Labour costs.

A brief discussion is outlined, followed by an analysis of what was undertaken as part of the PDP.

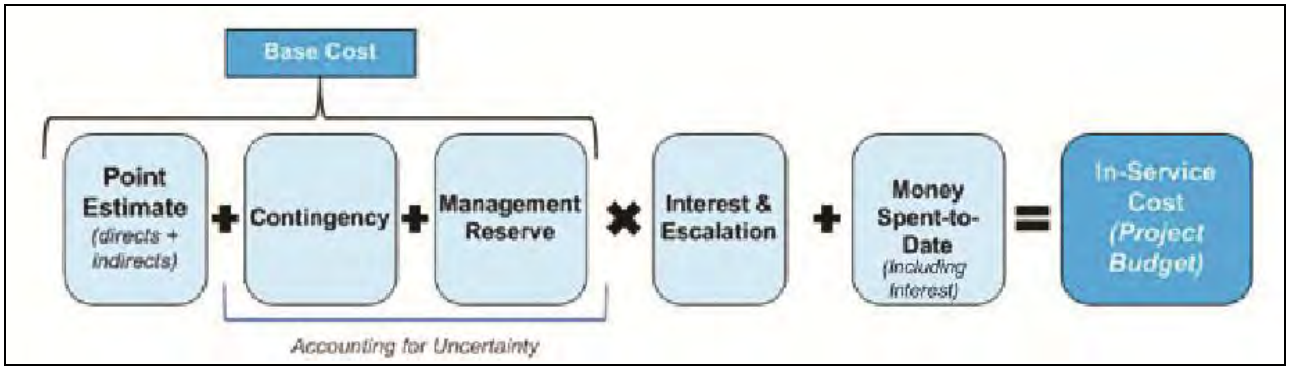
3.2.3.1 Verification of Construction Costs Estimates

The Keeyask and Conawapa capital cost estimates were developed based on the Association for Advancement of Cost Engineering International (AACEI) recommended practices for estimate development. The estimate development is a structured approach that builds estimates from the bottom up. Exhibit 5 illustrates the overall Manitoba Hydro Cost Development Process, inclusive of contingency and management reserve.[9]

[8] The comments provided in this review are limited, in that they are based on how the British Columbia IOM calculates economic impacts. It is not known if the Manitoba model uses the same process. However, it should be noted that input-output modeling methods are similar in nature and even though the application of modeling techniques may vary, the results of these exercises would normally be expected to fall within standard ranges.

[9] Needs for and Alternatives to Appendix 2.4 - Developing the Keeyask and Conawapa cost Estimates. Contingency and management reserves are excluded from the economic impact assessment model.

Exhibit 5: Manitoba Hydro's Cost Estimate Development Process



Source: Needs for and Alternatives to Appendix 2.4 - Developing Keeyask and Conawapa Cost Estimates

The first step in the process is the point estimate, representing a risk-free escalation based on initial set of assumptions and current costs within the marketplace. MH followed the AACEI recommended practice guideline 36R-08 to undertake this estimate.[10] Contractor indirect costs inclusive of mobilization supervising site facility costs; costs for major pieces of equipment (turbines generators and transformers etc.) are estimated from recent vendor quotations. In developing the point estimate information from other North American hydroelectric companies and market intelligence was utilized.

Keeyask

The last major re-estimate of the Keeyask project costs was undertaken in 2009/2010. The re-estimate involved detailed revision of estimate assumptions, incorporation of current market conditions and inclusion of additional lessons learned from Wuskwatim. The estimate can be considered to be between a Class 2 and Class 3 estimate, as (defined by AACEI), recommended practice 69R-12: Cost Estimate Classification system.[11]

Conawapa

The last major re-estimate of the Conawapa GS projects cost was undertaken in 2010/2011. The estimate was developed following the methodology outlined above and included incorporation of current market conditions and lessons learned from Wuskwatim and the 2009/2010 Keeyask re-estimate. This estimate can be considered a Class 3 estimate as defined by AACEI. Class 3 cost estimates are used for the purpose of budget authorization or control and based on semi detailed unit cost with assembly level line items. Class 2 cost estimates are used for bids and tenders, and include detailed unit cost with forced detailed take offs. Exhibit 6 illustrates the expected accuracy range of the various estimates derived from the AACEI methodology. The classes identified each represent a differing level of accuracy.

[10] The Point Estimate is based on the project definition report prepared by MH that provides a detailed and clear definition of project scope, compilation of all engineering design requirements, quantify definitions from current design and establishment of expected contract packages. Point estimates consist of both direct and indirect costs. Direct costs (costs directly attributable to the construction of the project) are identified, material cost databases, labour cost data bases and equipment cost data bases and productivity levels (human resources) are utilized as further inputs.

[11] The estimate is between these two classes because, despite a number of tender prices having been received, tender price for the General Civil contract (a major component of project expenditures) is still outstanding.

Exhibit 6: Cost Estimate Classification System

69R-12: Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Hydropower Industry 3 of 14

January 25, 2013

COST ESTIMATE CLASSIFICATION MATRIX FOR THE HYDROPOWER INDUSTRY

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges [a]
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

Notes: [a] The state of technology, availability of applicable reference cost data, and many other risks affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

Table 1 – Cost Estimate Classification Matrix for the Hydropower Industry

Source: Manitoba Hydro Appendix 7.2 - Range of Resource Options: Appendix C AACE Cost Estimate Classification System

MH construction costs derived from this methodology were subsequently utilized to populate the commodity tables in the IOM.

Observations:

The construction costs defined by MH for the PDP are based on the Association for Advancement of Cost Engineering International (AACEI) practices and represent standard practice in industry. For the KGP they represent between a Class 2 and Class 3 estimate. The CGP is based on a Class 2 estimate. The construction cost estimates developed by MH for the purpose of economic impact are reasonable. The identification of operating and maintenance, and other costs related to both the Keeyask and Conawapa within the IOM fall within normal boundaries.

3.2.3.2 Allocation of cost input data into IO categories

The next step in impact modeling is to allocate project expenditures (above) to specific expenditure categories in the IOM. Proper categorization of expenditures to IO commodities can have a significant impact on the modeling results. The allocation of cost input data into the IO expenditure categories is dependent upon MH's and the modellers' understanding of how construction costs are allocated to the expenditure categories.

A review of the allocations indicates that a number of capital cost allocations may have been miscoded, and clarification from MH would be required.[12]

[12] Examples cited include (specific to Conawapa per dollar breakdowns as provided by MH): Sheet: CGOT – Construction, "Construction" coded to: "568 Gas & Oil facility construction" (given this is a dam, this does not appear to represent appropriate coding); "Anchors &

Observations:

The allocation of cost input data into IO categories by MH is based on their understanding of the expected cost breakdown. The allocation of cost data into the IOM categories, in a number of instances appears to be miscoded. MH should clarify.

The allocation of operating and maintenance, and other costs related to both the Keeyask and Conawapa within the IOM expenditure categories fall within normal boundaries.

3.2.3.3 Removal of expenditures with no Provincial benefits

Some types of construction expenditures do not result in a change to economic output as they are produced out of Province or in foreign countries, and are excluded from the analysis. These include goods that are purchased directly from suppliers outside of the province and the purchase of assets such as land and buildings.[13]

Based on the IOM expenditure categories those project expenditures that would not create an economic benefit were removed from the IOM. Turbines are such an example. In addition, based on MH experience with other recent projects other commodities were proportioned based on the percentage attributable to Manitoba and the rest of in Canada, essentially defining economic leakages from Manitoba.

The treatment of many purchases (identified in the IO expenditure categories) as leakages, as presented by MH, may result in understating the impact of the projects in Manitoba, while overstating the impact in Canada. This is due to the fact that margins embedded in the purchase cost of these goods and services may not have been attributed to Manitoba producers who may be providing services such as transport or wholesaling. Another example would be the treatment of cement, which is currently treated as a leakage from the economy. As of 1992 no cement plants operated in Manitoba, and cement is assumed to be 100% imported. If treated as a leakage, then the input-output model would fail to capture any margins or taxes associated with the use of the cement. For example, the cost of transporting the cement within Manitoba, mixing the cement in a batch plant (that would be required on site) represents provincial benefits that should be identified. Such benefits should be tracked through the model. It is not known how this has been accomplished in the model as presented.

The extent of such leakages may be explained, in part, by the fact that the majority of contracting opportunities (such as the General Civil Contractor) will be issued to out-of-province vendors. This review is limited as without a full understanding of either the Manitoba economy and how it functions, and an understanding of on-going contractual arrangements between MH and service providers, it is difficult to ascertain the extent of such leakages and how margins are treated.

To illustrate, from a theoretical perspective, standard economic multipliers produced by Statistics Canada, referencing their interprovincial input-output model (which takes into account the unique characteristics of each

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Foundation" coded to "438 Lime"; "Alum. Phase Conductors" coded to: "431 Wire & cable, insulated, excl. aluminum"; "Steel Ground Conductors" coded to: "321 Food, beverage and other cans"; Potential inconsistency with "Insulators" coded to "441 Bricks & other clay building products".

[13] Goods that are purchased directly from a supplier outside the province. For example, there are no provincial economic impacts associated with the manufacture of a turbine overseas. However, if there are local services (or tax revenues) associated with such a purchase, they should be accounted for in the analysis, particularly if the purchase represents a significant percentage of total expenditures. For example, in the case of the turbine purchased from a foreign supplier, transportation and other services required to move, install and test the turbine could potentially be provided by local companies. There may also be associated tax revenue or other impacts that should be taken into consideration. If these represent significant expenditures, they should be explicitly accounted for in the analysis. In the case of transporting and installing turbines such might be the case but are not noted in the model. Purchases of existing assets such as land or buildings. Legal or real estate services associated with the transfer of the asset represent actual costs and should be included

provincial economy, and traces flows of goods and services across provincial borders), illustrates the number of jobs created by 1 million dollars of spending.

The following table shows the expected employment impact of electric power and other engineering construction projects in Manitoba, based on the Statistics Canada model and average industry expenditure patterns.

Table 3: Provincial Input Output Multipliers

Jobs per million dollars of output	Direct Employment Only	Direct, Indirect and Induced Employment by Area		
	Manitoba	Manitoba	Rest of Canada (ROC)	All Provinces
Provincial Input Output Multipliers , 2009 Statistics Canada				
Electric power engineering construction	5.5	8.3	2.7	11.0
Other engineering construction	6.3	9.6	3.9	13.5

Source: Statistics Canada; Interprovincial Model

The table shows that, for a typical "other engineering construction" project in Manitoba, there would be 9.6 direct, indirect and induced jobs for every $1 million spent on construction. The employment impact in the rest of Canada would be less than half that amount at 3.9 jobs.

These employment impacts are similar to those observed in other provinces, although provinces that have a larger manufacturing base rely less on imported goods and have fewer leakages, and therefore more of the jobs are in the province rather than in the rest of the country. In British Columbia, for example, the Statistics Canada data suggests that $1 million of engineering construction activity would generate an estimated 10.0 jobs in the province, and 2.2 jobs in other parts of Canada. Ontario, with its manufacturing base, would see 11.0 jobs in the province, with just 1.0 job generated in other parts of the country.

While it is true that Manitoba's economy is different and has a smaller manufacturing base, the expected leakages (based on industry averages) to the rest of the country from a major capital construction project may be less than those assumed in the MH analysis. While the allocation of expenditures for the MH projects may differ from the industry average based on MH experience, the reasons for these differences should be clearly explained as the results of this analysis fall outside the normal range.

Observations:

The treatment of many purchases as leakages and treatment of margins may tend to understate the impact of the project in Manitoba, while overstating the impact in the rest of Canada, since the margins embedded in the purchase cost of these goods and services may not have been attributed to Manitoba producers who would be providing services such as transportation or wholesaling.

Such extensive leakages to the rest of Canada may be reasonable and realistic if they accurately reflect MH's past experience and the Manitoba economy. The reasons for these differences should be clearly articulated in the reporting.

The allocation of operating and maintenance, and other benefits to both the Keeyask and Conawapa projects fall within normal boundaries.

3.2.3.4 Treatment of Labour Costs

It is assumed for both Keeyask and Conawapa that most of the Labour costs associated with construction of the generating station will be incurred outside the Province, which supports the observations provided in regard to the removal of expenditures with no provincial benefits (see Section 3.2.3.3). Labour costs should only include payments to workers directly employed on the project.

If it is expected that most of the people working on the project will come from outside of Manitoba, then the assumptions that most of the wages are paid outside the province is reasonable, and would help explain the higher than average impact on the rest of Canada. Regardless, if such is the case it should be explicitly stated.

Observations

If it is expected that most of the labour working on the project will come from outside Manitoba, then the assumptions that most of the wages are paid outside the province and wages being paid out of province is reasonable, and would partly explain the higher than average impact on the rest of Canada. A statement confirming that major contracts (i.e., such as the General Civil Contractor) will be issued to out-of-province companies should be clarified in the economic impact assessment.

3.2.4 Analysis of Results

In general, the results of the economic impact analysis appear to be consistent with the input data provided by Manitoba Hydro.

Table 4: Assessment of Manitoba Hydro's Approach to Economic Impact Assessment for the Preferred Development Plan

Steps Required for Input Output Modeling	Manitoba Hydro Approach	Observations	Implications On Model Results	Compliance to standard practice (Yes=☑ , No=N)
Step 1: Verification of construction cost estimates	The Keeyask and Conawapa capital cost estimates were developed based on the Association for Advancement of Cost Engineering International (AACEI) recommended practices for estimate development.	The Keeyask construction cost estimate can be considered to be between a Class 3 and Class 2 estimate, as (defined by AACE). The Conawapa cost estimate can be considered a Class 3 estimate as defined by AACE	The construction cost estimates provided to the Bureau of Statistics from Manitoba Hydro are detailed and accurate for purposes	☑
Step 2: Allocation of cost input data into IO commodity categories	Manitoba Hydro has allocated all cost inputs into commodity categories. In total over 40 commodity categories identified	MH has a comprehensive listing of commodity inputs that were generally appropriately allocated into the commodity expenditure categories within the IOM	The allocation of cost input data into the IO commodity categories was reasonable	☑
Step 3: Removal of expenditures with no Provincial benefit	Manitoba Hydro has removed all expenditures that are not produced in Canada and further proportioned Canada vs. Provincial expenditures	MH based on experience and knowledge of the provincial economy, has identified a number of expenditures representing leakages from the provincial economy	The treatment of many purchases as leakages may tend to understate the impact of the project in Manitoba, while overstating the impact in other provinces. the results might be in part from the fact that the margins embedded in the purchase cost of these goods and services may not have been attributed to Manitoba producers who may be providing services such as transportation or wholesaling	☑ The assumption here is that the extent of leakages is representative or the provincial economy. However construction of a major capital intensive hydroelectric project should by its nature contribute significantly to the provincial economy unless the majority of commodities are made and purchased out of province

Steps Required for Input Output Modeling	Manitoba Hydro Approach	Observations	Implications On Model Results	Compliance to standard practice (Yes=☑ , No=N)
Step 4: Treatment of Labour costs	It is assumed for both Keeyask and Conawapa that most of the Labour costs associated with construction of the generating station will be incurred outside of the Province, which supports the observations provided in regard to the removal of expenditures with no provincial benefits	If it is expected that most of the people working on the project will come from outside Manitoba, then the assumptions that most of the wages are paid outside of the province is reasonable, and would explain the higher than average impact on the rest of Canada	The current treatment of labour costs results in an potential overstatement of Canada wide benefits and an understatement of provincial benefits	☑ The assumption here is that the majority of labour originates out of Province. If that is the case results are reasonable

Source: BC Stats

Observations:

MH has provided detailed costs as inputs into the model; allocated cost input data to the IO expenditure categories based on their understanding of the expenditures involved; removed expenditures with no Provincial economic benefit and identified leakages from the provincial economy, the results of which are also reflected in the treatment of Labour. Manitoba Hydro has taken a reasonable approach to this review.

It is observed however, that the treatment of many purchases as leakages and the treatment of margins may tend to understate the impact of the PDP in Manitoba, while overstating the impact in the rest of Canada. The extent of the leakages can be explained by a number of factors such as the relatively small manufacturing base of Manitoba compared to the rest of Canada, and extensive experience of MH regarding recently constructed projects, that verifies that out-of-province service providers will be retained.

It is important to explain such assumptions regarding contracting opportunities, and if the majority of the contracts are to be secured by non-provincial firms, the results appear reasonable.

3.3 Canadian Benefits

In order to provide a theoretical comparison against which the impact estimates could be compared, the Canadian Interprovincial input-output model was used to assess the economic impact associated with expenditures on the goods and services expected to be purchased for the construction of the KGS. The Statistics Canada Interprovincial IOM is similar to the national model but consists of 12 regional economies (10 provincial and two territories) and has an interprovincial trade or regional commodity share matrix for each commodity.[14]

A generally accepted principle of input output modelling is that the "direct" benefits of any project are incurred in the jurisdiction in which the project is located. The approached used in the Statistics Canada Interprovincial Input-Output Economic Impact Simulation model (catalogue no. 15F0009XDB) focused on the expenditures (purchase of goods and services) and the location where these expenditures took place. This approach ensures that the results generated from the model show the entire direct impact in Manitoba. It should be noted however that when the expenditure approach is used with the Statistics Canada model, the model estimates where the goods and services purchased are supplied from.

The key difference in the MH IOM approach was that it considered the supply side, in which MH made decisions, based on local experience and knowledge, on where the goods and services originated from based on experience. Although such an approach is reasonable, one must be careful in how to interpret the direct and indirect impacts, as the production (supply) of goods and services might generate a direct impact in the jurisdiction where the production took place, but in reality, this production should be interpreted as indirect impact, because these goods and services were produced to satisfy the demand associated with the project.

Either approach is reasonable, however as noted earlier in this report, assumptions are critical regarding the results. The results of both the MH IOM and the Statistics Canada Interprovincial model are presented for comparison purposes. Refer to Appendix C for details.

[14] Canadian Journal of Regional Science XV111:2 Summer 1995): A Concise Description of Statistics Canada's Input Output Models: Erik Poole; Input Output Division Statistics Canada, and Department of Economics Simon Fraser University

Table 5: Comparison of Manitoba Hydro Results vs. Statistics Canada Closed Model Keeyask Generating Station

	Manitoba Hydro Results			Statistics Canada Closed Model		
IOM Results by Category	Manitoba	ROC	Total	Manitoba	ROC	Total
Employment						
Project direct (#)	2,014	2,463	4,477	12,792	0	12,792
Other direct (#)	1,887	2,644	4,531	4,345	3,826	8,171
Indirect and Induced (#)	3,089	9,047	12,136	8,360	7,023	15,383
Total employment (#)	6,990	14,153	21,144	21,152	7,023	28,175
Labour income	532,748	925,178	1,457,926	996,575	357,620	1,354,195
GDP ($ millions)*	706,393	1,285,069	1,991,462	1,456,863	703,309	2,160,172
Tax Revenues ($ millions)*	171,154	225,519	396,673	147,993	29,306	177,299
Provincial ($ millions)	34,745	59,340	94,085	107,375	18,090	125,465
Local ($ millions)	135,280	272,249	407,529	955	72	1,027
Federal ($millions)	341,180	557,108	898,288	39,663	11,144	50,807
Average Wage (calculated)($)	76,216	65,370	68,952	47,115	50,924	48,064
Total employment estimate using average wage assumed by MBS	6,990	14,153	21,144	13,076	5,471	19,640

* Statistics Canada tax revenues only include commodity taxes

ROC: Rest of Canada

Based on the information provided in table 5 the following comments are provided.

Overall, the Stats Canada model validates the total economic benefits derived by MH IOM results. There are however, important differences in the distributions between the benefits in Manitoba and the rest of Canada (ROC) between the two approaches used.

The Statistics Canada model estimated total employment to be about 28,175 jobs based on an average employment income of $48,064. The MH IOM model estimated total employment to be about 21,144 jobs based on an average employment income of $68,952. The average employment income generated from the Statistics Canada model is thought to be underestimated (and hence the number of jobs to overestimated) because the income estimate is based on the overall average employment income for the Electric power engineering construction industry as shown in the Input-Output Tables, whereas the average employment income generated by the MH IOM model is more reflective of the fact that the project takes place in a remote region of the province where one would expect the average employment income to be higher (thus generating a lower number of jobs). As such, it is assumed that the total number of jobs estimated by the MH IOM study is more accurate than the estimate generated by the Statistics Canada model.

The Statistics Canada model estimated all the direct jobs as well as 75% of all jobs to be in Manitoba. The MH model estimated that 43% of direct jobs and 33% of all jobs to be in Manitoba. The MH distribution of jobs is not reasonable, given that all direct jobs should take place on Manitoba. As well, the overall percentage of jobs in Manitoba appears to be very low given the significant investment taking place in Manitoba. If one were to allocate all the direct jobs from the MH IOM study to Manitoba, the overall percentage of jobs in Manitoba would increase from 33% to 57%, which seems to be a more reasonable estimate.

The Statistics Canada and MH IOM models provide consistent estimates of GDP and labour income generated from this project, suggesting that these estimated values are reasonable. The two models, however, show very significant differences of these impacts in the province of Manitoba and the rest of Canada. The proportion of the

benefits estimated in the province of Manitoba by the MH IOM models appears low, for the same reasons explained in the allocation of jobs mentioned above. It would not be unreasonable to reallocate a portion of the GDP and labour income benefits from the rest of Canada to Manitoba to be consistent with the suggested reallocation of the employment.

The Statistics Canada model does not include estimates for income taxes and therefore no comparison is made.

Observations:

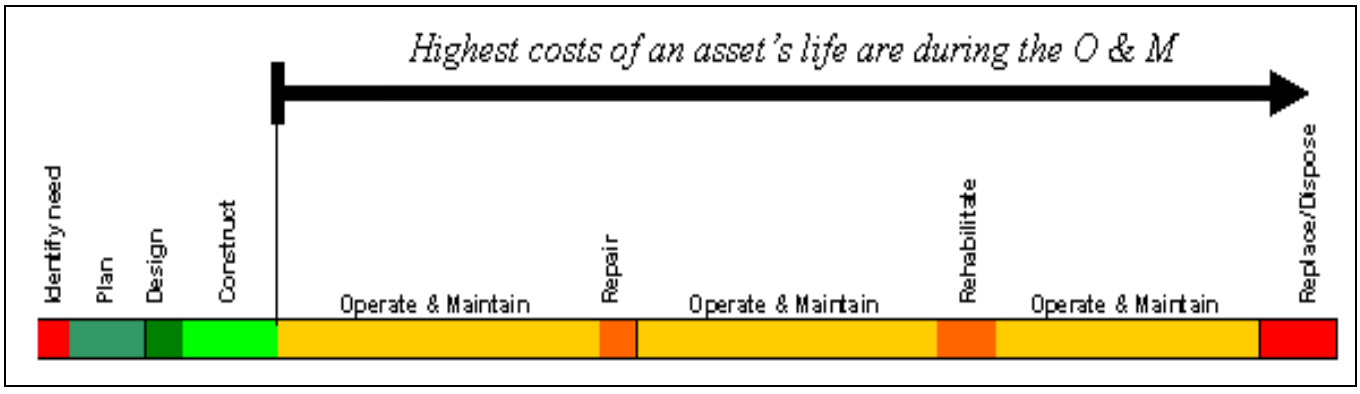
The Statistics Canada model suggests that the PDP will likely benefit the local economy more than was originally thought, while benefitting the rest of Canada less than was originally anticipated. These differences can be explained in part based on the approach taken by MH, which should be clearly articulated by MH as part of project assumptions. The results do not change the overall conclusions. The conclusion that the PDP provides greatest economic benefit is confirmed.

3.4 Determining Gross Provincial Financial Benefits by Examining Benefits over the Life of the Project

The determination of the gross provincial financial benefits is examined in this section by providing comment on the benefits of such assets over the life of the project. Provincial benefits of any major infrastructure project must consider all costs that would be incurred throughout the entire life of the project. Such costs include planning, design and construction as well as costs to operate and maintain, repair, rehabilitate and replace.

From a life cycle perspective significant costs are incurred throughout the operational and maintenance phases of a project. The following exhibit provides a representation of such costs. Different infrastructure projects have their own life cycle costs incurred throughout the entire life of the project. Hydroelectric facilities tend to have capital-intensive costs associated with planning, design and construction and extended economic lives, provided stringent maintenance repair and rehabilitation programs are followed.

Exhibit 7: Life of a Project: The range of planning, construction and operation and maintenance costs



Source: UMA Engineering

Appendix 9.3 Economic Evaluation Documentation considers the economic life of new generation resources used in economic evaluations.

Table 6: Economic Lives of New Generation Resources

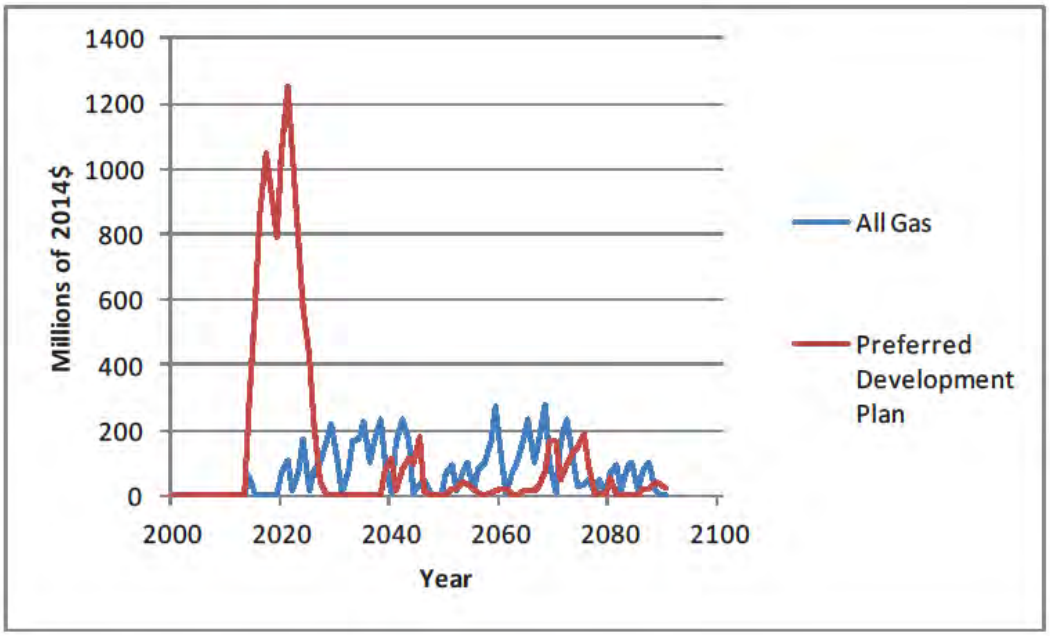
New Generation Resource Options	Economic Life (years)
Hydro-Electric Generating Station	67
Wind Generating Stations	20
Simple Cycle Gas Turbines (SCGT)	30
Combined Cycle Gas turbine (CCGT)	30
Individual Turbines and generators for hydro-electric stations	25
Transmission Stations	35
Transmission Lines	50

Source Appendix 9.3 - Economic Evaluation Documentation, Table 1.1

The economic evaluations undertaken by MH for all alternative plans considered a total study life of 78-years. Total study life considers a 35 year detailed evaluation, and an extension to the end of the hydroelectric facilities service life. Beyond the 35 year study period, replacement capital costs are assumed for assets that reach the end of their economic lives, up to the 78 total study lives. This means that for those resource options with an economic life of 30 years (simple cycle gas turbines and combined cycle gas turbines) replacement costs would be considered.

Exhibit 8 shows the timing and value (in millions of 2014) of replacement capital costs of the PDP and the all gas plan over the total study life.

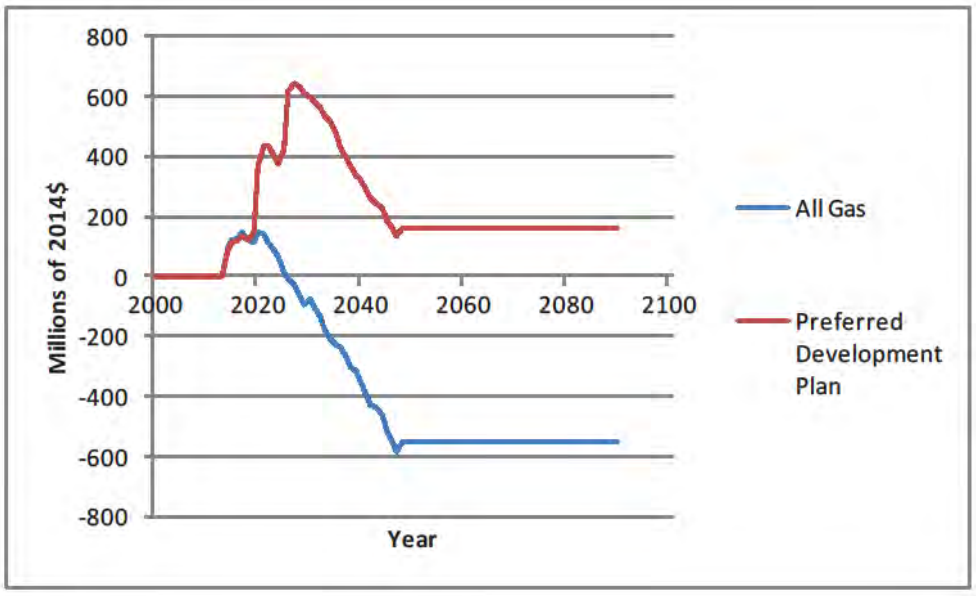
Exhibit 8: Timing and Value of Replacement Capital Costs: Total Capital



Source: Needs for and Alternatives to Appendix 9.3 - Economic Evaluation Documentation, Figure 1.1, Page 4

Exhibit 9 shows the timing and value of net production costs net revenues throughout the life of the total study life. The net average flow related revenue (production costs and revenues) are made of components using MH's System Simulation Computer Model (Splash). The exhibit highlights the benefits of the PDP over the study life.

Exhibit 9: Timing and Value of Net Production Costs: Net Revenue



Source: Needs for and Alternatives to Appendix 9.3 - Economic Evaluation Documentation, Figure 1.2, Page 4

While the benefits over the total study life of the project identify a preference for the PDP, the key consideration is the determination of the replacement timelines of the hydroelectric facilities past the total study life. The longer such a facility can be maintained the greater the extended societal benefits.

According to a research paper pertaining to the lifespan of a storage facility (hydroelectric facility) a dam can range from 80-150 years.[15] For example the average lifespan in years, for different components of a storage power station are presented below:

Table 7: Average lifespan in years of different parts of storage and run of river power stations (Frischnecht et al. 1996)

Parameter	Storage power station
Concrete	200
Reinforced steel	150
Steel (rest)	80
Cooper	150

Source: Life Cycle Inventories of Hydroelectric Power Generation ESU Fair Consulting in Sustainability (Karin Flury, Rolf Frischknecht).

The longer-term life (past the economic life) of hydroelectric facilities represents a consideration worth noting in this review. Referred to by MH as bequest value, is difficult to ascertain how long such facilities can be maintained and operated. Literature suggests over the longer term (past the economic life) hydroelectric facilities continue to contribute to the provincial economy.

[15] Life Cycle Inventories of Hydroelectric Power Generation ESU Fair Consulting in Sustainability (Karin Flury, Rolf Frischknecht)

Observations:

The economic lives of hydroelectric facilities are much greater than those of other resource options. Based on the timing and value of replacement costs and net production costs based on MH Splash modeling, the PDP creates the greatest value over the economic life of the asset. The longer-term life (past the economic life) of hydroelectric facilities represents a consideration worth noting in this review. Referred to by MH as bequest value, is difficult to ascertain how long such facilities can be maintained and operated. Literature suggests over the longer term (past the economic life) hydroelectric facilities continue to contribute to the provincial economy well past the economic life of the facility.

3.5 Northern and aboriginal community based impacts in terms of employment opportunities, incomes community tax base, skills development and community business opportunities

Northern and Aboriginal based community benefits represent a critical component of the PDP's rationale and a key corporate goal of MH. MH's ability to meet specific criteria/measures is examined. The criteria/measures utilized by large crown utilities approach to Aboriginal issues should include, in varying degrees of compliance, the following initiatives/practices:[16]

- Proactive (longer term) approach to engagement
- Establishment of benefit agreements
- Community ratification and support
- Provision of equity ownership opportunities
- Identifications of skill sets, training requirements, education and job opportunities
- Comprehensive education and training programs and supporting Federal and Provincial agency involvement in the delivery of programs
- Clear mandates and performance measures
- Pilot projects to assist in training
- Provision of administrative and management support
- Post project funding for other opportunities

[16] Criteria/measures were also derived from the review of Quebec Hydro's approach to Eastmain and Rupert Diversion Project and Nalcor's Lower Churchill River Hydroelectric Project outlined in section 6 of this report, and further defined by TyPlan based on experience with First Nations involved in hydroelectric facility developments in British Columbia.

The historic development of MH hydroelectric facilities in northern Manitoba (the construction of the Limestone Generating Stations (LGS), Long Spruce (LSGS) and Kettle (KGS), provides insight into and context to, the establishment of the benefit agreements with First Nations that have been established for KGP. Historic agreements that have influenced MH approach to First Nations include:

- Northern Flood Agreement[17]
- Burntwood Nelson Agreement[18]
- Adverse Effects Agreements[19]

3.5.1 The Joint Keeyask Development Agreement

In June 2008, the Joint Keeyask Development Agreement (JKDA) was ratified by Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation, and York Factory First Nation. The Keeyask Cree Nations collectively have the right to own up to 25 percent of the partnership, with 75 percent remaining with Manitoba Hydro.

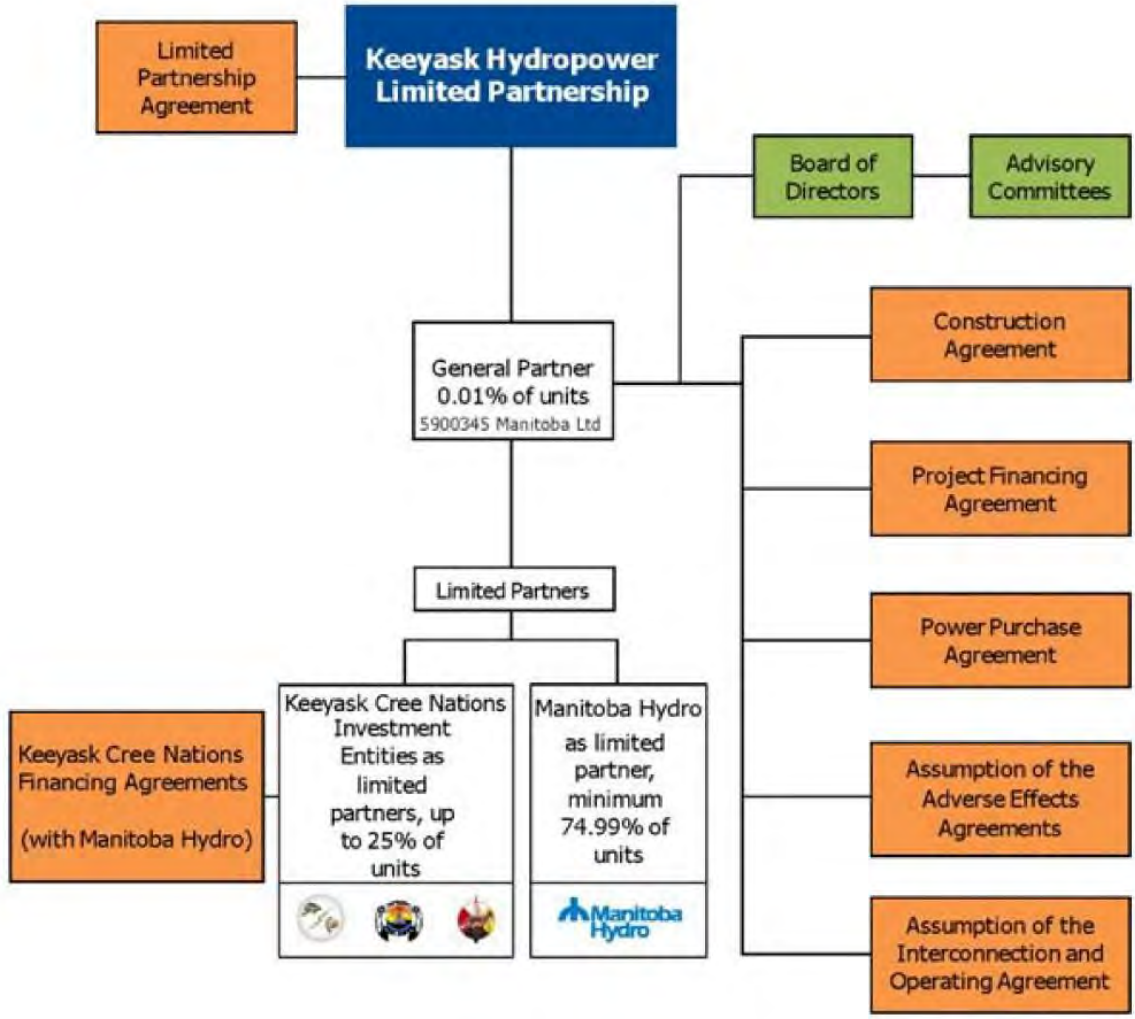
The JKDA lays out the terms of the partnership through which Manitoba Hydro and the four First Nations would become co-owners of and investors in the KGS. The JKDA sets out the rules for how the partners would invest and receive revenues. The JKDA also sets out provisions for training and employment business opportunities, the construction and operation of the project, and environmental monitoring. The business partnership created through the JKDA is the Keeyask Hydropower Limited Partnership (KHLP). The KHLP governance structure is illustrated below:

[17] Northern Flood Agreement Adverse effects to First Nations in the early 1970's by flooding arising from hydroelectric projects on the Nelson, Churchill Rivers and by the Lake Winnipeg Regulation Project were considered in the Northern Flood Agreement (NFA). To compensate First Nations for such adverse effects the Manitoba NFA and an accompanying Economic Development Agreement (EDA) was signed in 1977. Parties to the agreement included Canada, the Province of Manitoba, Manitoba Hydro and the Northern Flood Committee Inc. (NFC), an Aboriginal corporation acting on behalf of the five affected First Nations (Cross Lake First Nation, Nelson House - now Nisichawayasihk Cree Nation, Split Lake - now Tataskweyak Cree Nation, York Factory First Nation and Norway House Cree Nation).

[18] Established in 2005 the Burntwood Nelson Agreement (BNA) is a collective agreement between Hydro Projects Management Association (HPMA), representing contractors and the allied Hydro Workers of Manitoba, namely unions which sets out terms of employment for all workers including aboriginal peoples who work on northern construction projects. While many provisions exist in the BNA one important provision is the preference for, on all major northern hydro projects, will be offered to northern aboriginals who register with the job placement referral agency for the Keeyask project. The Job Referral Service is set up by the Provincial governments Entrepreneurship, Training and Trade (ETT) branch, and can be submitted at one of 17 of Employment Manitoba's 17 centers across the Province. A complete listing of jobs covered by the BNA is outlined on MH's web site.

[19] Individual adverse effects agreements with four first Nations have been signed. These agreements identify potential negative impacts of the Keeyask Project, and outline measures to prevent or reduce these effects. Where adverse effects cannot be avoided, offsetting measures are being pursued or compensation will be provided.

Exhibit 10: Keeyask Hydropower Limited Partnership Governance Structure



Source: Joint Keeyask Development Agreement Summary for members of York Factory First Nation

The general partner (Manitoba Hydro) is the entity that will have management and control over the Keeyask Project, awarding work contracts coordinating construction and ultimately operating the Keeyask Project. The general partner only owns 0.01% of the KHLP and is owned and controlled by Manitoba Hydro. Ownership is as follows:

- Manitoba Hydro 75% ownership;
- CNP 15% ownership;
- YFFN %% ownership; and
- FLCN 5% ownership.

The KCN's have the opportunity to negotiate up to $203.1 million of direct negotiated contracts (DNC) related to the Keeyask project.[20]

3.5.1.1 Keeyask Infrastructure Project

The Keeyask Infrastructure Project, which forms part of the JKDA commencing in early 2012, will consist of work on access road construction and camp development. This would enable a timely and efficient construction of the KGP based on the lessons learned from Wuskwatim (refer to Section 2).

The Keeyask Infrastructure Project is being undertaken to achieve the following objectives to:

- Provide early business opportunities for the Keeyask Cree Nations;
- Provide early and more employment opportunities for First Nation members, northern Aboriginal people and other northern and Manitoba workers;
- Provide more time for Cree Nation businesses to develop their management capabilities; and
- Accelerate investment to support the promotion of sustainable growth in the Province of Manitoba.

The Keeyask Infrastructure Project will provide an estimated 184 person years of employment over an estimate three-year period beginning the summer of 2011.

3.5.1.2 Training

The First Nations project partners are receiving pre-project training dollars through the Hydro Northern Training and Employment Initiative (HNTEI), established in 2004.Developed to support construction at Wuskwatim and Keeyask, Manitoba Hydro, Provincial and Federal Governments funded a $60 million dollar pre-training initiative.

During the period 2001 to 2010, the KCN's received $33.75 million of these funds to train their members.[21]

The results compiled by MH in the environmental impact statement suggested that[22]:

- 1402 trainees participated in 3272 training activities.
- 627 individuals completed project-related trades or occupational training.
- Of the 627, there are 13 carried journeypersons, 135 active apprentices and 97 pre-apprenticeship trainees.
- Aboriginal partners report 267 individuals employed in jobs related to training completed as well as other occupations.

3.5.1.3 Construction Jobs at Keeyask

A target of 630 person years of employment for members during construction has been identified within the JKDA.[23]

[20] Source: Joint Keeyask Development Agreement Summary for members of York Factory First Nation

[21] Needs for and alternatives to; Appendix 2.3 - Joint Keeyask Development Agreement - Benefits Summary

[22] Source Keeyask Environmental Impact Assessment Public consultation round 1 (http://www.hydro.mb.ca/projects/keeyask/panels_round_one.pdf)

[23] Needs for and alternatives to; Appendix 2.3 - Joint Keeyask Development Agreement - Benefits Summary

3.5.1.4 Monitoring

Under the JKDA two advisory committees have been negotiated designed specifically for the Keeyask project these include:

- Advisory Group on Employment (AGE)
- Construction Advisory Committee (CAC)

AGE has been negotiated under the BNA. Its aim is to increase the numbers of Keeyask Cree employed in the Keeyask Project. CAC was established o inform workers on issues and provide updates related to construction on Keeyask inclusive of upcoming contracts.

3.5.2 Manitoba Hydro's Ability to Support Northern and Aboriginal Community based Economic Development

MH's ability to satisfy meet the criteria/measures identified in Section 3.5 is summarized below.

Table 8: Northern and Aboriginal Community based Impacts

Criteria/measures	Manitoba Hydro Responses	Has Manitoba Hydro satisfied criteria/measure (Yes ☑ / No X)
Proactive approach to engagement	Aboriginal community engagement with Manitoba Hydro has been on-going for 40 years, from the Northern Flood Agreement, the Burntwood Agreement, Adverse Effects agreement and the Joint Keeyask Development Agreement (JKDA). The JKDA clearly defines the terms of the partnership through which Manitoba Hydro and the four first Nations would become co-owners of and investors in the Keeyask project. The JKDA sets out the rules for how the partners would invest and receive revenues. The JKDA also sets out provisions for training and employment business opportunities, the construction and operation of the project, and environmental monitoring.	☑
Establishment of benefit agreements	The JKDA as well as Adverse Effects Agreements have been signed with four First Nations affected by Keeyask Project. Each First Nation has signed the JKDA.	☑
Community ratification and support	Community ratification of the JDKA was achieved in 2009.	☑
Equity ownership	Equity ownership has been provided under the terms the JKDA.	☑
Identification of skill sets training, education and jobs	The JKDA sets out job opportunities. Targets for construction and operations are established.	☑
Comprehensive education and training programs with federal and provincial agency involvement	Jobs training and education has been coordinated with a variety of Federal and provincial agencies involved in the delivery of such programs. Hydro Northern Training and Employment Initiative (HNTEI) is one such example.	☑
Clear mandate and performance measures	JKDA sets out mandates and performance measures for the Keeyask Project.	☑
Pilot projects to assist in training workers	The Keeyask Infrastructure Project (KIP) represents such a pilot project enabling First Nations to gain employment, establish businesses related to various contracting and service opportunities.	☑
Provision of management and administrative services	Under the JKDA Manitoba Hydro is providing administrative and management support.	☑
Post project funding for other project opportunities	This represents a follow up activity related to overall approvals.	☑ (Monitoring of performance of the above should be emphasized).

Source: TyPlan

Observations:

The historic agreements between First Nations, MH, the Province and Federal government pertaining to past hydroelectric development projects has provided a context upon which MH has pursued and secured agreements with affected First Nations (e.g., JKDA). MH has been proactive at creating and securing relationships and legal agreements investing considerable time and effort in establishing such agreements. The identification of skill set requirements, job opportunities and the provision of training and education has been coordinated with other Federal and Provincial agencies to optimize opportunities. A pilot project in the form of Keeyask Infrastructure Project (KIP) enables First Nations to deliver on such benefits. The JKDA has clear mandates and performance measures related to jobs and training requirements. MH has also provided both administrative and management support to as part of the JKDA, to ensure project success. First Nations have also been provided ownership opportunities in the Keeyask Project.

The above represent aspects of industry best practices that MH has not only met but exceeded. On-going and post project monitoring regarding the success of this approach should be undertaken to ensure lessons learned are incorporated into future projects.

3.6 Community Access Improvements Related to Health, Education and Culture

Community access improvements and their implications (environmental setting, effects assessment, mitigation, and residual effects) related to health, education and culture are discussed in the following sections of the Environmental Impact Statement (EIS) for the KGP:

- Socio-economic Environment Resource Use and Heritage Resources, Section 3: Economy.
- Socio-economic Environment Resource Use and Heritage Resources, Section 4: Population and Infrastructure.
- Socio-economic Environment Resource Use and Heritage Resources, Section 5: Personal Community and Family Life.

Each volume comments upon communities within the local study area (inclusive of Keeyask Cree Nations, Thompson and Gillian). The construction of the access road forming part of the KIP, designed as a two lane gravel road, will remain in perpetuity and establish improved access to Tataskweyak First Nation, the Keeyask Generating Station site and Gillam, as well as Fox Lake Cree Nation (immediately west of Gillam) and to York Factory First Nation, War Lake First Nation to the south of the Nelson River.

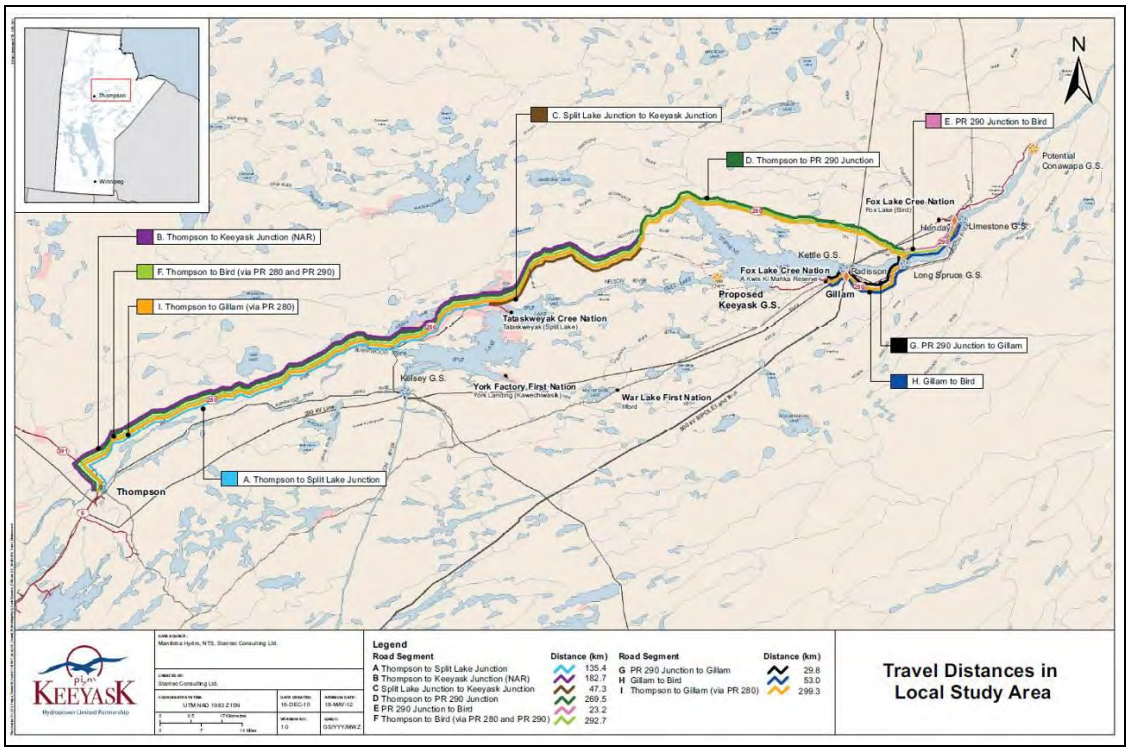
Correspondingly, improved access can create both positive and negative effects to aspects of health, education and culture. Education and training is discussed in Section 3.5.

3.6.1 Community Access

The main access route to the site would be via the North Road access road, which is being constructed under the KIP, in advance of the KGP. The north access road would be a two-lane all weather gravel road, meeting the Ministry of Infrastructure and Transportation (MIT) standards, starting at kilometer 174 on Provincial Road (PR) 280 approximately 185 km east-northeast from Thompson, and extending 25 km east to the north shore of Gull Rapids, the site of the KGP.

The potential effects of transportation infrastructure within the local study area would include increased use of rail, air, and road networks related to the transportation of people, equipment and materials to the Project site. No effect on transportation infrastructure is expected as a result of project construction. Post construction improved accessibility and reduced travel times to and from the local study area communities would result.

Exhibit 11: The Keeyask Infrastructure Project Access Road



Source: Socio-economic environment, Resource Use and Heritage Resources, Section 4, Figure 4.1

The proposed access improvements represent an overall benefit to the area communities providing a safer and more direct road transportation route to Gillian via Thompson and vice versa.

3.6.2 Community Health

The EIS Section 5: Personnel, Family and Community and Family Life, discusses MH approach to community health. The effects of which were discussed for both the construction and operation phases of the project in accordance with standard environmental assessment practices. The EIS provided an environmental setting (baseline); environmental effects assessment and mitigation; and summary of residual effects.

Specific to community health, the health of individuals, families and communities is shaped by a variety of factors or determinants of health, which include the social and economic environment, the physical environment and a person's individual characteristics and behaviors[24]. Community health in context to the environmental impact assessment prepared by MH goes beyond the absence of disease and considers a more holistic perspective. The EIS notes that from a Cree perspective, health has as much-to-do with social relations, land, and cultural as it does with individual physiology and disease. This is similar to the current day perspectives on population health research, with a focus on broad social and economic determinants, and the interaction with and impacts on health.

Community health issues directly associated with Project construction, as identified in the EIS, included water quality, community well being, and health services. Operational effects included mercury and human health, water quality, community well-being.

[24] World Health Organization (http://communityhealth.ku.edu/publications/publications.shtml)

The EIS provides a detailed and comprehensive assessment of the issues, potential effects and mitigation to address such issues. From a residual effects perspective increased demand for community health and social services was identified and mitigation inclusive of monitoring health and safety service levels; and the provision of health and safety services at the construction site were defined. MH has committed to working with other government agencies to manage this concern going forward.

Observations:

Manitoba Hydro has been proactive in identifying health issues based on the Cree perspective of community health and has identified appropriate mitigative measures, inclusive of on-going monitoring.

3.6.3 Cultural Benefits

Culture and spirituality according to Cree definition represents a composite of values, beliefs, perceptions, principles, traditions and worldviews that are based on individual and collective history experiences an interpretation. Cultural indicators include worldview, language, traditional knowledge, cultural practices, health and wellness, kinship, leisure, law and order and cultural products.

As part of the effects assessment reference is made to the JKDA, adverse effects agreements, employee retention and support services, highlighting the approach MH has taken to identify and understand Cree values and beliefs and engaging First Nations in the assessments.

The report considers the potential effects of in-migration to the communities, increased alcohol abuse, housing demand and potential pressures of local employees moving to work at the KGS. The creation of the construction camp in proximity to the KGS, at a distance from First Nation communities to the construction site, represents one mitigative measure to reduce potential interactions, as well as other mitigative measures that were identified limiting residual effects. Critical to the success of mitigation will be the on-going monitoring. Investment income generated as a result of the JKDA, equity partnership in the project also highlights MH attempts to address such issues (refer to Section 2 of this report).

It is further noted that the under the terms of the Burntwood Agreement, Adverse Effects Agreement and the JKDA proactive measures has be established to address concerns.

Observations:

Manitoba Hydro has been proactive in identifying cultural issues, appropriate mitigation and on-going monitoring.

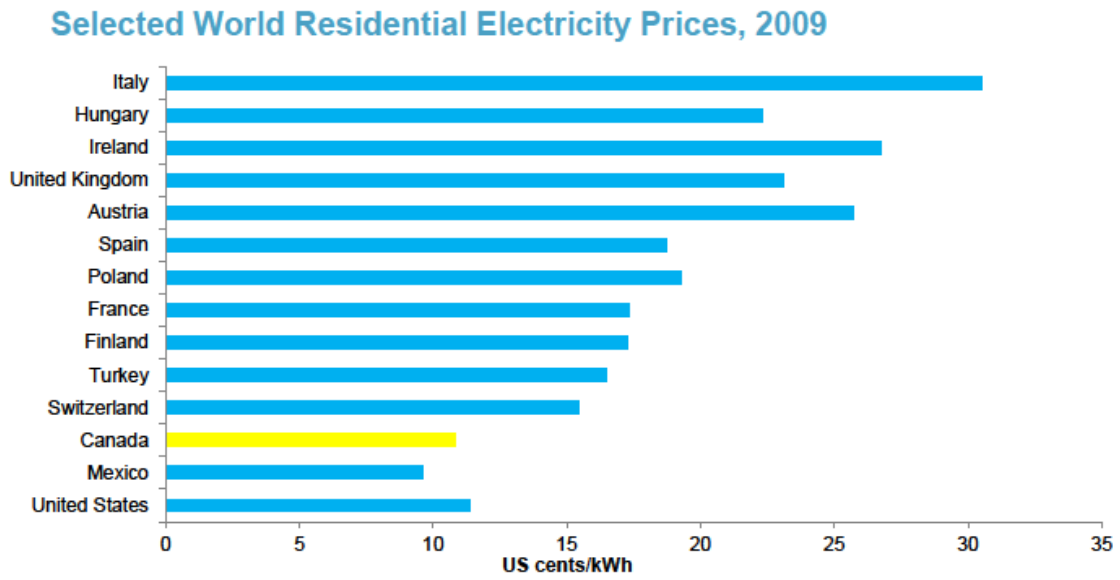
4 ECONOMIC DISPLACEMENT IMPACTS AND EFFECTS ON CONSUMER SPENDING

This section considers the economic displacement impacts and effects on consumer spending to the extent consumers will face increased electricity rates as a result of the PDP. Specifically, this section provides an overview of residential electricity prices in other countries relative to Canada, provincial utility rates relative to each other, and recent literature on proposed rate increases throughout Canada as context regarding current status and trends. The section concludes with a literature review of the effects of increasing utility prices (outlined in trends) on consumer spending, identifying those most affected (displaced) by such increases, and the key initiatives to reduce such effects, namely energy reduction and efficiency measures.

4.1 Review of Global, Canadian and Provincial Electricity Rates

4.1.1 World Electricity Rates

The Canadian Electrical Association (CEA) provides insight into Canadian electricity pricing. Based on selected world residential electricity prices in 2009, Canada benefits from some of the lowest rates, resultant from the historic capital investments associated with major hydroelectric projects in renewable energy. [25]



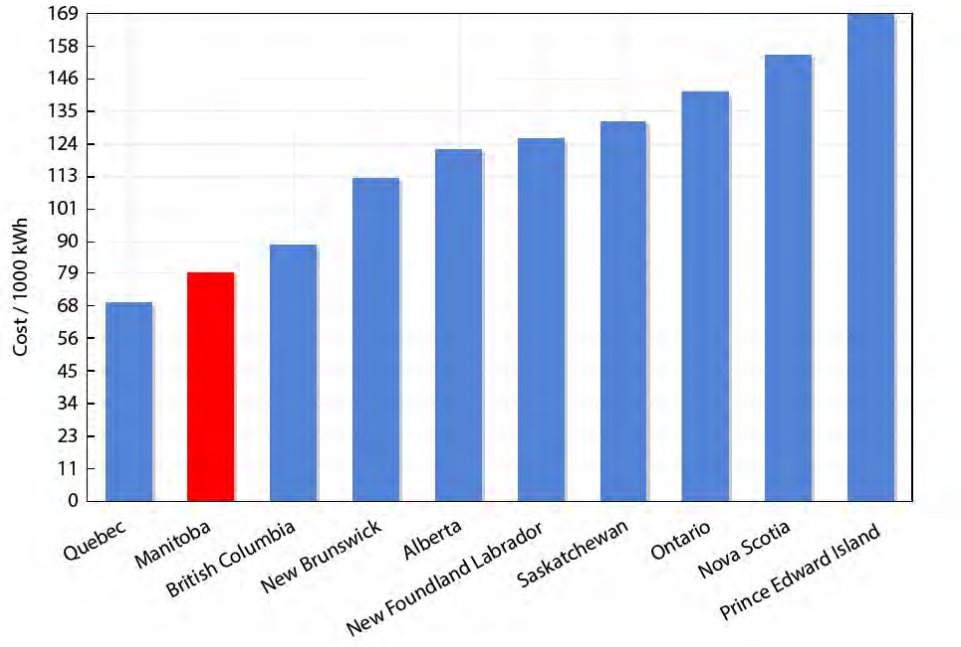
Source: Canadian Electricity Association: Electricity Pricing - An Introduction to Canadian Electricity Rates
Source for Canada: Hydro Québec, Comparison of Electricity prices in Major North American Cities 2009
Source for rest of the world: International Energy Agency Key World Energy Statistics 2009

[25] Canadian Electricity Association Power Point presentation: Energy Pricing An introduction to Canadian Electricity Rates

4.1.2 Provincial Utility Rates Overview

Correspondingly, provinces throughout Canada have low rates. The provinces associated with historic hydroelectric developments namely; Manitoba, Québec and British Columbia, exhibit the lowest rates. The chart below shows the average monthly electricity bill by province for 1,000 kWh of electricity consumption (which is typically about what most households use) as of May 1, 2013.

Exhibit 13: Domestic Electricity Rates across Canada based on 1,000 kWh Consumption per month as of May 2013



Source: Ontario Hydro http://www.ontario-hydro.com/index.php?page=electricity_rates_by_province

4.1.3 Current Rate Applications in Canada

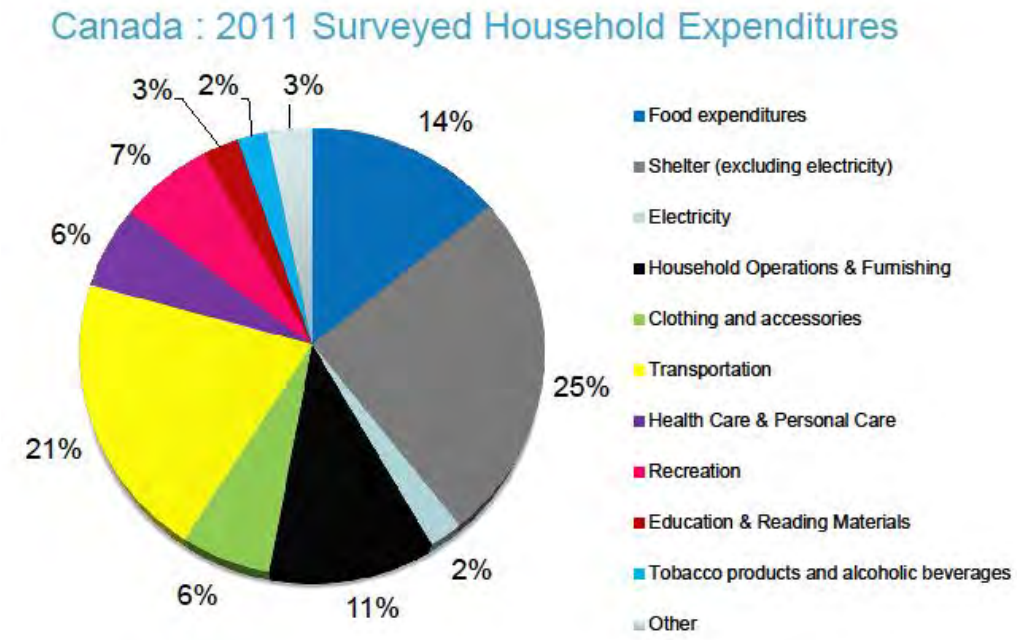
Rates are overseen by each province's respective regulator authority (e.g., Provincial Energy Board or Public Utility Board), and in most provinces prices are set by the electricity regulator. Any changes in rates require the electric utility to submit applications and seek regulatory approvals. As a result, prices in these jurisdictions are adjusted periodically and are not immediately affected by market conditions. A number of the more common reasons for rate increase applications include:

- Replacement of aging infrastructure;
- Inflation;
- Higher cost of new contracted/constructed generation; and
- Upgrades and expansions to infrastructure.

The state of the economy also plays a part in electricity pricing as economic downturns can put downward pressure on pricing due to decreased demand. For example in Nova Scotia, in which reduced payments from the economically struggling pulp and paper industry (key industrial users whom generally consume significant energy) has recently been noted. In Manitoba, the net income fell on lower export revenues. As noted the economic deterioration reduced the need for power demand in the US and low natural gas prices contributed to lower US electricity rates, resulted in a decrease in the volume and price of Manitoba electricity.

The Canadian Broadcasting Corporation (CBC) undertook a study of provincial utilities' power-purchase agreements and financial statements that indicated that the average cost per kilowatt-hour countrywide will rise more than 50 % by 2020. The article indicated that BC Hydro has raised its rates 7.3 per cent last year and has announced it will seek an additional 30 per cent hike over the next three years. The Ontario government declared that the province's rates would rise 46 per cent by 2015.[26]

The potential effects of such proposed rate increases on households require an understanding of household spending expenditures. Based on 2011 Surveyed Household Expenditures, electricity accounts for 3% of total household expenditures.



Source: Statistics Canada, CANSIM 203-0021 Survey of household spending, retrieved April 10 2013

* total current consumption excluding income taxes, personnel insurance payments and pension contributions, gifts of money alimony and contributions to charity

Observations:

Canada has one of the lowest electricity rates in the world and Manitoba has one of the lowest utility costs in Canada. Literature suggests that such rates are resultant from the historical investment in major hydroelectric developments, notably those in Manitoba, Québec and British Columbia. Aging infrastructure, refurbishment, new construction, inflation and higher costs to produce electricity, are cited examples of increasing rate pressure. The majority of provincial electricity utilities throughout Canada are seeking rate increases. Continued upward pressure is expected on rates in both the short and medium term throughout Canada and the world.

[26] Electric shocker: Power prices set to rise sharply Zach Dubinsky, CBC News Posted: Mar 30, 2011 6:04 PM ET Last Updated: Mar 31, 2011 1:09 PM ET

4.2 Review of Increased Energy Costs on Consumers

A high level literature review was undertaken of selected documents pertaining to the impact of increased energy costs on consumers and their spending patterns. Much of the available literature in North America on-line focuses on the impact of rising gasoline or oil prices on consumer spending, rather than the impact of increased home energy (electricity) costs. Specific quantitative evidence regarding the effect of increasing household electricity bills is not evident; however the findings identify the socio-economic characteristics of those most affected households.

The impact of increased energy prices will vary significantly by household income, with high-income households being the least impacted and low-income households and those on fixed incomes such as low-income seniors, being the most impacted.

High-end retailers will be less impacted than low-end retailers as high-income households will still spend on discretionary items, as increased energy costs can be absorbed by households through higher disposable income and savings. Spending by middle income households may be decreased as a result of higher energy costs through less discretionary spending and substitution toward lower cost goods, particularly groceries, and curtailing the purchase of non-essential goods, dining out and entertainment. In case of studies on the impact of increased gasoline costs, it was estimated that a 25% increase in gas prices would cut the net cost of price paid by grocery item by 2-3% due to consumer substitution of usual grocery products toward promotional items.[27] Other retail categories most impacted for middle-income households are less essential goods such as sporting goods, clothing, and personal care items.

Spending by low income households will be the most impacted segment of consumer spending as their income is often inadequate to cover basic needs, which may result in the choice being made between spending on groceries, other essentials or heat.

The overall impact to the retail sector at a community level will depend on the income distribution in the community, energy costs, consumption, and needs (which will differ by climate), and programs available to offset the costs for low income households.

Aside from energy costs relative to income, other key variables in the level of impact are energy efficiency programs related to demand side management (e.g., Power Smart) as well as initiatives by households toward increasing energy efficiency of their homes and use of energy during off peak hours.

The table below provides a summary of the literature review, considering studies by major banks, US studies, Canadian energy poverty groups, and literature from jurisdictions with high-energy costs and an example from South Africa.

[27] CIBC Economics: Consumer Watch Canada' Sucking Energy Out of Households' April 2011 http://research.cibcwm.com/economic_public/download/cw-20110411.pdf

Table 9: Review of the Effects of Increased Energy Costs on Consumers

Report	Observations	Conclusions
CIBC Economics - Sucking Energy Out of Households'[28]	The conclusions of the report confirms that the impact will vary by income and are consistent with studies focusing on the impacts of rising home energy costs "Higher-income households are better able to absorb the increase in energy spending without much sacrifice to their non-energy spending." In other words, the extra cost is largely borne by their savings. But low and middle-income Canadian consumers are less likely to do so because energy represents a much larger share of their overall spending. For example, low income households spend more than twice as much of their income on energy as do high-income households. That suggests that high-end retailers will bode better in this environment compared to low-end retailers that service low to medium income households."	CIBC was contacted to determine if they had done any recent analysis on the impact of home energy prices (response was no, and "although power prices have risen in some jurisdictions, overall energy inflation has been much quieter of late".)
Scotiabank Group - Global Economic Research - report in 2011 "Energizing Household Energy Efficiency"[29]	The report notes that there is an on-going urgency to reduce household energy consumption because of the discernible upward trend in the price of energy. The report states: "Energy costs have, on average, outpaced the general rate of inflation since the 1980s, and increasingly so over the past decade. From the perspective of households, reducing energy consumption, or at least slowing its rise, could generate significant long-term cost savings. It would also reduce the sensitivity of household spending to future energy price shocks".	The report concludes that substantial progress has been made in improving household energy efficiency. However, more needs to be done, especially with energy usage and pricing on the upswing. Rising energy prices should help speed more efficiency gains in the future, generating long-term cost savings for households."
American Coalition for Clean Coal Energy report "Energy Cost Impacts on American Families, 2001-2012[30] [31]	The report noted that there is a disproportionate impact on low income households. "Lower-income families are more vulnerable to energy costs than higher-income families because energy represents a larger portion of their household budgets. Energy is consuming one-fifth or more of the household incomes of lower and middle-income families, reducing the amount of income that can be spent on food, housing, health care, and other necessities".	The report confirms that the key vulnerable segments are fixed income seniors and minorities due to their relatively low incomes
Canadian Energy Poverty Groups [36] Wellington and Guelph Task Force for Poverty Elimination[32]	Various academic and community groups have written about' energy poverty' – definitions vary by group but it is often defined as being when a household spends more than 10% of its after tax income on energy costs. In a recent report by the Wellington and Guelph Task Force for Poverty Elimination[33], several supporting studies are referenced. Key findings of the study are: "energy poverty affects about 1 million households in Canada, forcing many to choose between	The report concluded that Municipal, Provincial and Federal governments all have an integral role to play in eliminating energy poverty".

[28] http://research.cibcwm.com/economic_public/download/cw-20110411.pdf

[29] http://www.scotiabank.com/ca/en/files/11/09/Energizing_Household_Energy_Efficiency.pdf

[30] http://www.americaspower.org/sites/default/files/Energy_Cost_Impacts_2012_FINAL.pdf

[31] American Coalition for Clean Coal Energy 'Energy Cost Impacts on American Families, 2001-2012, Feb. 2012 http://www.americaspower.org/sites/default/files/Energy_Cost_Impacts_2012_FINAL.pdf

Report	Observations	Conclusions
	heating their homes and buying groceries; energy poverty is expected to rise without intervention as the result of rising energy costs which are expected to increase 6.7 to 8 percent annually over the next five years; energy poverty directly and indirectly impacts resident's health and can result in disconnection and eviction leading to homelessness; energy poverty can be eradicated by increasing income, regulating energy pricing and improving energy efficiency of homes.	
Literature from Jurisdictions with High Energy Cost Increases	There are a lot of examples of reports and studies in jurisdictions hard hit by energy costs increases. Examples: Canadian Centre for Policy Alternatives: 'Energy Cost Politics and the Environment in Nova Scotia'; Ecology Action Centre Recommendations for Nova Scotia Energy Policy 'Energy Affordability vs. Rising Electricity Costs'; Environmental Law Centre, University of Victoria: 'Conserving the Planet without Hurting Low Income Households', etc.	
The Impact of Electricity Price Increase and Eskom's six-year Capital Investment Program on South African Economy[34]	Eskom is a South African electricity public utility established in 1923 as the Electricity Supply Commission (ESCOM) by the government of South Africa under the terms of the Electricity Act (1922). Eskom operates a number of notable power and nuclear stations. The company is divided into Generation, Transmission and Distribution divisions and together Eskom generates approximately 95% of electricity used in South Africa.[35] Generally speaking the report suggests that electricity price hikes have, by and large, a negative impact on the South African economy whereas extensive capital investment in hydroelectric developments leads to positive outcomes in both the short (employment) and long term from an economic development policy perspective. [36]	Eskom has put in place measures that will soften the burden on the poor, namely the Inclining Block Tariff (IBT).

[32] Guelph and Wellington Task Force for Poverty Elimination, Energy Poverty, May 2011 http://gwpoverty.ca/wp-content/uploads/2011/06/Energy-Poverty.pdf

[33] (www.gwpoverty.ca)

[34] Pan-African Investment and Research Services the Impact of Electricity Price Increase and Eskom's Six-Year Capital Investment Programme on the South African Economy (May 2011)

[35] Wikipedia http://en.wikipedia.org/wiki/Eskom

[36] In countries in which the energy sector remains an integral part of infrastructural development to support economic development (e.g. hydroelectric intensive industries like mining), sets the foundation for broad based sustainable long term economic growth and development.

It is apparent in South Africa's case that the current and future growth of the economy is also tied to sufficient and reliable energy availability and equitable access to it.

The report suggests a bi-directional causal relationship between GDP and energy production (GDP determines the level of energy produced and vice versa) and it is argued that the prosperity of the country is dependent on efficient and sustainable supply of and distributions energy. Simply stated, availability of energy is a pre-condition of growth. An increase in electricity pricing that is in general considered sudden and substantial increases (e.g., Manitoba Hydro's short term price increases) leads to disruptions for many businesses that had not anticipated sharp increases. Businesses that are at the margins of profitability cannot absorb substantial cost increases, be it electricity or otherwise. For such firms it is not the increase per se that matters, rather it is the quantum increases in the short term that leaves them with no degrees of freedom to absorb the production cost increases.

However increasing electricity rates based on capital investment does have distinct benefits, as increases establish the platform for sustainable and reliable power, helps set electricity prices at cost-reflective levels, creates economic stability over the longer term via sustainable use of resources and opens up other opportunities for alternative energy options.[36]

Observations:

The economic displacement effects of increasing rates identify that the lower income households, seniors with limited incomes will be most impacted, whereas the middle and upper class will adjust spending habits via savings or disposable income. The literature does not quantify the magnitude of potential effects, but confirms that federal, provincial and local programs (including utilities), designed to reduce the effects of increased energy prices on low-income households and the poor is the preferred solution. This solution is directed towards energy efficiency and reduction initiatives.

4.3 Energy Efficiency and Reduction Initiatives

The challenges of increasing energy costs are being faced by jurisdictions across Canada, the USA, Europe, and beyond. The focus of addressing this challenge is on initiatives to increase energy efficiency and reduce waste, which will have the effect of lowering the cost of energy for households, and on developing new methods to ensure energy affordability for those groups most impacted by rate increases. Both MH and British Columbia Hydro have a on-going programs designed to enable users to conserve and reduce energy demand. An overview of some of the strategic directions of other jurisdictions is provided in the table below.

Table 10: Literature Review of Energy Efficiency Programs and Reduction Initiatives

Province or Territory	Report / Program	Conclusions
Nova Scotia	Ecology Action Centre for Nova Scotia Energy Policy, as documented in the 2013 report 'Energy Affordability vs. Rising Electricity Prices'[37]	Key conclusion is that 'energy cost security will not be provided via lower prices, but by providing universal access to energy efficiency services and renewable energy generation opportunities… a new social bargain whereby government, citizens, and industry agree to respond to rising energy prices by developing new methods of ensuring energy affordability". "The best way to address energy security (i.e. affordability for low income households) is to implement a Universal Service Program that directly addresses energy cost security by making energy costs affordable to low income households. The target should be households whose total energy costs exceed 6% of income or whose electricity costs exceed 3% of income with an income cap." Recommendations pertaining to implementing an energy cost relief program for targeted low income households; developing a relief program to deal with arrears; fund crisis intervention assistance; and expansion of efficiency programs for low income households.
British Columbia	A report 'Conserving the Planet Without Hurting Low-Income Families: Options for Fair Energy-Efficiency Programs for Low-Income' by the University of Victoria. The report focuses on the importance of energy efficiency programs as a way to decrease energy costs[38]	Based on a review of various programs and related literature on low-income programs yields, the following best practices for low-income energy efficiency programs (LIEEPs) were identified in that paper for consideration in British Columbia: "A central energy-efficiency body should oversee, fund, and monitor household energy efficiency programs and low-income energy efficiency programs; LIEEPs should be comprehensive, addressing all savings opportunities, including household behaviours, and serving all fuel types; LIEEPs should also have mechanisms in place to provide basic health and safety upgrades where needed; all housing types, including rental and mixed-occupancy/mixed-use buildings, should be eligible for LIEEPs; LIEEP elements should be consistent with target populations, such as renters and minority groups; income criteria for participation in LIEEPs should be simple and consistent with other low income programs; and LIEEPs should be delivered by and in partnership with trusted non-profits and community organizations to improve outreach, participation, and delivery; develop partnerships with other governments and organizations to leverage funds and services, and where possible, pool resources and minimize delivery costs." Other recommendations are outlined in above noted report.
Ontario	The Low-Income Energy Assistance Program (LIEAP) was developed by the Ontario Energy Board (OEB) and has three	Households are eligible if they meet the Statistics Canada determination of low-income levels along with additional 15% thresholds.

[37] Ecology Action Centre Recommendations for Nova Scotia Energy Policy 'Solving Nova Scotia's Electricity Pricing Problem: Energy Affordability vs. Rising Electricity Prices, August 2013 http://www.ecologyaction.ca/energy_policy_reports,http://www.ecologyaction.ca/files/images/file/Energy/SolvingNSElectricityPricingProblem_LoRes.pdf

[38] Environmental Law Centre, University of Victoria, Conserving the Planet without Hurting Low-Income Families: Options for Fair Energy-Efficiency Programs for Low-Income Households, April 2010

Province or Territory	Report / Program	Conclusions
	components to assist low-income customers:[39] • emergency financial assistance fund; • targeted conservation programs; and • more flexible customer service rules.	These vary by community size to take into account the higher cost of living in large communities. For example, a 3-person household with a pre-tax family income of $28,651 in rural areas would qualify for the program. This increases to a pre-tax income of $41,622 in a community with a population of 500,000 or over. Information on the program is available at: http://www.hydroone.com
Manitoba	The practices of Manitoba are reviewed in a report to identify and quantify among the provincial programs that build on federal funding The report concludes Manitoba has been a leader through its collaborative, community-based LIEEPs. Successful pilot projects in Winnipeg and Brandon drew on provincial and federal funding, as well as support from Manitoba Hydro and non-profits". [40]	Manitoba Hydro has established a number of programs and loans geared towards reducing costs for qualified households inclusive of the home insulation program, refrigerator retirement program, water and energy saver program, Pays Financing, First Nations program, and the On-going residential loan and Affordable Energy Program. The affordable energy program is intended for homeowners and renters on limited incomes to save money via energy efficient upgrades. Programs are also available for commercial and industrial users.

[39] Ryerson University, Centre for Urban Energy: Roundtable Series 2012 – Electricity Prices: How Will Consumers Manage, June 2012: http://cue.ryerson.ca/publications/Roundtable_1_Electricity%20Prices.pdf

[40] http://www.hydro.mb.ca/savings_rebates_loans.shtml

Observations:

Energy efficiency and reduction initiatives have been identified and are supported by utilities throughout Canada, to reduce the burden on those socio-economic classes most affected by rates increases, low income households, citizens and elderly on fixed income. MH has established a number of programs and loans geared towards reducing costs for qualified households inclusive of the home insulation program, refrigerator retirement program, water and energy saver program, First Nations program, and the on-going residential loan and Affordable Energy Program. The affordable energy program is intended for homeowners and renters on limited incomes to save money via energy efficient upgrades.[41] *Programs are also available for commercial and industrial users.*

While such programs are prudent, continued effort and focus should be considered to ensure such programs, and related benefits are optimized in Manitoba in relation to the proposed rate increases outlined in the PDP, specifically referencing those most impacted, low income households and those on fixed incomes.

[41] http://www.hydro.mb.ca/savings_rebates_loans.shtml

5 SOCIO-ECONOMIC IMPACT OF KEY ALTERNATIVE SCENARIOS

This section evaluates the socio-economic impact of key alternative scenarios identified in Chapter 13 of the NFAT focusing on the reasonableness of the assumptions made (Section 5.2), and high-level comparison table between the PDP and alternatives (Section 5.3).

Manitoba Hydro undertook a Multiple Account Benefit Cost Analysis (MA-BCA) of Manitoba Hydro's PDP compared to a number of the alternative plans.

MA-BCA is different than Economic Impact Assessment (presented in Section 3).[42] Traditional cost-benefit analysis is a standard method economists use to assess the net benefits of alternative plans, projects or programs from a broad social perspective. Such analysis takes into account both the positive (advantages) and negative (disadvantages) of the alternatives, inclusive of social and environmental consequences[43]. The MA-BCA varies from traditional cost-benefit analysis, as it recognizes acknowledges non-monetized advantages/disadvantages to calculate the bottom line. A unique aspect of MA-BCA is that it also provides an assessment of the nature and distribution of those benefits and costs over time.[44]

Specific to MH's evaluation of the broader socio-economic benefits, the following accounts have been assessed:

- Market Valuation
- Manitoba Hydro Customer
- Manitoba Government
- Manitoba Economy
- Environment
- Social
- Risk

Each account, its purpose, the type of analysis undertaken, and indicators are provided below. It is noted that the environmental account is not included in this review as it is dealt with outside of this scope of work.

[42] Compared to economic impact analysis that focuses on gross impacts (benefits), the MA-BCA provides a **net** measure of the benefits inclusive of project expenditures. Economic impact analysis does not consider the opportunity cost of labour and capital in the project nor does it consider the revenue generated by the project.

[43] Multiple Account Cost Benefit Analysis: A Practical guide for the systematic Evaluation of Project and Policy alternatives, University of Toronto Press 2010 pp 3-15 Marvin Shaffer.

[44] As noted in Chapter 13 and referenced by Dr. Shaffer one of the first government agencies to adopt a multiple account approach to project assessment in North American was the U.S Water Resources Council, economic and Environmental Principles and Guidelines for Water and related Land resources Implementation Studies 1983.

Table 11: Multiple Account Benefit Cost Assessment Accounts

Account	Purpose	Analysis	Indicators
Market Valuation	Net benefit to Manitoba Hydro and project partners	Incremental revenues from surplus sales less incremental capital and O@M expenditures	Present value of net revenues or cost (market variation of investment)
Manitoba Customer	Consequences for customers (rate payers) in short to medium and long term and system reliability	Rate increases required to recover costs and meet MH financial targets System reliability	Average annual and cumulative rate increases over the planning period System reliability /Load carrying capability and cost of expected unnerved load
Manitoba Government	Net benefit to taxpayers	Incremental government net revenues	Present value of incremental revenues to government
Manitoba Economy	Consequences to the economy (net employment benefits)	Employment generated and incremental income earned	Present value of incremental income
Social	Consequences to aboriginal and non- aboriginal communities and Manitoba as a whole	Benefits to project partners Benefits/ Impacts on affected communities Benefits to the people of Manitoba	Nature and significance of partner benefits Nature and extent of residual community benefits /impacts Nature and benefits to Manitoba's (Potential bequest value of remaining assets)
Risk	Nature and significance of risk	Range of possible consequences Risk mitigation potential	Options to reduce risk

Source: Needs for and alternatives To Chapter 13 - Integrated comparisons of Development Plans - Multiple Account analysis, Table 13.1 Summary of Multiple Account Framework

Observations:

Multiple Account Benefit Cost Analysis focuses on the identification of net benefits from a broader social perspective. It enables comparisons of the distributional advantages and disadvantages of various plans over the stated life cycle of the plan. MA-BCA is a standard approach to evaluate policy options.

5.1 Evaluation of Alternative Development Plans

The MA-BCA assesses the preferred and three alternative resource development plans, two of which assume no US interconnection or firm export sales (one based on gas fired thermal generation and one specific to hydro development of Keeyask) (see Table 12 below). The concept of decision pathways are introduced here as they provide MH considerable flexibility in changing the development plan as new information becomes available. Pathways and their significance are discussed at the end of this section (See Section 5.3).

Table 12: Resource Development Plans Evaluated via the Multiple Account Cost Benefit Analysis

Resource Development Plan and objective	Description	Pathway (footnote 45)
Preferred Development Plan	Development of Keeyask and related transmission for 2019/2020; Conawapa and related transmission, and the North-South network upgrades for 2025/26, New 750 MW interconnections with US from 2020/2021 New export sales with Minnesota Power (250MW from 2020-2035) and Wisconsin Power (108 MW from 2014-2021, 100MW from 2021 to 2027, and 300MW from 2026-2036) Expansion of the Northern States Power Export sale (125MW from 2021-2025). Single cycle gas thermal units to be installed after 2041.	Commitment to develop Keeyask, the 750MW interconnection and new export sales. The pathway anticipates the development of Conawapa for 2025/26.The decision on that is not required at this time, and the precise in service date could be deferred if warranted by load growth or market conditions.
The Smaller Interconnection Plan (K19/Gas24/250MW)	Combines the development of hydro generation to meet growing domestic requirements with new export interconnection and export sales in the US (only 250 MW) Construction of Keeyask and related transmission for in-service date of 2019/20 Construction of new 250MW transmission interconnection with the US with an in service date of 2020/21 New export sale commitments of 250MW with Minnesota Power from 2020-2035, 100 MW with Wisconsin Power Service from 2021-2027, and 125MW with Northern States Power from 2021-2025	Commits to the development of Keeyask and a small interconnection. What transpires after the development of Keeyask could change. One variant would be the development of Conawapa instead of gas to accommodate domestic load.
Keeyask with No Interconnection (K22/Gas)	Construction of Keeyask and related transmission with an in service date of 2022/23 New export sale commitments of 100 MW with Wisconsin Power Service from 2023-2027 New SCGT starting 2029/30 and CCCTs starting 2034/35	Commits to the development of Keeyask and abandons the opportunity for and benefits of the current new interconnection opportunity. What happens after the construction of Keeyask can change such as the development of Conawapa instead of gas plants.
Gas Thermal with non-new interconnection (All Gas)	No new interconnection, any new firm export sales with the US and would only rely on gas - fired thermal generation to meet growing load Manitoba Hydro would developed SCCTs starting in 2022/23 and Act's starting 2031/32	Abandons the development of Keeyask for the foreseeable future and the current opportunity for and benefits of a new interconnections.

Source: Needs for and Alternatives to Chapter 14, Pages 17-20

[45] The concepts of pathways recognize that the long-term development plans may be modified in the future as new information becomes available. In this sense pathways defines what is set and what adjustments to the plan may be considered after initial decisions and commitments are made following the NFAT review.

5.2 Comparative Analysis

All of the accounts (except for the environmental account) identified in Table 12 are commented upon in terms of the reasonableness of the assumptions made.

5.2.1 Market Valuation

This account assesses the net benefit or cost of the preferred and alternative plans to Manitoba Hydro and its project partners. It quantifies the incremental revenues generated by the surplus electricity supply relative to the incremental capital and operating expenses incurred, based on a net present value, assuming a certain discount rate. The evaluation is based on the economic and financial appendices as provided by Manitoba Hydro in the NFAT submission.

The key assumption effecting results is the discount rate utilized. The discount rate is a critical parameter in cost benefit analysis especially when costs and benefits differ in distribution over time. This is especially important when they occur over a long period of time.

Two general approaches to discount rates are common, each providing a range of rates:[46]

- descriptive approach based on the opportunity cost of drawing funds from the private sector; and
- prescriptive approach that derives from ethical views about intergenerational equity.

As noted the net present value of any project with future costs and benefits crucially depends on the discount rate chosen especially when the costs are born in a different time frame than the benefits received. The size of the discount rate makes an even more significant difference when benefits occur in the distant future, such as many environmental policies/programs government initiate. Hydroelectric projects are one such example.

As part of the NFAT submission a detailed rationale for the selection of the discount rate is provided. A real rate of 6% has been used in the NFAT review that reflects the social cost of capital. The use of 6% is based on research on discounting in cost -benefit analysis outlined in supporting footnotes of the NFAT. Supporting references suggest that the social cost of capital can range from 5-7.3 % (as outlined in Chapter 13 Page 5 of 74), 6% is used as the mid-point between such variations. For comparative purposes the BC Hydro Site C clean energy project assumes a real discount rate from 5.5 to 6 per cent.[47]

The K19/G24/250MW appears to represent the best plan in this account.

Observations:

The discount rate utilized for the market evaluation account is the critical factor effecting results of this account review. The 6% real discount rate chosen for the PDP, based on a social cost of capital is reasonable.

5.2.2 Manitoba Hydro Customer

This account assesses the consequences of the alternative plans for Manitoba Hydro's customers relying on the financial analysis in Chapter 11 of the NFAT, that provides estimates of the rate increases in the short to medium

[46] Valuing the Future: the social discount rate in cost benefit analysis visiting Research Paper Australian government, Dr. Mark Harrison (April 2010)

[47] Site C Clean Energy Project Information sheet cost Estimate for Site C
http://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/projects/site-c/cost-estimate-site-c.pdf

and long term that would be required to cover net system costs and meet 75:25 debt/equity ratio by the 20th year of the planning period. After year 20, the rates were adjusted each year to maintain an interest coverage ratio of 1:2.

This account also considers system reliability, defined as the ability to meet MH and industry standard reliability criteria.

Rate Impacts

Section 4 of this report provides a summary of Global, Canada wide and Provincial trends in electricity pricing and confirms continued upward pressure on rates. The rate impact undertaken under the Customer Account provides a discussion in short to medium term to longer-term impacts.

The results indicate the:[48]

- Projected cumulative rate increase by 2031/32 for the PDP would be 108% equating to a rate increase of 3.95% annually.
- Projected cumulative rate increase to the year 2031/32 for the all gas plan and small interconnection would be 90%, a 3.4% to 3.5% annual increase.
- Projected cumulative rate increase to the year 2031/32 for the Keeyask but no interconnection at 92 %, a 3.4% to 3.5 % annual increase.

The key difference between the plans is that higher rates would be needed in the short to medium term with the PDP as opposed to the long term to cover the 75:25 debt/equity ratios. After the debt ratio is achieved in year 20 there would be reduced inflationary pressure on costs. Conversely, lower rate increases would be required for the other options over the short term.

System Reliability

The different development plans are all designed to ensure MH has sufficient resources to be able to meet its peak and annual load, even under a wide range of forced outage and other contingencies. Manitoba's planning criteria for all alternatives provide for a very high degree of system reliability, and MH confirms there is a high probability of being able to meet system requirements under all contingencies.

Reliability assumes all plans are designed to meet Manitoba Hydro and industry standard reliability criteria. Loss of load expectation is the average number of days per year that the load could not be fully met. The common industry a standard is 0.1 days per year or an inability to meet system load one day every 10 years. Figure 13.2 of the NFAT review shows the estimated load carrying capability of the Manitoba Hydro system.[49]

Observations:

Manitoba currently has one of the lowest residential electricity rates in Canada. Pressure on rate increases is expected to continue throughout Canada and residential users should expect to pay for increasing rates. While the PDP has the greatest rate annual projected rate increases proposed in all plans evaluated, all plans will require rate increases (until year 20, the cumulative rate increases of all plans are not substantially different, with

[48] Chapter 13 - Integrated Comparison of Development Plans

[49] Appendix 13.1 - Reliability Evaluation confirms that Peak load carrying capability assessment shows there are some deficits in all alternatives to the Preferred Plan. In this case, the differences in the estimate of the loss of load probability and consequently load carrying capability are used to indicate the difference in the system reliability. This is measured by multiplying the expected unnerved energy by the cost of supply interruptions to calculate the differences in the expected costs of the bulk system failures. On average the Preferred Plan is able to carry approximately 10-15% more load than its alternatives.

the benefits incurring over the longer term as inflationary costs are reduced with the PDP). As the current PDP has greatest impacts on customers in the short term, one possible means of addressing this issue with rate payers would be to consider changing the 75:25 debt/equity ratio within 20 years. Rate impacts should not only be discussed, but also fully understood by Manitobans regardless of which plan is considered.

From system reliability perspective the PDP is preferred; however all of the development plans can handle load requirements under the majority of adverse conditions. The approach and assumptions are reasonable.

5.2.3 Manitoba Government

This account assesses the net benefit or cost (incremental net revenue) of the different plans to the Manitoba Government (ultimately the taxpayer). The key assumption under this account is to remove tax impacts that do not constitute incremental net revenues for government. The account identifies only direct incremental taxes and fees paid by Manitoba Hydro, net of incremental Government cost or risks. Issues pertaining to government cost or risk are dealt with under other aspects of the NFAT review.

The account provides a summary of the total payments made to government inclusive of capital tax, water rentals, debt guarantee fee, sinking fund administration fee, coal tax and potential carbon charges to derive total payments to the Manitoba government. Table 13.3 of Chapter 13 of the NFAT provides a summary of direct payments (which are substantial) for context, however such costs must be considered in relation to net benefits to government.

The key net benefits are the direct incremental taxes and fees paid by Manitoba Hydro net of incremental government costs or risks, essentially, water rentals and capital taxes, which are greater in the hydro, based plans.

This account also illustrates the net debt in context to the overall balance sheet. It is noted that debt is high with the PDP, in the early years due to construction; the debt is offset in later years due to overall higher fixed assets and retained earnings.

Observations:

The Manitoba Government account is specific to net benefits to government over the period of the Plan (78-years). PDP provides the greatest net benefit based on this accounts assumptions that are reasonable. The key generators of revenues to the Provincial Government are the capital taxes and water rentals.

5.2.4 Manitoba Economy

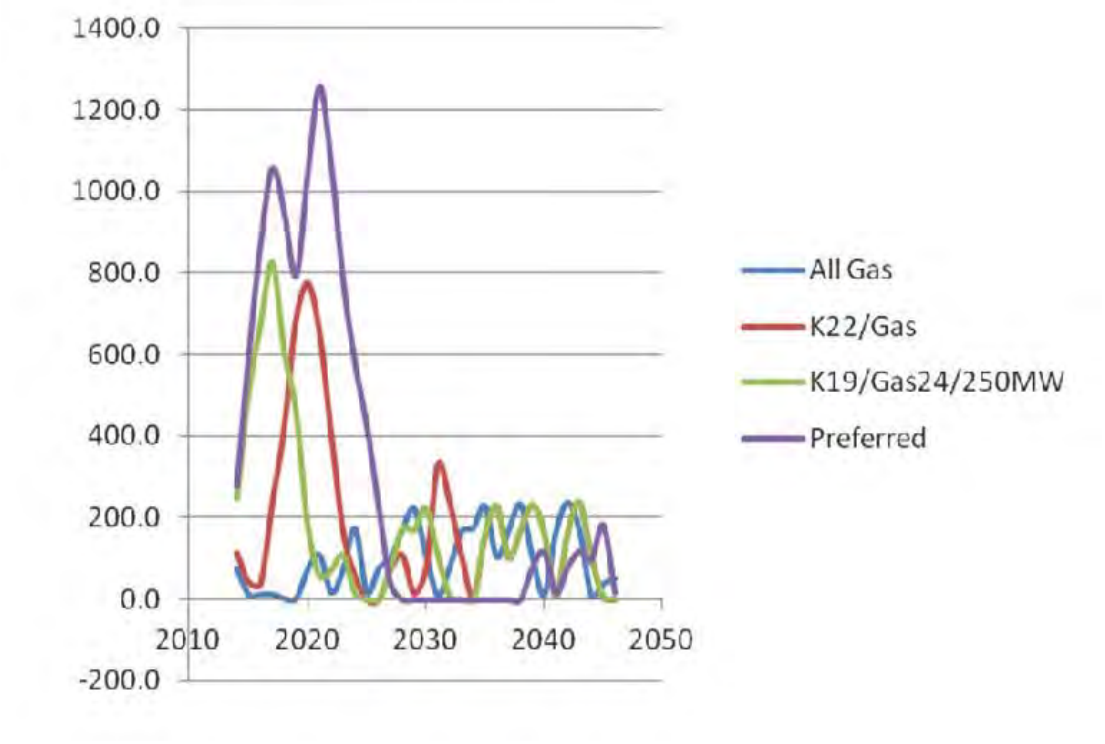
The Manitoba Economy account assesses the consequences of the different plans for the Manitoba economy and considers based on the NFAT reference scenario:

1. Annual capital expenditures with each plan over the alternatives life cycle.
2. Annual employment for project construction over the alternatives life cycle.
3. Annual employment for project operations and maintenance over the alternatives life cycle.
4. Comparison of gross wages for construction and operations and maintenance over the alternatives life cycle.
5. Comparison of the incremental income based on assumptions regarding the economic rent and jobs being filled based on regional employment differences.

The employment information utilized for this account was based on raw data provided by the construction and planning groups. The PDP is more capital and labour intensive than the alternative plans. It stands to reason that annual employment projected for construction would also be greater.

An important assumption made in the Manitoba Economy Account is that in well-functioning economies, the incremental income (defined as economic rent) is relatively small, as incentives are required to attract workers away from existing jobs (regions with relatively low unemployment), whereas in poorly performing economies (with high unemployment), in which new wages (jobs) are created and those unemployed can secure such jobs, the economic rent can be significant. As noted in the EIS (supported in Chapter 13) there is higher unemployment in northern Manitoba than in southern Manitoba. Consequently, the economic rent derived in northern Manitoba would be greater than that of southern Manitoba.[50]

The exhibit below depicts the total annual employment, directly required for the construction of all plans. The greatest amount of construction employment is generated by the PDP followed by the two plans, which include Keeyask. The gas plans generates the least amount of construction employment.



Source: Figure 13.5, Chapter 13, Multiple Account Analysis

[50] As noted in Chapter 13 Statistics Canada data indicated that at the 2001 unemployment rate for Keeyask Cree Nation was 40% and for the Northern Manitoba Aboriginal population (census divisions 19,2122, 23) was 28% compared to 6.1% to Manitoba as a whole.

The demand for Labour during operations is different. While all of the alternative plans generate increasing amount of annual O@M employment towards the end of the planning period, the three alternatives without Conawapa GS generate more annual employment than the preferred PDP, because of the need for more thermal plants to be constructed and maintained to meet growing load over the longer term.

Potential incremental income that employment (wages) offers for Manitobans is derived from assumptions made in regard the willingness to take jobs in the regions in which the alternative plans are located.[51] For the purpose of this account employment net benefits are measured by wages that are paid less the minimum amount of workers would have to be paid to take the jobs. This approach nets out the economic rent.[52]

Table 13.5 of Chapter 13 (Gross Wages for Construction and O&M) presents gross wages compared to the alternative plans. Again to derive the net benefits (which are measured not by the gross impact (Table 13.5) but by the incremental income) assumptions regarding northern and southern communities overall net benefit are identified:

- Construction: Northern communities the net benefit would 19.14%, southern communities 15% of the gross wages paid.
- Operations: Northern communities net benefit would be 30.75 % of the total gross wages paid, southern net benefits of wages paid would be 15%.

The results are presented In Table 13 below.

Table 13: Employment Net Benefits for Project Construction and O&M

	Preferred Development Plan	K19/G24/250MW	K22/Gas	All Gas
Construction Northern Manitoba	234.4	113.2	95.1	0.0
Construction Southern Manitoba	6.1	12.7	10.6	9.0
Total Construction	240.5	125.8	105.7	9.0
O&M Northern Manitoba	39.2	23.6	18.9	0.0
O&M Southern Manitoba	0.5	7.1	5.6	10.9
Total O& M	39.7	30.7	24.5	10.9
Gross Wages	280.20	156.5	130.3	19.8
Difference from the Preferred Development Plan	0	(123.7)	(150.0)	(260.3)

Source NFAT: Reference Scenario Assumptions (2014 Present Value in Millions).

[51] This account is different than the economic impact analysis that serves to estimate the direct, indirect and induced demand for labour generated by project expenditures. Economic impact measures gross effects not incremental employment or wages.

[52] Economic rent arises from conditions of exclusivity or scarcity. Economic rent can be used to demonstrate numerous pricing discrepancies in the real world. For example, a worker may be willing to work for $15 per hour, but because she belongs to a union, she receives $18 per hour for the same job. The difference of $3 is the worker's economic rent. As another example, the owner of a property in an exclusive shopping mall may be willing to rent it out for $10,000 per month, but a company that is keen to have a retail storefront in the mall may offer $12,000 as monthly rent for the property to secure it and forestall competition. The difference of $2,000, in this case, is the owner's economic rent.
(http://www.investopedia.com/terms/e/economicrent.asp) Essentially it is the difference between moving from one job to another for greater pay and the

Observations:

The Manitoba account is specific to the net employment and wages generated by the project in each plan, based on assumptions related to the net benefits based on location (southern vs. northern Manitoba). The approach and assumptions are reasonable.

5.2.5 Social

The social account addresses the consequences of the different plans for aboriginal and non- aboriginal communities as well as other social effects not addressed in the other accounts. Benefits to project partners, local and regional partners and Manitoban's as a whole are considered.

This account also considers the long-term sustainability attributes of the plans, namely the heritage/bequest value (or legacy value) of assets remaining at the end of the planning period (refer to Section 3.4). The bequest value is the acknowledgement that society is willing to pay or allocate resources today for the benefit of future generations.

Project Partners

The JKDA outlines the investment; employment and direct contract awarding that would benefit the four Cree Nations (refer to Section 3.5 of this report), inclusive of the current construction of the KIP project. As per the JKDA which guarantees that certain person years of construction employment be provided to the Partnership, as well as direct award contracts, such opportunities represent significant contributions to project partners and foster capacity building within these communities. Over the longer term (operations) there is a target under the JKDA of 182 KCN members in operating positions within Manitoba Hydro[53].

Equity ownership up to 25% is also provided to project partners that would generate significant returns, and while a similar approach has not been signed for Conawapa Generating Project (CGP) there is intent to do so.

MH has secured unique relationships with First Nations and northern communities that will generate significant socio-economic benefits, and satisfy MH corporate objectives related to economic development and fostering relationship with Aboriginal people.

Local and Regional Partners

Local and regional community impacts and mitigation are outlined in detail in the EIS Report:

- Socio-economic Environment Resource Use and Heritage Resources;
- Section 3: Economy;
- Section 4: Population Infrastructure and Services; and
- Section 5: Personnel Family and Community Life.

Overall the PDP generates significant employment benefits throughout the region both for First Nations and northern communities (the communities of Gilliam (MH company town) and to a lesser extent Thompson). While concerns regarding wage pressures, commercial trapping and drug and alcohol abuse are noted in the environmental impact statement as well as potential impacts on housing, the effects will be dealt with via on-going monitoring of the issues as commitments made in the EIS.

[53] Refer to Keeyask Hydro Power Limited Partnership EIS, Chapter 6

There will be significant benefits during the construction and to a lesser extent operations. MH has also made commitments in local communities. The improvements to the road access to the Keeyask will also represent a long-term benefit to northern Manitobans (refer to Section 3.6 of this report).

Manitobans as a Whole

The NFAT business case speaks to the perceived societal benefits of renewable energy vs. fossil fuels, and GHG gas emissions. One key noted benefit to Manitoban's is the bequest value (or legacy value) of the hydroelectric assets. The bequest value of the assets is defined as the benefits for future generations of Manitobans. Hydroelectric assets have long been recognized as having significant bequest value, and is suggested that this is evident in the low rates exhibited in provinces that have undertaken such investments, such as British Columbia, Québec and Manitoba (refer to section 4).

From an economic theory perspective the concept of the intergenerational consequences of investment and policy decisions remains an on-going point of contention. Lower discount rates utilized in the NFAT business case regarding the social cost of capital enhance the attractiveness of such investments compared to how the private market would discount the project. Economists suggest (as highlighted the NFAT Chapter 13, Pages 66 of 74), some government cost-benefit guidelines have in fact adopted declining real discount rates over time to give greater weight to intergenerational impacts.

Hydroelectric facilities do have a significant bequest value, which is a significant benefit to all Manitobans.

However, Appendix 9.3 - Economic Evaluation Documentation, Table 1.2, identifies sunk costs associated the Keeyask and Conawapa related to as stated in-service dates.

Table 14: Capital cost as Net of Sunk costs Used for Economic Evaluation Keeyask GS and Conawapa GS by In-service Date

	Keeyask 2019	Keeyask 2022	Conawapa 2025	Conawapa 2026	Conawapa 2029	Conawapa 2031
Base Cost	$4.3	$4.4	$6.0	$6.1	$6.2	$6.3
Sunk cost to June 2014	($1.0)	($1.0)	($0.3)	($0.3)	($0.3)	($0.3)
Evaluation Costs	$3.3	$3.4	$5.7	$5.8	$5.9	$6.0

Source: Appendix 9.3 - Economic Evaluation Documentation, Table 1.2

While bequest value is significant and not monetized in context to this review, one also has to consider the initial sunk costs that are not reflected in the evaluation.

Observations:

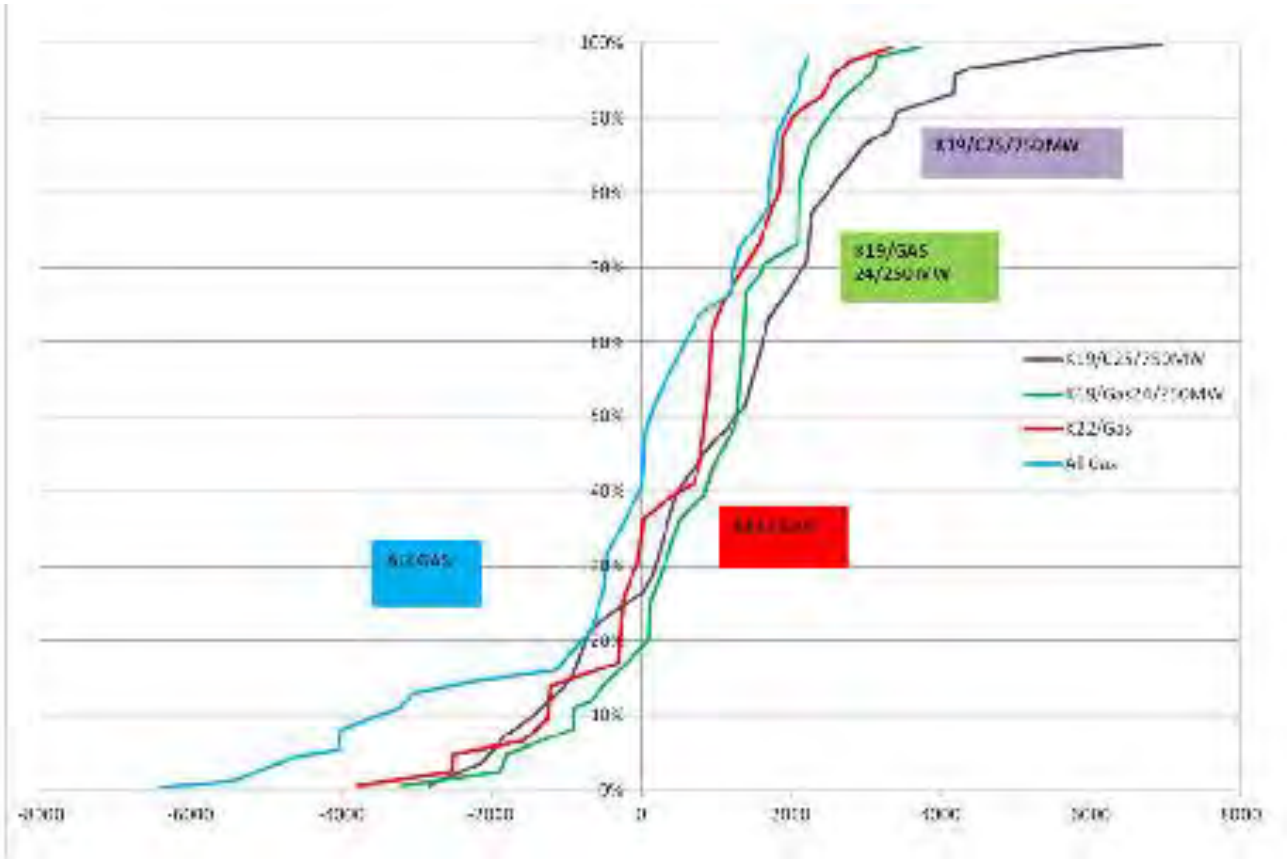
From a social perspective there are significant benefits to project partners, local and regional communities and Manitobans as a whole resultant from the PDP. The bequest value of such hydro facilities is also significant and is highlighted for the PUB board in its decision-making.

5.2.6 Risk and Uncertainty

How MH manages risk and uncertainty in relation to all alternatives is critical, and affects the results of this review. Longer-term assumptions past the 20-year forecast period are subject to considerable variation and ambiguity (load forecasts, construction costs, demand side management etc.).

Risk and uncertainty is addressed through the presentation "S"-curves illustrating the growth and variability of each alternative plan over time. Each reference plan (and the assumptions inherent in each) is presented as "S"-curve, illustrating the cumulative probability outcome values ($) over time, both positive and negative.[54]

Exhibit 16: Manitoba Hydro Net Revenue S-Curves



Source: Chapter 13 - Integrated Comparison of Development Plants - Multiple Account Analysis

Key aspects of risk and uncertainty are presented in context to the net present value variation associated with each plan. While a wide range of outcomes are presented, the PDP does offer the greatest upside potential, whereas the gas plans the most downside potential. The options with both hydro and gas small interconnection has less downside risk but not the upside of the PDP.

As Chapter 13 notes, what differentiates the plans is not the extent of downside risk but what is foregone by initial decisions to proceed, such as the revenues secured as part of export contracts.

Ultimately the ability of risk and uncertainty to be managed by each resource plan is dealt with and discussed in Chapter 14 - Conclusions. Chapter 14 presents a synthesis all of the technical information presented in the NFAT Business Case and introduces the concept of "pathways" in relation to critical time based decisions that enable

[54] An S curve is a type of curve that shows the growth of a variable in terms of another variable often expressed as unities of time (http://www.businessdictionary.com/definition/S-curve.html#ixzz2nZI1dTDD)

MH to verify the various components of the PDP, as presented, based on new information and changing market conditions. Chapter 14 is based on grouping the development plans into 5 pathways to assist the integration of results and assist in drawing conclusions on each commitment choice that must be made in 2014 and thereafter.

The pathways are established to enable MH modify the PDP based on continued input into those areas of uncertainty.

The ability to adapt to changing market conditions and change the ultimate plan represents a critical means of minimizing risk and uncertainty from a socio-economic perspective. The importance of which cannot be overstated.

Observations:

The Multiple Account Benefit Cost Approach (MA-BCA) was utilized to evaluate alternative plans identified by MH. The MA-BCA approach is a standard method in assessing the broader socio-economic benefits of an infrastructure investment, focused on the identification of net benefits. The MA-BCA consisted of the following accounts in the determination of the relative advantages and disadvantages and incremental benefits of each alternative plan: a market evaluation account, Manitoba Hydro customer account, Manitoba government account, Manitoba economy account, environment account, Social and Risk and uncertainty account. The assumptions utilized in the determination of MA-BCA results are reasonable.

The following table provides a summary of the MA-BCA as presented based on the reference scenarios. As noted the assumptions utilized in the analysis are commented upon above.

Table 15: Summary Comparison of Alternative Plans from a Socio-economic Perspective

Account	All Gas	K22/Gas	K19/G24/250MW	Preferred Development Plan
Market Valuation Account (1)	This option exhibits the highest net costs, significantly higher than the other options	This options net cost is $270.5 m higher than the PDP	This options net cost is the lowest	The PDP has 2nd lowest net costs. This plan entails much higher capital expenditures, which is offset by higher firm export sales and residual value of the assets
Manitoba Customer Account (2)	**Rate Impacts** The projected cumulative rate increase would be 90%, a 3.4 to 3.5% annual rate increase **System Reliability** This option has the least load carrying capacity	**Rate Impacts** The projected cumulative rate increase would be 92% a 3.4 to 3.5% annual rate increase **System Reliability** This option has the third greatest peak load carrying capacity. The interconnection and additional hydro resources contributes to reliability	**Rate Impacts** The projected cumulative rate increase would be 90% a 3.4 to 3.5% annual rate increase **System Reliability** This option has the second greatest load carrying capacity. The interconnection and additional hydro resources contributes to reliability	**Rate Impacts** The projected cumulative rate increase is 108%, a 3.95 % annually rate increase **System Reliability** The PDP has the greatest load carrying capability. The interconnection and additional hydro resources contributes to reliability
Manitoba Government (3)	The all gas plan generates the least net benefit to government	The K22/ Gas plan generates less than the PDP but more than the all gas plan due to capital taxes	The K19/ G24/250MW generates less than the PDP but more than the all gas plan due to capital taxes	The PDP generates the greatest net benefits to the Manitoba government, driven predominantly from water rentals and capital taxes
Manitoba Economy (4)	**Employment Net Benefits** The all gas plan generates the least net benefits during construction (9.0 m) **Operational Net Benefits** Total O@M benefits are $10.9m	**Employment Net Benefits** This plan generates $105.7m in construction net benefits **Operational Net Benefits** Total O@M benefits are $24.5m	**Employment Net Benefits** This plan generates $125.8m in construction net benefits **Operational Net Benefits** Total O@M benefits are $30.7m	**Employment Net Benefits** The PDP generates $240.5 m in construction net benefits **Operational Net Benefits** Total O@M benefits are $39.7

Account	All Gas	K22/Gas	K19/G24/250MW	Preferred Development Plan
Social Account (5)	**Project Partners** No plans to enhance local employment opportunities (no JKDA). **Local and Regional Partners** No plans to enhance local employment opportunities (no JKDA). **Manitoban's as a whole** Support in fossil fuel rather than a renewable energy solution - fossil fuels may not be supported socially. While jobs will be generated they will be located in areas that do not suffer high unemployment and therefore economic rent will be lower.	**Project Partners** Secures the benefits under the JKDA to project partners. **Local and Regional Partners** Significant employment benefits would occur throughout the region, inclusive of spin off benefits in Gillam and Thompson as a result of Keeyask construction. Potential adverse effects such as alcohol abuse and community conflicts with workers identified but appropriate mitigation identified in the EIS. **Manitoban's as a whole** Societal benefits of renewable energy solutions rather than fossil fuels and bequest value (the benefits of assets benefiting future generations).	**Project Partners** Secures the benefits under the JKDA to project partners. **Local and Regional Partners** Significant employment benefits would occur throughout the region, inclusive of spin off benefits in Gillam and Thompson as a result of Keeyask construction. Potential adverse effects such as alcohol abuse and community conflicts with workers identified but appropriate mitigation identified in the EIS. **Manitoban's as a whole** Societal benefits of renewable energy solutions rather than fossil fuels and bequest value (the benefits of assets benefiting future generations).	**Project Partners** The greatest benefit to Project partners is achieved under the PDP provided a similar agreement is established for Conawapa, which is envisioned **Local and Regional Partners** Significant employment benefits would occur throughout the region, inclusive of spin off benefits in Gillam and Thompson as a result of both Keeyask and Conawapa construction. Potential adverse effects such as alcohol abuse and community conflicts with workers identified but appropriate mitigation identified in the EIS. **Manitoban's as a whole** Societal benefits of renewable energy solutions rather than fossil fuels and bequest value (the benefits of assets benefiting future generations) are greatest in the options due to both Keeyask and Conawapa being constructed.
Uncertainty and Risk Account (6)	The downside (negative impacts) risk is greatest for the all gas plan, whereas the upside risk (positive impacts) is least for the all gas plan. The development of Pathways provides further opportunities to modify plans going forward.	The downside (negative impacts) risk are relatively even for the PDP and K19/Gas 24/250MW options, whereas the upside risk (positive impact) is greater than all gas but less than the PDP and the K19/Gas24/250MW. The development of Pathways provides further opportunities to modify plans going forward.	The downside (negative impacts) risk are relatively even with the K22/Gas and the PDP options whereas the upside risk (positive benefit) from partial export sales is greater than the all gas and K22/Gas options. The development of Pathways provides further opportunities to modify plans going forward.	The downside (negative impacts) risks are relatively even the K22/Gas and K19/Gas24/250mw options whereas the upside risk from export sales is the greatest. The development of Pathways provides further opportunities to modify plans going forward.

Notes

(1) Under the Market Valuation Account the discount rate represents the key factor affecting the outcome in this account. Projects with longer life cycles, such as hydroelectric projects, consider the social cost of capital in their economic evaluations , with the lower the discount rate the greater the net present value , the higher the discount rate the less the net present value .A discount of rate of 6% is utilized reflecting current literature and other utility benchmarks, as the social opportunity cost of capital. The present value are based on the estimated incremental capital and system operating expenditures and revenues over the 2014-2047 period.

(2) Under the Manitoba Customer Account the rate increases would be required to achieve a target 75:25 debt/equity ratio by year 20 (2031/32). The rates identified are expressed in nominal dollars that include the general rate of inflation. The real increase after adjusting for inflation would be approximately 1.9% per year less. Under the Manitoba

Customer Account the system reliability section confirms that all of the different plans are designed to ensure MH has sufficient resources to be able to meet its peak and annual load even under a wide range of forced outage and extreme weather conditions.

(3) Manitoba Government Account assesses the net benefit or cost of the different plans to the Manitoba government and analyses the incremental net revenues accruing to the government. Capital tax (a tax on a corporation's taxable capital, comprising capital stock, surpluses, indebtedness and reserves. Capital tax is applicable to capital owned by a company, not its spending. Capital taxes, in contrast to income taxes, are charged regardless of the profitability of the firm). Also known as "corporation capital tax", water rentals, debt guarantee fee, sinking fund administration fee, coal tax and potential carbon taxes are dealt with within this account.

(4) The Manitoba economy account is specific to the demand for Labour associated with construction and operations. The development plans that support the greatest potential for economic rent or net benefits associated with wages and salaries provides the greatest socio-economic benefit. The Manitoba economy account considers and incorporates the northern and southern employment /unemployment rates and a proportion of wages that would generate net benefits. Numbers are based on 2014 dollars.

(5) The social account provides a summary of the benefits to project partners local and regional partners and Manitobans' as a whole, which pertains to the use of renewable energy and bequest value of the reaming hydroelectric or gas assets upon completion of the assets life cycle.

(6) The uncertainty or risk account of the MA-CBA presents "S" curves illustrating the growth and variability of each alternative plan over time. Each reference plan (and the assumptions inherent in each) is presented as "S" curve, illustrating the cumulative probability outcome values ($) over time, both positive and negative. From a socio-economic perspective key aspects of risk and uncertainty are presented in context to the net present value variation associated with each plan, and whether to residents of Manitoba will be responsible for such risks.

5.3 The Significance of Pathways

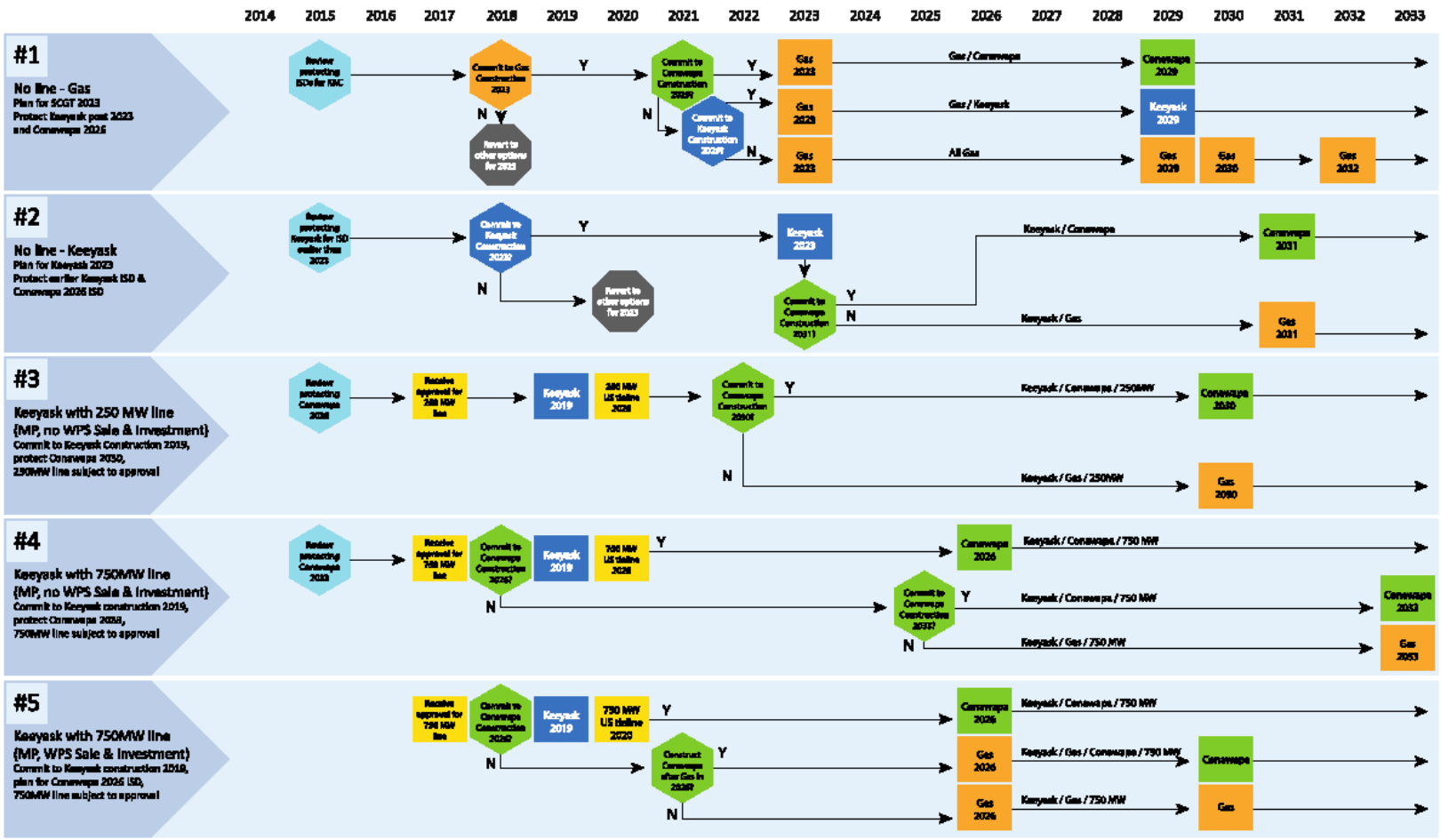
Pathways are established to address future uncertainties inherent in the NFAT submission related to the plans for new generation. Load growth forecasts, on-going plans, new export contracts, natural gas price forecasts, export price forecasts capital cost estimates, retirement of existing gas generation and other parameters all impact on the recommendation associated with the PDP. Over time although such forecasts remain uncertain, the passage of time will provide additional information learning's available to reduce such uncertainty.

Accordingly, the ability of MH to adapt to changing conditions enables the province of Manitoba MH to make more informed decisions. The decision pathways enable MH the flexibility to modify the PDP. For example, the PDP can be supported currently although a decision specific to the construction of Conawapa does not have to be made until 2018.

Long term flexibility to respond to events or changing market conditions as they unfold is fundamental to managing risks and dealing with such fundamental uncertainties. Five pathways have been identified and are depicted below.

Thus, if circumstances warrant the selected development plan will and can be modified over time. The specific components in the preferred and alternative plans assessed in the MA-BCA are shown below.

Exhibit 17: Project Pathways for the preferred and Alternative Development Plans



Observations:

MH has considered potential pathways to limit the longer-term risk and uncertainty within the PDP. The decision pathways enable MH the flexibility to modify the PDP to address those longer term risk factors such as load growth, on-going (DSM), new export contracts (and prices), natural gas price changes, capital costs etc. From a socio-economic perspective the ability to adapt policy to evolving and ever changing social and market conditions is crucial. The most critical decision point within the pathways if the PDP is pursued (i.e., construction of Keeyask) is a decision specific to the construction of Conawapa, which does not have to be made until 2018. In the in-term if the PDP is pursued the above risk factors should be studied in relation to the Conawapa decision, and reported back to the PUB. The government of Manitoba should provide the PUB legislative authority to review such plans as such risks are addressed.

6 HIGH LEVEL REVIEW OF APPROACHES TO OPTIMIZING PROVINCIAL ECONOMIC BENEFITS OF LARGE SCALE RESOURCE PROJECTS

This section provides a high-level analysis of how other Canadian jurisdictions maximize provincial economic benefits from the development of large-scale resource projects and assesses if the PDP provides the highest level of socio-economic benefits to Manitobans.

6.1 Benchmark Review of Manitoba Hydro, Québec Hydro and Nalcor Energy

This section compares NALCOR's (Newfoundland and Labrador Hydro) Lower Churchill Project and Québec Hydro's Eastmain and Rupert Diversion Project with that of MH PDP. As both hydroelectric projects are sited in northern boreal forests and sparsely populated areas, they have similar geographical characteristics as with PDP. The power produced is intended to support future load requirements as well as export markets (provincial revenues), and the projects are sited on rivers that have historically been developed for hydroelectric power, the selection of such provides a defensible benchmark.

This high level review is based on available published information of the utilities website, inclusive of environmental impact statements and joint panel review hearing reports.

6.2 Manitoba Hydro: the Preferred Development Plan

Sections 1 and 3 of this report provide insight into the initiatives taken by Manitoba Hydro regarding optimization of provincial benefits via a review of the economic impact assessment results, and benefits to First Nations.

6.3 Nalcor Energy

6.3.1 The Lower Churchill Hydroelectric Project: Muskrat Falls and Gull Island Newfoundland and Labrador

The Muskrat Falls and Gull Island Hydroelectric Project have a combined capacity of more than 3,000 megawatts and are located on the lower Churchill River in Labrador. The Lower Churchill Project will be developed in two phases first, Muskrat Falls (824 megawatts) and then Gull Island (2,250 megawatts).[55]

6.3.1.1 Muskrat Falls

Phase one of the Lower Churchill Project is referred to as the Muskrat Falls Project. The project includes an 824-megawatt hydroelectric generating facility at Muskrat Falls, the Labrador-Island Link that will transmit power from Muskrat Falls to Soldiers Pond on the Avalon Peninsula, and the Maritime Link connecting Newfoundland and Nova Scotia. The Muskrat Falls project was sanctioned by the Government of Newfoundland and Labrador in December 2012, and construction is expected to take five years to complete.

[55] As noted in this review the MH Plan includes the 695MW Keeyask project followed by the 1485 MW Conawapa Hydroelectric project

6.3.1.2 Gull Island

Phase two of the Lower Churchill Project will consist of the development of the 2,250 MW Gull Island generation facility and associated transmission to markets. The proposed development of Gull Island would follow no earlier than three years after the sanction of Muskrat Falls, similar to what is proposed for Conawapa.

6.3.2 Determination of Economic Benefits

Provincial input output modeling was utilized in the determination of Canada wide and provincial benefits.

6.3.2.1 Canadian Wide Benefits

Canadian, Provincial and Regional (site specific) benefits are outlined on the Provincial website. It is noted that the development of Muskrat Falls and the transmission link to Nova Scotia is a national project (interprovincial interests), as reflected by the estimated Canada-wide benefits realized during construction and operations.[56]

6.3.2.2 Provincial Benefits: Newfoundland and Labrador

Newfoundland and Labrador Provincial Benefits will be optimized as per the Province's Benefits Strategy for the Lower Churchill Construction Project with Nalcor, which ensures opportunities for the people of the province. Total direct, indirect and induced employment in the province is estimated to be 18,400 person years. Peak direct employment in Newfoundland and Labrador will be approximately 2,700 people in 2013. After construction is complete, Newfoundland and Labrador employment will continue with an estimated 120 direct full-time jobs.[57]

6.3.2.3 Regional (Labrador)

The Provincial Government's regionally based benefits strategy for the project was developed to provide consideration to Labrador's Innu Nation and qualified residents of Labrador before those from other parts of the province. Studies suggest more than 7,500 person-years of direct, indirect and induced employment will take place in Labrador – an average of 1,150 people per year – throughout the development of Muskrat Falls. More than 75 percent of the direct Labour for the Muskrat Falls Generation Facility will be undertaken in Labrador. Approximately $450 million in income to business and labour will be earned by Labradoreans' and Labrador-based businesses.

Nalcor, to facilitate regional (local) benefits has committed to competitive terms and conditions of employment for workers. Workers receive an attractive compensation package inclusive of competitive wages, and high quality accommodations, transportation and accessible training. In 2012, Nalcor Energy launched (www.muskratfallsjobs.com), an online employment database where anyone interested in working on the project can be included in a database, with the objective that individuals can create an online resume, find information about contractors working with the project, and learn more about the many job opportunities that will be available throughout construction.

Registering with muskratfallsjobs.com represents the key means NALCOR pursued to ensure an individual's resume and information is accessible to contractors and unions seeking qualified workers with the project.

[56] Newfoundland and Labradorhttp://www.gov.nl.ca/lowerchurchillproject/backgrounder_4.htm

[57] Ibid

6.3.3 Provincial Economic Benefit Agreements

The Provincial Government and Nalcor committed to optimizing benefits with the business community via the following commitments made in:[58]

- Benefits Strategy with the Government of Newfoundland and Labrador
- Benefits Memorandum of Understanding between the Governments of Newfoundland and Labrador and Nova Scotia.

6.3.4 Economic Benefit Agreements with Innu Nations (November 11 2011)

Negotiations have been on-going between the Innu Nation and the Province of Newfoundland and Labrador in separate forums for many years. On September 26, 2008, Nalcor Energy, the Government of Newfoundland and Labrador and Innu Nation signed the Tshash Petapen (New Dawn) Agreement. Since that time, the parties have worked to complete three agreements:[59]

- A tripartite Innu Land claim and Self-government Agreement-in-Principle between Canada, Newfoundland and Labrador and Innu Nation (AIP)
- The Lower Churchill Project Innu Impacts and Benefits Agreement (IBA)
- The Upper Churchill Redress Agreement (UCRA)

These three agreements were ratified by the Innu in, 2011, and signed by the parties on November 18, 2011. The IBA and the UCRA come into effect immediately upon signing. The AIP will form the basis for on-going treaty negotiations between the Innu, Canada and Newfoundland and Labrador.

6.3.4.1 Land Claims and Self-Government Agreement-in-Principle with the Innu of Labrador (AIP)

The Labrador Innu asserts Aboriginal rights and title throughout a large area of central Labrador and Eastern Québec including the North Shore of the Gulf of St. Lawrence. No treaty has ever been signed with the Innu of Labrador. The Agreement-in-Principle (AIP) sets out jurisdictions, rights, benefits and limitations for the Labrador Innu in a variety of subject areas. These include the harvesting of forest resources and plants; fish; migratory birds; and wildlife. All rights and benefits are directly tied to specific geographically defined lands. Specific to the AIP four types of lands referenced, inclusive of the area of land under Innu control, the Labrador Innu settlement Area (LISA), and the rights to harvest within permit free hunting area and the economic and hydroelectric major development impacts and benefits areas, that would give the Innu the right to Impact and Benefit Agreements for Major Developments as defined in the AIP. While the AIP is not a legally binding document it does set the context for the related benefit agreements related to proposed hydroelectric developments.[60]

6.3.4.2 Lower Churchill Project Impacts and Benefits Agreement

The following benefits have been determined:

- Financial benefits:
  - Five per cent of net project revenue

[58] Backgrounder Execution of Agreements with the Innu Nations November 18, 2011

[59] Execution of Agreements with Innu Nations (November 11 2011 http://www.gov.nl.ca/lowerchurchillproject/backgrounder_9.htm

[60] Backgrounder: Highlights: Land claims and Self Government Agreement in Principle with the Innu of Labrador (www.aadnc-aandc.gc.ca/eng/1321571114945/1321571168634)

  - Five million dollars per year payable upon Lower Churchill Project sanction until commercial power
- Employment and training participation objectives in place for construction and operations.
- A target of $400 million in contracts for Innu businesses.
- Joint Nalcor-Innu Environmental Management Committee responsible for:
  - Environmental policies
  - Environmental Management System
  - Review and consideration of Innu knowledge
- Innu Nation will provide Nalcor with a comprehensive release and indemnity relating to any adverse effects associated with the development of the Lower Churchill Project.

6.3.4.3 Upper Churchill Redress Agreement

The Agreement provides compensation to the Labrador Innu for impacts associated with the Upper Churchill Falls development over the full project lifecycle.

- The compensation structure is an annual settlement payment of $2 million per year (indexed annually at 2.5 per cent) upon execution of the Final agreement until August 31, 2041, after which the Labrador Innu will be entitled to an annual dividend share of three per cent of Nalcor's revenue from the existing Churchill Falls development.
- Prior to September 1, 2041, the Innu Nation has the option to convert the annual settlement payments into an annual dividend share or percentage of revenue from the existing Churchill Falls development. This option is triggered if the revenue from the Power Contract between Churchill Falls (Labrador) Corporation and Québec Hydro changes.
- The Agreement provides the Province of Newfoundland and Labrador and Nalcor with a comprehensive release and indemnity against claims by the Labrador Innu relating to the Churchill Falls development.

6.3.5 Procurement Process

Throughout project construction, business opportunities will be made available via direct supply to Nalcor Energy or as a subcontractor or supplier to the project's primary contractors. Businesses interested in supplying works, goods and services to the project are encouraged to monitor the website for forecasted, active and awarded contract packages to identify potential opportunities matching expertise. All contractors, subcontractors and suppliers interested in supplying works, goods and services to the project are required to complete and return a Vendor/Contractor Registration Questionnaire to be added to the database of potential suppliers. The procurement process for primary contract opportunities with the project is managed by the following:

1. Upcoming contract packages and scopes of work are identified in the procurement forecast, available by selecting the Procurement Forecast link on Project website.
2. Expressions of Interest (EOI) and Bidder selection documents for contract packages are posted online in the Bidder Selection and RFP section of Project website.
3. Evaluation and selection of bidders.
4. Requests for Proposals (RFP) are issued to bidders selected through the Bidder Selection phase. The bidders list is then available online through the corresponding contract package.
5. Evaluation of proposals received through the RFP process.
6. Contact information for the successful contractor is available in the Awarded Contracts section of the Project website.

6.3.5.1 Subcontractor Opportunities

In addition to major contract awards, the project will generate significant subcontract opportunities for goods and services that will be required throughout construction. Subcontracted opportunities will be managed by primary contractors and suppliers with the project. Businesses can take advantage of subcontract opportunities by:

- Contacting bidders and primary contractors/suppliers directly. Contact information for approved bidders and primary contractors/suppliers with the project is available in both the Bidder Selection and Request for Proposals section and the Awarded Contracts section of the Project website.
- Regularly monitoring forecasted, active and awarded packages to identify areas for potential subcontract opportunities matching their area of expertise. All procurement information and scopes of work for contract packages are available by navigating the Project website.

While an Engineering, Procurement and Construction Management (EPCM) consultant for the development of the Muskrat Falls hydroelectric generating facility and the Labrador-Island Link has been selected, procurement opportunities with the project are managed by an integrated supply chain team with representatives from Nalcor and EPCM contractor to further ensure regional (local) content is supported.

Observations:

Nalcor, the Federal and Provincial Governments, and Innu peoples have worked to establish agreements to support economic development within the north. Long-term provincial economic benefits are derived by the sale of surplus power. In the short term, optimization of employment provincially and locally during construction has been identified via procurement strategies in which local businesses, service providers and individuals looking to obtain work are solicited and given preference too. While it is up to the contractors to assemble teams, procurement opportunities with the project are managed by an integrated supply chain team with representatives from Nalcor and contractor to further ensure regional (local) content is matched.

The Innu people's long term negotiations with the Province of Labrador and Newfoundland has resulted in the signing of the New Dawn agreement that articulates through AIP, IBA UCRA the benefits associated with undertaking the Muskrat Falls project for the regional populations.

6.4 Québec Hydro

6.4.1 The James Bay Hydro Electric Project: Québec Hydro; an Overview

In 2002, the Québec Government and the Grand Council of the Crees signed an agreement, "La Paix des Braves" ("The Peace of the Braves"), ensuring the completion of the last phase of the original James Bay Project: construction of the Eastmain-1 generating station, with a capacity of 480 MW, and the Eastmain Reservoir with a surface area of about 600 km^2. A subsequent agreement in April 2004 opened the way to a joint environmental assessment of the projected diversion of the Rupert River, to the south of the Eastmain River.[61] The project entails the diversion of about 50% of the total water flow of the Rupert River (and 70% of the flow at the diversion point)

[61] By 1986, the largest generating stations and reservoirs on the La Grande River were completed, including the Robert-Bourassa (originally named La Grande-2), La Grande-3 and La Grande-4 generating stations, with an installed capacity of 10,800 MW, and five reservoirs covering an area of 11,300 $km^{2.}$ Collectively these projects are known as the James Bay Hydro Electric Project. The Eastmain and Caniapiscau River diversions each added 800 m^3/s of water to the La Grande River. During the late 1980s and early 1990s, construction of the second phase of the James Bay Project centered on the construction of five secondary power plants on the La Grande River and its tributaries (La Grande-1, La Grande-2A, Laforge-1, Laforge-2 and Brisay), adding a further 5,200 MW of generating capacity by the end of 1996.

towards the Eastmain Reservoir and into the La Grande Complex, and the construction of two additional generating stations: Eastmain-1A and Sarcelle, with a combined capacity of 888 MW.[62]

6.4.2 Eastmain-1A and Rupert Diversion Hydropower Project

Specific to the Eastmain-1A and Rupert Hydro Project consists of:

The project estimated to cost $5 billion dollars consists of three main components:[63]

- Construction of a 768-MW powerhouse, Eastmain-1A, near the existing Eastmain-1 powerhouse.
- Construction of a 150-MW powerhouse, Sarcelle, at the outlet of Opinaca reservoir.
- Partial diversion of the Rupert River to these two generating stations and from there to Robert-Bourassa, La Grande 2A and La Grande-1 generating stations.

The Rupert diversion includes four dams, a spillway 74 dykes, two diversion bays and a 2.9 km long tunnel and a network of canals with a total length of about 12 km to facilitate flow in the various portions of the diversion bay. To bring the output from the new generating facilities onto the power grid, 315-kV lines were built.

6.4.2.1 Provincial Economic Benefits of the Eastmain-1A/Rupert Project

Construction of the Eastmain-1A and Rupert Diversion project will generate economic spinoffs of nearly $2.4 billion for all of Québec, including direct, indirect and induced spinoffs. As for the northern region of Québec (Nord-du-Québec administrative region), where the project will be carried out, it will benefit from 9% of the economic spinoffs.[64]

To optimize the potential economic benefits for northern Québec residents (predominantly Cree) a number of agreements were concluded to promote economic development in the region. A brief description of each is provided below:

6.4.2.2 Provincial Economic Benefits: Aboriginal Agreements

The James Bay and Northern Québec Agreement (JBNQA) – was signed on November 11th 1975. This agreement originally only covered claims made by Québec Cree Indians and Inuit, on 31 January, 1978; the Naskapi Indians of Québec signed a parallel agreement – the Northeastern Québec Agreement - and joined under the 1975 accord.[65]

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[62] Wikipedia

[63] Quebec Hydro http://www.hydroquebec.com/rupert/en/projet_en_bref.html

[64] Government of Quebec (http://www.mddep.gouv.qc.ca/evaluations/eastmain-rupert/rapport-comexen/economic.htm)

[65] In the 1960s, Quebec began developing potential hydroelectric resources in the north, and in 1971 created the *James Bay Development Corporation (JBDC)* to pursue the development of mining, forestry and potential resources starting with the James Bay Hydroelectric Project (JBHP). This undertaking, which had been directed by the government of Quebec without consulting native people, was opposed by the majority of northern Quebec's Cree and Inuit.
The *Quebec Association of Indians* - an *ad hoc* representative body of native northern Quebecers - sued the government and, on 15 November 1973, won an injunction in the Quebec Superior Court blocking hydroelectric development until the province had negotiated an agreement with the natives. This judgment was overruled by the Quebec Court of Appeal seven days later, after the government's efforts to quickly negotiate an agreement failed. The legal requirement that Quebec negotiate a treaty covering the territory had not been overturned, even though construction continued.

The JBNQA agreement identifies a number of subjects and, as the first Canadian native treaty since the 1920s, has become the prototype of the many agreements made since then. It established a number of provisions, principally in the following areas:

- lands
- environmental and social protection
- economic and social protections
- economic development and financial compensation
- education
- local government
- heath and social services

In return for their signatures the governments of Québec and Canada and Québec Hydro agreed to provide northern Québec natives with extensive direct financial compensation to manage economic development through three native owned development corporations: The Cree Board of Compensation, the Makivik Corporation and the Naskapi Development Corporation.

A number of development agreements were subsequently established to compensate northern Québec Natives and include:[66]

- Nadoshtin Agreement
- Boumhounan Agreement
- Cree Employment Agreement
- Mercury agreement
- Decommissioning Agreement
- Waskaganish Transmission Line Agreement
- Whapmagoostui Transmission Line Agreement

The above agreements are summarized below.[67]

Over the course of the next year, the government of Quebec negotiated the required accord. On 15 November 1974 – exactly a year after the Superior Court decision – an *agreement-in-principle* was signed between the governments of Canada, Quebec, publicly owned Hydro-Québec, the Grand Council of the Crees, and the Northern Quebec Inuit Association.

[66] Agreements between Hydro Quebec the society d'energie de la Baie James and the Cree of Quebec summaries Quebec Hydro February 72002

[67] Summary of the complementary Agreement No.13 and Summary of the Agreement respecting Disputes and Dispute Resolutions committee are not presented.

Table 16: Québec Hydro and the Province of Québec: Provincial Benefit Agreements

Agreement	Objective of Agreement /Amounts ($)
Nadoshtin Agreement	The agreement allows Québec Hydro to build and operate the Eastmain 1 Project, as contemplated in the James Bay and Northern Québec Agreement (JBNQA). The agreement provides for the implementation of various environmental measures and allocated costs, including remedial and mitigating initiatives, with a view to reducing impacts of the project on concerned Cree. This includes the remedial measures fund ($1.8 m), archaeology and cultural heritage fund ($2.5m), Eenou Indohoun fund ($3.9 m), wildlife management fund (0.75 m), training fund ($1.5 m) and the EM-1 mercury fund ($3.0m)[68]
Boumhounan Agreement	The Crees consent to the construction and operation of the project in accordance with the terms set forth in the Boumhounan Agreement and subject to government authorizations, including those in conformity with the environmental and social protection regime prescribed in the JBNQA. The Crees will participate directly with Québec Hydro in studies and works rated to the project and will be involved throughout the feasibility phase, during which the necessary permits must be obtained. The agreement provides for the implementation of various environmental mitigating and remedial works, measure and programs aimed at reducing the impacts of the project. Contracts established by negotiation, subject to Québec Hydro's scheduling, cost, quality and guarantee requirements to be included consist of during the feasibility phase contracts totaling $5 m, construction phase, contracts totaling $240 m, and operations phase totaling $45 m.
Cree Employment Agreement	In total 150 Cree First Nations will be employed in permanent positions associated with the James Bay Project. To assist the Cree's in obtaining temporary jobs in the James Bay region, the agreement provides for the implementation of incentives and temporary employment programs designated to alleviate the negative impacts of the James Bay Project on traditional Cree activities and to improve the Cree's use of affected areas. The Apatisiiwin Corporation, a joint non-profit company, will be established under the agreement among others to facilitate and foster the employment of James Bay Cree, to reduce the barriers to employment, to recreate employment opportunities, to provide employment training and the create economic opportunities and jobs for the Crees, thereby creating a framework for improved relations between the James Bay Crees and Québec Hydro. A budget of $7 m has been established.
Mercury Agreement	This agreement was established to support human health authorities in the development and delivery of programs designed to manage the risks associated with human exposure to mercury. The Eye Names Corporation, a joint non-profit company, will be established to carry out studies monitoring etc. The corporation will be funded by $24 m as well as additional $3 m under the Nadoshitin Agreement and 3 m under the Boumhounan Agreement.
Decommissioning of work sites	This agreement is established to ensure the decommission of Québec Hydro's sites and installations that are no longer in service in the James Bay region and to agree upon a mechanism forth resolution of disputes with respect to decommission procedures.
Waskaganish Transmission Line Agreement	This agreement pertains to connect the community of Waskaganish to Québec hydro's main power grid by means of a transmission line.

Observations:

The Québec Government, the Federal and Provincial Governments, and Cree peoples worked to establish agreements to support economic development within the north. The Québec Government and the Grand Council of the Cree's signed the "The Peace of the Braves", ensuring the completion of the last phase of the original James Bay Project and identifying future opportunities. Provincial economic benefits were driven, in part by export sales and the revenues generated to the Province of Québec. From a regional perspective the economic benefits were focused on addressing economic disparity with the northern residents the majority of which were local aboriginals of Cree decent. A number of agreements were established inclusive of: The Nadoshtin Agreement, Boumhounan Agreement, Cree Employment Agreement, Mercury Agreement, Decommissioning Agreement, Waskaganish Transmission Line Agreement, and Whapmagoostui Transmission Line Agreement. All agreements

[68] Source: Agreements between Hydro-Québec, the Societies demerge de las Baie James and the Cree of Québec

provide insight into Québec Hydro's initiatives to optimize local benefits and address adverse effects of such projects. Agreements outline initiatives to train, educate and provide employment opportunities and address regional disparity felt in northern communities. The connection of communities of Waskaganish and Whapmagoostui within the Québec Hydro grid is one such example of capacity building. While such agreements evolved in part from addressing past issues resultant from historic hydroelectric development from aboriginal rights and title perspective, they have benefited from lessons learned from earlier hydro developments as outlined in the original The James Bay and Northern Québec Agreement (JBNQA).

Summary of Observations: NALCOR and Québec Hydro

Manitoba, Québec and Newfoundland and Labrador in cooperation with Federal and Provincial agencies have negotiated benefit agreements with local First Nations related to hydroelectric projects with the objectives of addressing outstanding issues pertaining to historic hydroelectric projects. In historic context, all of the utilities benchmarked have benefited from lessons learned from previous hydroelectric developments and incorporated initiatives to optimize local and regional benefits, specifically for northern and indigenous populations. Provincial and Canadian wide benefits are driven for the most part from construction benefits (employment) and a lesser extent operational employment jobs, and the on-going revenues secured as a result of export sales. Provincial input out models were utilized to determine benefits. First Nations benefit agreements have been tabled to address adverse effects and facilitate co-operation with other federal and local agencies involved in employment training and social services. Equity ownership and management and administrative assistance also help in building capacity within the organization. Manitoba Hydro's approach in this regard represents an industry best practice. On-going monitoring represents the key to ascertaining the success of the programs.

7 OBSERVATIONS

This section provides the PUB a series of observations derived from the NFAT review of the socio-economic considerations associated with the preferred development plan.

Economic Impact Assessment

Interpreting the Results of the Input Output Model for various alternative plans

The Manitoba Bureau of Statistics Input Output Model (IOM) was used to compare the expected economic impacts associated with the PDP and other alternatives such as a Simple Gas Turbine and a Combined Gas Turbine project. While varying detail was provided regarding construction costs for the gas options, we note that IOM's are linear and therefore scalable. Scaling the gas options to reflect the Keeyask Generating Project construction costs ($2.2 billion) enables a comparison of economic impacts. The Keeyask Generating Project (and the PDP) creates significantly greater economic benefits than that of the gas turbine projects.

Interpreting the Results of the Input Output Model for the PDP

Specific to evaluating the overall economic benefits of the PDP, our review commented on the key steps and related assumptions required to preparing the model, namely:

- the level detail related to construction costs;
- allocation of construction costs into input output categories;
- removal of expenditures with no provincial economic benefit and other leakages from the provincial economy; and,
- treatment of labour.

MH provided detailed costs as inputs into the model, and has for the most part, allocated cost input data to the corresponding IO expenditure categories based on an understanding of the expenditures involved. MH has removed expenditures with no provincial economic benefit and identified leakages from the provincial economy. The results of which are also reflected in the treatment of labour.

It is observed however, that the treatment of many purchases as leakages may tend to understate the impact of the PDP in Manitoba, while overstating the impact in the rest of Canada. This is due to the fact that the margins embedded in the purchase cost of these goods and services (treated as leakages), may not have been attributed to Manitoba producers who may be providing services such as transportation or wholesaling.

The extent of the leakages can be explained by a number of factors such as the relatively small manufacturing base of Manitoba economy compared to the rest of the provinces in Canada (Ontario and British Columbia), as well as the extensive experience of MH regarding recently constructed projects that would verify the of out-of-province purchases.

The extent of the out of province expenditures may be reasonable, but MH should have explicitly commented on this as part of reporting.

The issue pertaining to whether the impacts to the rest of Canada are overstated, whereas the impacts to Manitoba are understated remains, and is discussed below.

Canadian vs. Provincial Benefits

A generally accepted principle of input output modelling is that the "direct" benefits of any project are incurred in the jurisdiction in which the project is located. The approach used in the Statistics Canada Interprovincial Input-

Output Economic Impact Simulation model (catalogue no. 15F0009XDB) focused on the expenditures (purchase of goods and services) and the location where these expenditures took place. This approach ensures that the results generated from the model show the entire direct impact in Manitoba. It should be noted however that when the expenditure approach is used with the Statistics Canada model, the model estimates where the goods and services purchased are supplied from.

The key difference in the MH IOM approach was that MH made decisions, based on local experience and knowledge, on where the goods and services originated from. Although such an approach is reasonable, one must be careful in how to interpret the direct and indirect impacts, as the production (supply) of goods and services might generate a direct impact in the jurisdiction where the production took place, but in reality, this production should be interpreted as indirect impact, because these goods and services were produced to satisfy the demand associated with the project.

The results of both the MH IOM and the Statistics Canada Interprovincial model are presented for comparison purposes in the main body of the report for the Keeyask Generating Station.

The analysis suggests that the allocation of impacts between Manitoba and the rest of Canada in the MH study is significantly different from what the normal allocation, based on the structure and characteristics of Manitoba's economy would be, according to the Statistics Canada model.

Based on the results of the Statistics Canada model, one would expect the economic impact in Manitoba to be higher than what was suggested in the MH study (employment, labour income and GDP), while the impact in the rest of Canada would be lower.

Regardless, the results confirm that the PDP creates the greatest economic impacts, and if the Statistics Canada Interprovincial model is considered, the benefits to Manitobans is greater than what was reported.

Determining gross provincial financial benefits by examining benefits over the life of the project

The economic lives of hydroelectric facilities are much greater than those of other resource options. Based on the timing and value of replacement costs and net production costs based on MH Splash modeling, the PDP creates the greatest value over the economic life of the asset. The longer-term life (past the economic life) of hydroelectric facilities represents a consideration worth noting in this review. Referred to by MH as bequest value, is difficult to ascertain how long such facilities can be maintained and operated. Literature suggests over the longer term (past the economic life) hydroelectric facilities continue to contribute to the provincial economy well past the economic life of the facility evaluated in the NFAT.

Northern and Aboriginal community based impacts in terms of employment opportunities, incomes, community tax base, skills development and community based opportunities

Our review identified ten (10) provincial utility criteria/measurers, specific to optimizing economic benefits for First Nations and Northern communities. It is noted MH has met and exceeded such best practices.

Community Access Improvements related to Health, Education and Culture

Community access improvements and their implications (environmental setting, effects assessment, mitigation, and residual effects) related to health, education and culture are discussed in the Environmental Impact Statement (EIS) for the Keeyask Generating Project. The assessment followed standard environmental impact assessment process and all identified issues were evaluated.

On-going monitoring throughout construction, operation and beyond will be critical to ensure success of the identified mitigation.

Economic Displacement Impacts and Effects on Consumer Spending

Global Canadian and Provincial Electricity Rates

Manitobans (as of 2013) have one of the lowest residential electricity rates in Canada, and correspondingly, Canada has one of the lowest residential rates in the world (2009). In the literature reviewed, continued pressure to increase rates throughout Canada is evident and is expected to continue into the next decades.

Review of Increased Energy Costs on Consumers

Literature suggests that the displacement effects of rate increases predominantly affect the poor and those with low income or fixed incomes. The middle and upper class are not as affected as such costs are absorbed through greater disposable income.

Energy Efficiency and Reduction Initiatives

The literature also suggests that best means of mitigating such affects on those most affected will be to aggressively pursue energy efficiency and reduction initiatives. While MH is known for such programs, continued emphasis on such programs is suggested, along with on-going monitoring, in light of the proposed rate increases.

Optimizing demand side management (DSM) will be critical moving forward to manage impacts to ratepayers.

Socio-economic Impact of Key Alternative Scenarios

Evaluation of Alternative Plans

The use of Multiple Account Benefit Cost Analysis (MA-BCA) to ascertain socio-economic benefits focuses on the identification of net benefits from a broader social perspective. It also enables comparisons of the distributional advantages and disadvantages of various plans over the stated life cycle of the plan. MA-BCA is a methodology utilized to evaluate options and used to assist in program and policy decision-making.

The MA-BCA assesses the preferred and three alternative resource development plans, and include:

- the Preferred Development Plan;
- the Smaller Interconnection Plan (K19/Gas 24/250MW Interconnection);
- Keeyask with No Interconnection (K2/Gas); and
- Gas Thermal with on new Interconnection (all Gas).

The MA-BCA was based on the reference scenarios assuming a 78-year net present value metric. It is noted that while sensitivity analysis was undertaken for all of the alternatives, there still remains key assumptions within the economic, financial and sensitivity analysis (future load forecasting, the effect of demand side management, drought exposure, export sales and provincial revenues etc.), that would materially affect the outcome of this review.

Market Valuation

The key assumption effecting results is the discount rate utilized. The discount rate is a critical parameter in cost benefit analysis especially when costs and benefits differ in distribution over time. This is especially important when they occur over a long period of time. The 6% real discount rate chosen for the PDP, based on a social cost of capital, is reasonable based on literature reviewed.

The results are correspondingly reasonable.

Manitoba Hydro Customer Account

Pressure on rate increases is expected to continue globally and throughout Canada, and residential users should expect to pay for increasing rates. While the PDP has the greatest rate annual projected rate increases proposed in all plans, it will require residents of Manitoba to pay higher rates in the short term (until year 2031). The cumulative rate increases of all plans are not substantially different, with the benefits of the PDP incurring over the longer term as inflationary costs are reduced with the PDP limiting rate increases over the longer term. The key observation is pay now, benefit later regarding rates. Flexibility regarding MH objective to achieving the 20-year 75:25 debt/equity ratio is one means of dealing with rate issues.

Further discussion regarding the short to medium term rate increases associated with the MH plans should be clearly outlined and understood by the people of Manitoba as part of this process.

From a system reliability perspective, the PDP is preferred; however all of the development plans can handle load requirements under the majority of adverse conditions.

Manitoba Government Account

This account focuses on the net benefits to government over the term of the PDP. The results are based on identifying only direct incremental taxes and fees paid by Manitoba Hydro, net of incremental Government cost or risks. The key driver for revenues to the Provincial government in this account is represented by the capital taxes and water rentals. The account also assumes a "wash" for various taxes, such as coal tax and carbon charges taxes, discussed in the environmental review of the NFAT, and the debt guarantee fund, while substantial, is balanced between what MH owes and what the government of Manitoba secures. The approach the MA-CBA takes regarding the other total charges to government, such as the provincial debt guarantee is reasonable.

Manitoba Economy Account

The Manitoba account is specific to the employment and wages generated by the project in each plan, and estimates the potential incremental income that employment (wages) offers for Manitobans. The assumptions regarding proportioning the net economic rent (the additional wages earned net of) that would be derived, is based on project location and the employment/unemployment characteristics in that region. Northern regions with greater unemployment would result in greater net benefits, and the PDP is preferred. The assumptions made are reasonable.

Social Account

The societal benefit of hydroelectric projects outlined in the PDP should be considered in context to the $1 billion dollars in sunk costs incurred for the Keeyask Generating Project, and the $300 million in sunk costs for the Conawapa Generating Project, during project development. Such costs are not considered in the evaluation undertaken to justify the PDP. From a socio-economic perspective, while the investment of the $1 billion invested for KGP as sunk costs, is substantial, the corresponding socio-economic benefits derived from some of the sunk cost expenditures, such as the Joint Keeyask Development Agreement and related project benefits as well as Keeyask Infrastructure Project support the optimization of socio-economic benefits for First Nations and northern communities.

The MA-BCA is a reasonable approach to ascertain socio-economic benefits, and based on the reference scenarios provides insight into the distributional benefits of the alternative plans studied. Considerable risk and uncertainty remains. To address such issues the concept of pathways is introduced.

The Significance of Pathways

To deal with risk and uncertainty over the period of the plan, the concept of pathways were identified in the PDP. The decision pathways enable MH the flexibility to modify the PDP to address risk and uncertainty and the ever-changing market characteristics over the longer term of the plan. From a socio-economic perspective the critical decision point within the pathways, if the PDP is pursued, is decision specific to the construction of Conawapa, which does not have to be made until 2018.

Between 2014-2018, the risk and uncertainty factors should be studied in detail and reported back to the PUB prior to the decision date, to enable the government of Manitoba to make an informed decision regarding its future energy policy decisions. The Government of Manitoba should provide the PUB direction enabling the PUB to work directly with MH as such risk and uncertainty is addressed.

High-level review of approaches to optimizing Provincial economic benefits of large-scale resource projects

The utilities benchmarked (Québec Hydro and Nalcor) have benefited from lessons learned from previous hydroelectric developments and incorporated initiatives to optimize local and regional benefits, specifically for northern and indigenous populations. Provincial and Canadian wide benefits are driven for the most part from construction benefits (employment) and a lesser extent operational employment jobs which are local. Such economic impacts are derived from IOM's. Provincial revenues are secured from export sales and on-going government tax revenues from water rentals etc.

Legal or quasi-legal agreements with First Nations have been secured in all jurisdictions. Cooperation with other Federal and local agencies involved in employment training and social services has also been pursued and resulted in successful economic optimization strategies. Equity ownership and management and administrative assistance also help in building capacity within the organization, as outlined in the MH example via the Joint Keeyask Development Agreement.

Manitoba Hydro's approach to optimizing provincial economic benefits reflects industry practices. On-going monitoring of the success of all of the related socio-economic optimization strategies should be pursued; lessons learned identified and implemented going forward.

Summary

From a socio-economic perspective, the approach assumptions and findings MH has presented are reasonable. Overall the PDP exhibits the greatest socio-economic benefits to the people of Manitoba, northern communities and First Nations compared to other plans based on the reference plans evaluated.

Use of the Statistics Canada Interprovincial IOM utilized in this review suggests that, based on MH assumptions that the Manitoba related economic impact benefits may have been understated while the rest of Canada benefits overstated, making the PDP more attractive to Manitobans as greater benefits are derived. The Statistics Canada Interprovincial model confirms the overall benefits derived from the PDP are reasonable.

Planned investments are significant over the next decade (as outlined in the proposed PDP), placing increased pressure on the provincial debt and rates, in the short and medium term. The PDP is intended to contribute to the growth of the Manitoba economy, strengthen relationships with First Nations and create a lasting legacy for future generations. By doing so the PDP supports Manitoba Hydro's Corporate Strategic Plan (MCSP) 2012-13 and

goals of the corporation, with two corporate goals in the MCSP being highlighted, supporting Aboriginal people and Provincial economic development.[69]

Throughout the short/medium term the Keeyask Generating Project would generate significant socio-economic benefits for the people of Manitoba, First Nations and northern communities and if not pursued such benefits would be forgone, inclusive of the sunk costs already allocated to the Keeyask Generating Project.

Over the longer term considerable uncertainty and risk remains and the introduction of pathways in the decision making process enables such risk and uncertainty to be studied prior to a decision being made on Conawapa.

Both Keeyask and Conawapa are capital intensive projects, creating significant employment throughout construction, and operational benefits. Monitoring issues related to access, health, education and the cultural implications of project development, while identified, should be monitored aggressively, and lessons learned implemented on an annual basis to ensure sustainable capacity building within First Nations and northern communities.

[69] Needs for and Alternatives to: Appendix H - Corporate Strategic Plan 2012-2013

8 NON MANITOBA HYDRO REFERENCES

Canadian Electricity Association, Power for the Future; Electricity's Role in a Canadian Energy Strategy (2012).

International Renewable Energy Association, Renewable Power Generation Costs in 2012: An Overview (2012).

Life Cycle Inventories of Hydroelectric Power Generation ESU Fair Consulting in Sustainability (Karin Flury, Rolf Frischknecht).

NALCOR Energy (http://www.nalcorenergy.com/churchill-falls.asp).

Pan-African Investment and Research Services the Impact of Electricity Price Increase and Eskom's Six-Year Capital Investment Programme on the South African Economy (May 2011).

Québec Hydro, Eastmain-1A/Sacelle Rupert Project (http://www.hydroQuébec.com/rupert/en/).

APPENDIX A

Key Manitoba Hydro and NFAT Reports Referenced in this Review

Executive Summary

Chapter 1: Introduction

Chapter 2: Manitoba Hydro's Preferred Development Plan

Chapter 7: Screening of Manitoba Resource Options

Chapter 8: Determination and Description of development plans

Chapter 12: Economic Evaluations - 2013 Update on Selected Development Plans

Chapter 13: Integrated Comparison of Development Plans - Multiple Account Analysis

Chapter 14: Conclusions

Chapter 15: Implementation and Risk Management Plan for Preferred Development Plan

Appendix F: Economic Outlook 2012-2023

Appendix G: Economic Outlook 2013-2034

Appendix H: Corporate Strategic Plan

Appendix J: Sustainable Development Plan

Appendix 2.2: Joint Kayaks Development Agreement

Appendix 2.3: Economic Impact Assessment

Appendix 2.4: Developing the Keeyask and Conawapa Capital Cost Estimates

Appendix 4.3: Demand Side Management Potential Study

Appendix 9.1: High Level Development Plan Comparison Table

Appendix 11.5: Enlarged Figures 11.1-11.7

Appendix 15.1: Keeyask Aboriginal Partnership Business Risks

Keeyask Generation Project; Environmental Impact Statement Supporting Volume Socio-economic Environment Resource Use and Heritage Resources: Section 3; Economy

Keeyask Generation Project; Environmental Impact Statement Supporting Volume Socio-economic Environment Resource Use and Heritage Resources; Section 4; Population, Infrastructure and Services

Keeyask Generation Project; Environmental Impact Statement Supporting Volume Socio-economic Environment Resource Use and Heritage Resources; Section 5; Personal, Family and Community Life

APPENDIX B

What Economic Impact Models Measure

What Input Output Models Measure

An input output model (IOM) is a way of understanding and estimating how economic changes in one industry can affect other industries. For example, changes in lumber sales will have immediate (direct) effects on the sawmill industry, but also less immediate (indirect) effects on the logging industry, the transportation industry, and any other industries which provide inputs to the sawmill industry.[70] IOMs can be used to predict how an increase or a decrease in demand for the products of one industry will have an impact on other industries and therefore on the entire economy. An input-output analysis is based on:

- identifying a basket of goods and services used by a specific project and then; and
- tracking through all of the steps involved in producing those goods and services, to identify the total extent to which the provincial economy will be affected by project expenditures.

The results of IOM are presented based on three different types of impacts:

- The **direct supplier industry impact** measures the impact on provincial industries supplying goods and services directly used by the project;
- The **indirect supplier industry impact** measures the impact on provincial industries that are further back in the supply chain. The indirect impact is cumulative, and includes transactions going all the way back to the beginning of the supply chain; and
- The **induced impact** measures the effect that spending by workers (those employed by the project, or by direct and indirect supplier industries) has on the economy.

Output, GDP, employment, and tax revenues are the key measures used to assess the economic impacts associated with a project. In order to properly interpret the results of an analysis, some background information about what these measures represent and how they are calculated is presented.[71]

- Output is simply a measure of the total value of production associated with a project. In an industry-based analysis, output is equal to the value of goods and services produced by the provincial industry or industries that are affected by a specific project. In an expenditure-based analysis, it can be measured as the total dollar amount of all spending on goods and services produced in province. It should be noted that purchases of goods and services produced outside the province do not directly affect in- province businesses, so these expenditures are explicitly excluded from the analysis (allocation of expenditures to input output categories). This is usually the main reason why the direct impact on provincial industries is less than initial project expenditures.
- Gross Domestic Product (GDP) is a measure of the value added (the unduplicated total value of goods and services) to the provincial economy by current productive activities

[70] IOM's are derived from inter-provincial input-output tables developed by Statistics Canada. These tables provide a snapshot view of the economy in a given year, and include details on commodities, industries, and "Final demand" categories. The information in the tables is combined with a set of computer algorithms and used to estimate the economic impact associated with specific projects.

[71] BC Stats

attributable to the project. It includes household income (wages, salaries and benefits, as well as income earned by proprietors of unincorporated businesses) from current productive activities as well as profits and other income earned by corporations. Only activities that occur within the province are included in GDP.[72]

- Employment estimates generated by models are derived from estimated wage costs using information on average annual wages in an industry. They are not full-time equivalent (FTE) measures. Instead, they reflect the wages paid and hours spent on the job by a typical worker in an industry. For an industry where most employees work full time, the numbers will be very similar to FTE counts. However, in an industry where part-time work is more common, the job counts will be quite different from FTEs. Some models also provide FTE estimates.
- Government tax revenue estimates generated by input-output models include commodity taxes paid to federal, provincial and local governments. Some models also provide estimates of federal and provincial personal and corporate income taxes. Commodity taxes include PST, GST and other taxes such as gas taxes, liquor and lottery taxes and profits, air transportation taxes, duties and excise taxes.
- *Municipal tax revenues* include property taxes and other taxes such as accommodation taxes levied in some communities. Property tax revenues are included in the supplier industry impacts calculated by the model. Property taxes paid by the project are only reported if they have been explicitly included as an expenditure item in project expenditures.

[72] GDP is calculated by subtracting the cost of purchased goods, services and energy from the total value of an industry's output. As a result, the value of the work done by a producing industry is only counted once. In the case of a construction project, the direct GDP impact would only include the value of the work done by the construction firm. The indirect impact on the sawmill industry would only include the value of the work done to transform the logs into lumber, and the indirect impact on the logging industry would be a measure of the value of the work done by the loggers. There is no double counting in GDP measures.

It should be noted that the relationship between GDP and output is a useful analytical measure since it shows the extent to which industries rely on labour and capital as opposed to material and service inputs in production. The analysis of economic impacts relies on this relationship, since output is more easily and directly measured than GDP. In fact, the starting point for most input-output analyses is a measure of the direct output associated with a project. From this, known relationships between output and other indicators such as GDP and employment can be used to estimate the economic impact associated with a specific project (BC Stats).

APPENDIX C

Statistics Canada Interprovincial Input-Output Model 2009: Impact of Keeyask Generating Station

Simulation options selected by the user:

Table 1.1a Summary of original shock
(Thousands $)

Commodities (Detailed level)			Quebec	Ontario	Manitoba	Saskatchew	Alberta	British Colu	Total
45	ENE221100	Electricity	0	0	34,488	0	0	0	34,488
116	MPG321102	Softwood lumber	0	0	11,496	0	0	0	11,496
119	MPG321201	Veneer and plywood	0	0	22,771	0	0	0	22,771
140	ENE324111	Gasoline	0	0	1,326	0	0	0	1,326
141	ENE324112	Diesel fuel	0	0	124,689	0	0	0	124,689
147	MPG3241B0	Lubricants and other petroleum and coal products	0	0	2,432	0	0	0	2,432
159	MPG325500	Paints, coatings and adhesive products	0	0	5,306	0	0	0	5,306
162	MPG325900	Chemical products not elsewhere classified	0	0	10,391	0	0	0	10,391
175	MPG327301	Cement	0	0	46,206	0	0	0	46,206
177	MPG327303	Concrete products	0	0	4,643	0	0	0	4,643
182	MPG327A09	Non-metallic mineral products, not elsewhere classified	0	0	6,190	0	0	0	6,190
183	MPG331100	Iron and steel basic shapes and ferro-alloy products	0	0	2,874	0	0	0	2,874
184	MPG331201	Iron and steel pipes and tubes (except castings)	0	0	19,234	0	0	0	19,234
185	MPG331202	Rolled and drawn steel products including wire	0	0	28,961	0	0	0	28,961
192	MPG331502	Non-ferrous metal castings	0	0	6,411	0	0	0	6,411
196	MPG332301	Prefabricated metal building and components	0	0	63,008	0	0	0	63,008
197	MPG332302	Fabricated steel plates and other fabricated structural metal	0	0	167,358	0	0	0	167,358
199	MPG332309	Other ornamental and architectural metal products	0	0	884	0	0	0	884
213	MPG333200	Other industry-specific machinery	0	0	177,085	0	0	0	177,085
217	MPG333500	Metalworking machinery	0	0	5,306	0	0	0	5,306
220	MPG333901	Pumps and compressors	0	0	10,391	0	0	0	10,391
221	MPG333902	Material handling equipment	0	0	68,535	0	0	0	68,535
222	MPG333909	Other miscellaneous general-purpose machinery	0	0	442	0	0	0	442
232	MPG334409	Other electronic components	0	0	15,697	0	0	0	15,697
237	MPG335301	Transformers	0	0	26,530	0	0	0	26,530
238	MPG335302	Electric motors and generators	0	0	222,406	0	0	0	222,406
239	MPG335303	Switchgear, switchboard, relays and industrial control apparatus	0	0	32,499	0	0	0	32,499
246	MPG336120	Medium and heavy-duty trucks and chassis	0	0	76,494	0	0	0	76,494
248	MPG336202	Motor vehicle bodies and special purpose motor vehicles	0	0	1,105	0	0	0	1,105
287	MPS481001	Air passenger transportation services	0	0	30,288	0	0	0	30,288
291	MPS482002	Rail freight transportation services	0	0	47,090	0	0	0	47,090
293	MPS483002	Water freight transportation services	0	0	9,949	0	0	0	9,949
295	MPS484002	General freight truck transportation services	0	0	21,666	0	0	0	21,666
385	MPS541909	Other professional, scientific and technical services	0	0	181,507	0	0	0	181,507
423	MPS722001	Prepared meals	0	0	20,560	0	0	0	20,560
439	FIC130000	Office supplies	0	0	2,653	0	0	0	2,653
467	PRM500000	Wages and salaries	0	0	702,150	0	0	0	702,150
Total			0	0	2,211,021	0	0	0	2,211,021

Simulation options selected by the user:

Table 1.2 Impact on GDP
(Thousands $)

	Quebec	Ontario	Manitoba	Saskatchew	Alberta	British Colu	Total	
Total impact, open model								
Expenditure-based								
Final domestic expenditures on commodities	0	0	2,211,021	0	0	0	2,211,021	0
International imports (intermediate inputs)	-13,182	-34,697	-627,855	-5,524	-23,145	-10,628	-717,883	-90,028
Interprovincial imports (intermediate inputs)	-7,582	-18,941	-513,879	-18,340	-30,104	-11,834	-606,456	-92,577
Inventories and other commodity leakages	-3,116	-4,177	-12,372	-710	-8,015	-1,939	-31,263	-18,891
Interprovincial exports	56,670	179,438	4,138	65,683	207,086	75,115	606,456	602,319
Total	32,790	121,623	1,061,054	41,108	145,823	50,714	1,461,875	400,821
Income-based								
GDP at market prices	32,790	121,623	1,061,054	41,108	145,823	50,714	1,461,875	400,821
Taxes on products (intermediate inputs)	468	2,454	75,805	1,457	1,040	1,620	82,974	7,169
Taxes on products (import duties)	34	89	1,688	15	64	38	1,933	244
Subsidies on products	-639	-1,083	-3,085	-228	-455	-1,012	-6,666	-3,581
GDP at basic prices	32,926	120,163	986,645	39,866	145,173	50,069	1,383,634	396,989
Subsidies on production	-214	-76	-136	-19	-17	-33	-508	-372
Taxes on production	1,189	4,433	10,425	921	4,135	1,603	22,958	12,533
Wages and Salaries	17,140	66,541	846,843	11,264	64,080	27,780	1,038,880	192,037
Supplementary labour income	2,739	10,729	18,554	1,883	8,653	4,684	47,810	29,255
Mixed income	980	4,166	8,594	448	1,269	1,704	17,276	8,681
Other operating surplus	11,092	34,372	102,364	25,369	67,052	14,331	257,219	154,855
Total impact, closed model								
Expenditure-based								
Final domestic expenditures on commodities	21,870	79,414	2,892,920	12,432	59,675	32,284	3,104,594	211,674
International imports (final expenditures)	-3,014	-10,602	-98,501	-1,766	-8,754	-4,313	-127,660	-29,159
International imports (intermediate inputs)	-20,251	-53,239	-647,448	-7,587	-29,567	-14,126	-776,400	-128,953
Interprovincial imports (final expenditures)	-2,059	-4,973	-114,708	-2,314	-7,590	-3,366	-136,180	-21,472
Interprovincial imports (intermediate inputs)	-13,326	-30,630	-567,213	-24,833	-41,314	-16,749	-701,903	-134,690
Inventories and other commodity leakages	-3,799	-5,636	-16,113	-1,339	-9,944	-2,434	-40,362	-24,249
Interprovincial exports	89,530	265,687	7,925	87,605	264,950	96,703	838,083	830,158
Total	68,950	240,019	1,456,863	62,199	227,456	87,999	2,160,172	703,309
Income-based								
GDP at market prices	68,950	240,019	1,456,863	62,199	227,456	87,999	2,160,172	703,309
Taxes on products (final expenditures)	2,105	6,404	62,616	1,072	3,983	2,530	79,315	16,699
Taxes on products (intermediate inputs)	966	4,562	81,685	1,897	1,606	2,359	93,324	11,639
Taxes on products (import duties)	125	361	3,692	59	271	129	4,660	968
Subsidies on products	-1,741	-2,085	-7,370	-694	-1,188	-1,503	-14,873	-7,503
GDP at basic prices	67,494	230,778	1,316,239	59,866	222,784	84,484	1,997,745	681,506
Subsidies on production	-451	-177	-228	-40	-26	-68	-1,015	-787
Taxes on production	3,445	11,197	36,847	1,930	7,551	3,339	64,892	28,045
Wages and Salaries	31,575	116,535	962,670	17,879	95,227	42,625	1,274,938	312,267
Supplementary labour income	4,995	18,085	33,905	2,729	11,919	6,625	79,257	45,352
Mixed income	2,042	8,121	16,909	892	2,502	2,727	33,468	16,558
Other operating surplus	25,888	77,016	266,137	36,476	105,611	29,236	546,206	280,069
Total supply	0	0	2,211,021	0	0	0	0	-2,211,021
Total interprovincial imports	7,582	18,941	513,879	18,340	30,104	11,834	0	-513,879
International imports	13,182	34,697	627,855	5,524	23,145	10,628	0	-627,855
Total supply	42,710	133,533	3,838,875	47,260	178,803	55,233	606,456	-3,232,419
Manitoba	595	2,647	3,206,243	1,457	2,120	982	7,925	-3,198,319
Total interprovincial imports	15,386	35,604	681,920	27,146	48,904	20,115	0	-681,920
International imports	23,265	63,842	745,949	9,353	38,321	18,438	0	-745,949
Total supply	97,299	302,771	4,634,113	77,955	294,939	109,198	838,083	-3,796,030
Manitoba	595	2,647	3,206,243	1,457	2,120	982	7,925	-3,198,319
Total interprovincial imports	15,386	35,604	681,920	27,146	48,904	20,115	0	-681,920
International imports	23,265	63,842	745,949	9,353	38,321	18,438	0	-745,949
Total supply	97,299	302,771	4,634,113	77,955	294,939	109,198	838,083	-3,796,030
Jobs								
Total	0	0	12,792	0	0	0	12,792	0
Total	415	1,436	17,137	242	968	633	20,962	3,826
Total	828	2,735	21,152	467	1,673	1,089	28,175	7,023
Industry output								0
Total	75,500	255,156	2,688,908	88,368	324,626	105,948	3,560,683	871,775
Total	144,380	463,375	3,198,055	127,722	462,721	164,913	4,597,181	1,399,125

Provincial Input-Output Multipliers, 2009
Industry Accounts Division / Statistics Canada

Manitoba

Multipliers and ratios per $1 of exogenous industry output shock
Jobs effects per million dollars of output

Industries (Detailed level) No.	Code	Title	Direct effect Within province: Output	GDP basic price	Labour income	Jobs	International imports	Export shares	Simple multipliers (direct and indirect) Within province: Output	GDP basic price	Labour income	Jobs	International imports	Simple multipliers (direct and indirect) All provinces: Output	GDP basic price	Labour income	Jobs	International imports	Total multipliers (direct, indirect and induced) Within province: Output	GDP basic price	Labour income	Jobs	International imports	Total multipliers (direct, indirect and induced) All provinces: Output	GDP basic price	Labour income	Jobs	International imports
22	BS221100	Electric power generation, transmission and distribution	1.000	0.758	0.349	3.6	0.030	0.235	1.189	0.870	0.428	5.1	0.041	1.315	0.940	0.470	5.7	0.051	1.387	0.999	0.482	6.317	0.088	1.681	1.157	0.570	7.873	0.118
26	BS23B000	Non-residential building construction	1.000	0.335	0.282	5.1	0.143	0.000	1.337	0.515	0.401	7.4	0.166	1.775	0.735	0.544	9.6	0.212	1.529	0.640	0.453	8.558	0.212	2.212	0.994	0.664	12.099	0.292
27	BS23C100	Transportation engineering construction	1.000	0.498	0.415	8.0	0.076	0.000	1.241	0.626	0.493	9.5	0.091	1.668	0.828	0.601	11.1	0.127	1.487	0.785	0.560	11.035	0.149	2.167	1.124	0.737	14.027	0.219
28	BS23C200	Oil and gas engineering construction	1.000	0.297	0.154	2.3	0.162	0.000	1.242	0.436	0.244	4.0	0.178	1.808	0.700	0.460	7.1	0.245	1.350	0.505	0.273	4.630	0.203	2.161	0.909	0.557	9.100	0.309
29	BS23C300	Electric power engineering construction	1.000	0.553	0.303	5.5	0.104	0.000	1.214	0.668	0.383	6.9	0.118	1.513	0.815	0.480	8.4	0.151	1.432	0.809	0.442	8.296	0.170	1.957	1.077	0.601	10.962	0.232
31	BS23C500	Other engineering construction	1.000	0.434	0.338	6.3	0.075	0.000	1.283	0.588	0.443	8.2	0.094	1.742	0.831	0.597	10.5	0.137	1.509	0.735	0.505	9.603	0.147	2.249	1.131	0.736	13.474	0.230
75	BS332300	Architectural and structural metals manufacturing	1.000	0.403	0.321	6.4	0.132	0.157	1.250	0.530	0.401	7.9	0.156	1.730	0.728	0.535	9.9	0.240	1.458	0.665	0.458	9.190	0.205	2.185	0.997	0.659	12.533	0.323

Jobs per million dollars of output in:	Direct Manitoba	Direct, indirect & induced Manitoba	Rest of Canada	All provinces
Provincial Input-Output Multipliers, 2009 (Statistics Canada)				
Electric power engineering construction	5.5	8.3	2.7	11.0
Other engineering construction	6.3	9.6	3.9	13.5
Keeyask Construction				
Total construction expenditures ($million):	2,285			
Jobs	2,436	8,347	16,144	24,491
Jobs per million dollars of expenditure	1.1	3.7	7.1	10.7
Conawapa Construction				
Total construction expenditures ($million):	3,396			
Jobs	3,238	9,303	20,964	30,267
Jobs per million dollars of expenditure	1.0	2.7	6.2	8.9
North-South Upgrades				
Total construction expenditures ($million):	142			
Jobs	171	586	605	1191
Jobs per million dollars of expenditure	1.2	4.1	4.3	8.4
750 MW Interconnection				
Total construction expenditures ($million):				
Jobs	119	498	588	
Jobs per million dollars of expenditure	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Construction

	Keeyask			Conawapa			N-S Upgrades			750 MW Interconnection		
Keeyask	Manitoba	ROC	Total	Manitoba	ROC	Total	Manitoba	ROC	Total	Manitoba	ROC	Total
Employment												
Project Direct	2,436	2,532	4,967	3,238	3,915	7,154	171	0	171	119	0	119
Other Direct	2,175	3,198	5,374	1,831	3,448	5,279	164	219	383	124	144	268
Indirect and Induced	3,736	10,414	14,151	4,234	13,601	17,835	251	386	637	255	444	700
Total Employment	8,347	16,144	24,491	9,303	20,964	30,267	586	605	1,191	498	588	1,086
Labour income	635,169	1,021,350	1,656,519	761,233	1,402,932	2,164,166	48,627	30,606	79,233	35,195	24,977	60,173
GDP ($millions)	843,908	1,440,223	2,284,131	983,334	1,997,461	2,980,795	67,189	54,676	121,865	50,209	39,642	89,851
Tax Revenues ($million)	204,340	251,927	456,268	256,096	342,663	598,759	13,954	7,546	21,501	16,069	7,146	23,215
Provincial	40,915	66,289	107,204	45,807	90,164	135,972	2,186	1,986	4,172	2,478	1,880	4,358
Local	161,059	307,444	468,502	195,872	426,252	622,124	12,538	10,935	23,474	10,714	12,437	23,151
Federal	406,314	625,660	1,031,974	497,776	859,080	1,356,855	28,679	20,467	49,146	29,261	21,463	50,724

Keeyask Generating Station, Comparison of Results

	MBS Results			Statistics Canada Closed Model			% Difference		
Employment	Manitoba	ROC	Total	Manitoba	ROC	Total	Manitoba	ROC	Total
Project Direct	2,014	2,463	4,477	12,792	0	12,792	-535.1	100.0	-185.7
Other Direct	1,887	2,644	4,531	4,345	3,826	8,171	-130.2	-44.7	-80.3
Indirect and Induced	3,089	9,047	12,136	8,360	7,023	15,383	-170.6	22.4	-26.8
Total Employment	6,990	14,153	21,144	21,152	7,023	28,175	-202.6	50.4	-33.3
Labour income	532,748	925,178	1,457,926	996,575	357,620	1,354,195	-87.1	61.3	7.1
GDP ($millions)	706,393	1,285,069	1,991,462	1,456,863	703,309	2,160,172	-106.2	45.3	-8.5
Tax Revenues ($million)*	171,154	225,519	396,673	147,993	29,306	177,299	13.5	87.0	55.3
Provincial	34,745	59,340	94,085	107,375	18,090	125,465	-209.0	69.5	-33.4
Local	135,280	272,249	407,529	955	72	1,027	99.3	100.0	99.7
Federal	341,180	557,108	898,288	39,663	11,144	50,807	88.4	98.0	94.3
Average wage (calculated)	76,216	65,370	68,952	47,115	50,924	48,064			
Total Employment, estimated using average wage assumed by MBS	6,990	14,153	21,144	13,076	5,471	19,640	87.1	-61.3	-7.1

*Statistics Canada tax revenues only include commodity taxes

Employment												
Project Direct	39	0	39	42	0	42				1	0	1
Other Direct	2	1	3	2	1	4				0	0	0
Indirect and Induced	29	16	45	33	18	50				1	1	1
Total Employment	70	17	87	77	19	96				2	1	2
Labour income	5921	648	6569	6597	734	7331				123	23	145
GDP ($millions)	6872	1054	7926	7676	1184	8860				149	37	186
Tax Revenues ($million)	831	117	948	931	132	1063				22	5	27
Provincial	162	31	193	182	35	217				5	1	7
Local	988	128	1116	1099	144	1243				23	5	29
Federal	1981	276	2257	2212	311	2523				51	12	63

Tab 107

NEED FOR AND ALTERNATIVES TO (NFAT) REVIEW

NFAT review for Manitoba Hydro's proposed preferred development plan for the Keeyask and Conawapa Generating Stations, their associated domestic AC transmission facilities and a new Canada-USA transmission interconnection

EVALUATING MACRO ENVIRONMENTAL IMPACT

FEBRUARY 2014

Testimony of Rick Hendriks

Submitted to the Manitoba Public Utilities Board

On behalf of the Manitoba Métis Federation

CAMERADO energy consulting inc.

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1 INTRODUCTION

1.1 BACKGROUND

The *Manitoba Hydro Act* requires approval from the Lieutenant-Governor in Council for the development of new electricity generating stations, interconnections, and contracts for power exports and imports. In January 2011, the Government of Manitoba notified Manitoba Hydro (Hydro) of its intention to carry out a Needs For and Alternatives To (NFAT) review of Hydro's Preferred Development Plan ("PDP", or "Plan"). In November 2012, the Minister of Innovation, Energy and Mines announced that the Government of Manitoba had requested the Manitoba Public Utilities Board ("PUB" or "Board") to conduct the NFAT.

On August 16, 2013, Manitoba Hydro filed its NFAT documentation with the PUB for approval of its PDP. This Plan includes:

- Development of the Keeyask Project, a 695-megawatt (MW) hydroelectric generation project on the Nelson River with a proposed in-service date (ISD) of 2019;
- Development of the Conawapa Project, a 1,485-MW hydroelectric generation project on the Nelson River with an earliest ISD of 2026;
- Development of the North-South Transmission Project, a proposed 185-MW transmission line with an in-service date coinciding with the Conawapa Project;
- Development of the Manitoba-Minnesota Transmission Upgrade Project, a proposed 750-MW transmission intertie between Manitoba, Minnesota and Wisconsin with an in-service date of 2020;
- Development of natural gas generation facilities later in the planning period; and
- Six long-term export commitments, with Minnesota Power (MP), Wisconsin Public Service (WPS) and Northern States Power (NSP).

Manitoba Hydro notes that while the PDP includes the Conawapa Project, decisions on whether or not to construct Conawapa and its specific timing are not required now. However, activities (and spending) would continue to protect an in-service date for Conawapa as early as 2026, but conditions will be continually monitored to determine if such continued investments are worthwhile and, ultimately, to determine if Conawapa should be constructed and for what ISD.

The PUB is to submit a report to the Minister responsible for the administration of *The Public Utilities Board Act* by June 20, 2014. The report is to include recommendations to the Government of Manitoba on the need for the PDP and whether the Plan is in the best long-term interest of the Province compared to other options and alternatives.

1.2 QUALIFICATIONS

Rick Hendriks is Director of Camerado Energy Consulting, an Ontario-based consulting firm providing management consulting, strategic planning, research, and negotiation services to Aboriginal communities, community energy cooperatives, municipalities and non-governmental organizations with respect to energy planning, assessment, development and conservation. Mr. Hendriks' work with Aboriginal communities has focused on the environmental assessment of proposed hydroelectric, transmission and mining developments on or adjacent to some of the largest rivers in Canada, including the Mishta-shipu (Churchill) River in Nitassinan (Labrador), the Attawapiskat River in Treaty 9 (northern Ontario), the Slave River in Treaty 8 (Alberta and the Northwest Territories), and the Peace River in Treaty 8 (BC) in the traditional territory of the Dane-zaa.

Mr. Hendriks works closely and collaboratively with community and organizational leadership to envision, implement and achieve strategic objectives. Trained in engineering, science and social science, he brings an analytical, structured and comprehensive approach to understanding and explaining the opportunities and risks of development proposals.

Rick has provided testimony in several proceedings evaluating the environmental and socio-economic risks and benefits of hydroelectric development in Alberta, British Columbia, and Newfoundland and Labrador. At the recent environmental assessment hearings for BC Hydro's proposed Site C Clean Energy Project on the Peace River, he prepared written submissions and provided oral testimony concerning: the socio-economic benefits of wind resources; effectiveness of mitigation measures related to fish, fish habitat and fishing; and the development of site alternatives to the proposed Site C Project as a means to provide for potential reconciliation of the rights of the Crown with the rights of the affected First Nations.

Prior to founding Camerado Energy in 2009, Rick worked for six years with Chignecto Consulting Group, supporting natural resource negotiations between Aboriginal groups, government and industry with respect to mining and hydroelectric developments across Canada. Previous to that, Rick worked for the Innu Nation in Labrador as their environmental and engineering analyst for the proposed Lower Churchill Project.

Mr. Hendriks is a founding member of the Hamilton Association for Renewable Energy, and a member of the Ontario Waterpower Association, the Ontario Sustainable Energy Association and the Ontario Association for Impact Assessment.

1.3 MANDATE

The Terms of Reference for the NFAT Review of Manitoba Hydro's PDP require "an assessment as to whether the Plan is justified as superior to potential alternatives that could fulfill the need."[1] This assessment requires consideration of "the macro environmental impact of the Plan compared to alternatives", [2] which involves "a critical analysis of the macro environmental impacts and benefits of Manitoba Hydro's Preferred Development Plan (PDP) and alternative Plans." [3]

I was requested by the Manitoba Métis Federation (MMF) to review the available evidence concerning the macro environmental impact of the PDP and the alternative Plans, paying particular attention to the requirements of the definition of macro environmental impact provided by the PUB. Secondly, I was asked to comment on the determination of the macro environmental impact of the hydroelectric resources used in the various development plans, and to identify additional relevant information that would assist the Board in fulfilling its mandate.

[1] Terms of Reference – Needs For and Alternatives To (NFAT) Review, at p.2.
[2] Ibid., at p.3.
[3] Manitoba PUB, Order 92/13, at p. 13.

2 MACRO ENVIRONMENTAL IMPACT

2.1 REQUIREMENTS OF THE TERMS OF REFERENCE

The Terms of Reference for the NFAT Review detail the scope of the review to be undertaken by the PUB, and include:

> An assessment as to whether the Plan is justified as superior to potential alternatives that could fulfill the need. The assessment will take the following factors into consideration:
>
> i. The macro environmental impact of the Plan compared to alternatives; [4]

2.2 SCOPING THE DEFINITION OF MACRO ENVIRONMENTAL IMPACT

Prior to providing clarification with respect to interpretation of "macro environmental", the PUB, in Order 67-13, required Manitoba Hydro and any approved intervener intending to address this factor to submit a definition of this term. The PUB received several responses to its request, and I reviewed these responses in preparing this evidence in order to better understand the intentions and expectations of the Board when defining this factor, as well as the positions of other NFAT participants.

Manitoba Hydro

In its response to the PUB request, Manitoba Hydro provided a definition of macro environmental impact as follows:

> Macro environmental: high level summary of environmental impacts and benefits sufficient to compare resources (not detailed evaluations such as in EIS) [5]

Hydro's primary preoccupation in submitting this definition was to avoid any duplication of effort with the environmental assessment process being carried out by the Clean Environment Commission (CEC) in relation to the proposed Keeyask Project, one component of Hydro's PDP. Hydro noted that the recommendations and the final report of the CEC process would be available to the PUB prior to the PUB issuing its recommendations regarding the NFAT.

In my view, that duplication can be avoided by timely provision to the PUB of the recommendations of the CEC with respect to the Keeyask Project, including any findings with

[4] Terms of Reference – Needs For and Alternatives To (NFAT) Review, at pp.2-3.

[5] Letter of Manitoba Hydro to Mr. H. Singh (PUB) of June 28, 2013 re: Manitoba Hydro NFAT Terms of Reference Meaning of "Macro Environmental" and "Socio-economic", at p. 1.

respect to the significance of the environmental effects. The provision of this information, though necessary, is not sufficient for the PUB to make its determinations respecting the macro environmental impact of the Plan and the alternatives that include the proposed Keeyask Project, for reasons discussed further below.

In its response to the PUB request, Hydro also described the three-step process it used in its consideration of macro environmental impact:

1. Screening level analysis
    - Sixteen available resource technologies were screened against over fifteen technical, economic, environmental and socio-economic criteria

The screening process undertaken by Hydro is described in Chapter 7 of the NFAT. Detailed information is summarized in Table 7.1, and further information concerning emerging energy technologies is provided in Appendix 7-1. The relevant findings in the NFAT concerning the macro environmental impact of hydroelectric resources are discussed below in section 3 of this submission.

2. Preferred and alternative development plans
    - Specific resource plans were developed from the "screened in" technologies
    - A qualitative analysis of the potential environmental and socio-economic impacts of the specific resources in the preferred and alternative plans was undertaken
    - For the Keeyask, Conawapa and Manitoba-Minnesota Transmission Projects, Hydro drew on its existing understanding of these components of the PDP
    - For natural gas turbine and wind projects, Hydro drew from past environmental impact statements and licenses (underlining added)

The proposal to use a qualitative approach to analyzing the environmental impacts is generally appropriate. However, where quantitative information is available (e.g. in the case of greenhouse gas emissions), it should be used to support the understanding of the significance of the effects and the comparison between alternative plans and the PDP. A decision not to provide quantitative information that could be reasonably prepared is not a valid reason for resorting to a qualitative approach.

As indicated above, there are limitations to relying solely on the Keeyask environmental impact statement and existing preliminary understandings of the other PDP components, which have yet to be constructed. In my view, it is also important to consider available information concerning the known effects of similar projects developed on the same river or on rivers in similar environments, and some examples of this kind of information are discussed and

analyzed further in section 4 below. The Keeyask and Conawapa projects are not the first hydroelectric facilities constructed on the Nelson River, the Nelson River is not the only river to be developed with multiple hydroelectric facilities, and northern Manitoba is not the only region to be extensively developed for hydroelectric purposes.

Manitoba Hydro's suggested use of previous environmental impact statements, licenses and other related existing information for other similar projects is important and necessary in the case of wind and natural gas resources as well hydro resources, since no detailed environmental assessments have yet been undertaken for specific wind and gas resources that would be developed as part of any alternative plans to the PDP.

3. Multiple Account Cost-Benefit Analysis (MA-CBA)

- The MA-CBA is a disaggregated form of cost-benefit analysis that integrates project specific environmental and socio-economic considerations along with other factors. It was used to assess the full range of economic, environmental and social advantages and disadvantages of the different plans to Manitobans
- The overall socio-economic benefit of the preferred and alternative plans was assessed by examining the advantages and disadvantages in terms of seven accounts of which "environment" is one
- The environment account "assesses the consequences of the different plans for the environment. It analyzes impacts on GHG emissions in Manitoba and elsewhere, criteria air contaminant (CAC) emissions in Manitoba, and natural resource and other bio-physical effects associated with the construction and operation of the projects in the different plans, and assesses the externality (net social cost) they represent. For GHGs this is done quantitatively; for other impacts it is done qualitatively."[6]

The MA-CBA compared the PDP to three plans as follows:

- Plan 1 – Gas Thermal with No New Interconnection (All Gas)
- Plan 2 – Keeyask with No New Interconnection (K22/Gas)
- Plan 4 – The Smaller Interconnection Alternative (K19/Gas24/250MW)

Specific limitations to the MA-CBA respecting the consideration of hydroelectric resources are discussed below in section 3. I note also that the MA-CBA did not compare the PDP to any of

[6] Letter of Manitoba Hydro to Mr. H. Singh (PUB) of June 28, 2013, at p. 4.

the alternative plans containing wind resources. This issue is addressed more fully in my submission to the PUB pertaining to the macro environmental and socio-economic considerations of wind resources.

Consumers Association of Canada

In addition to Manitoba Hydro, the Consumers Association of Canada (CAC) also submitted its understanding of macro environmental impact to the PUB. The CAC made several observations that appear to have informed the PUB's determination of the definition of macro environmental impact, including a six-part definition of which the final three parts were as follows:

4. The macro level environmental effects findings presented to and discussed in the PUB process should be based on detailed existing analyses and the level of confidence about the conclusions ought to be clearly established. (p.2) (underlining added)

The request by the CAC for consideration of detailed existing analyses echoes the approach proposed by Hydro with respect to reliance on previous environmental impact statements and licenses.

5. The macro level environmental effects covered should include potential and likely effects, positive and adverse effects, individual and cumulative effects, and interactions among effects. (p.2-3) (underlining added)

This speaks to the need to address and consider a broad set of changes to environmental conditions.

6. The macro environmental effects discussion should consider not only the effects listed above but also the implications for the relative merits and the Plan components in light of the relative significance of the effects and the trade-offs involved in proceeding with the major Plan components and alternatives. (p.3) (underlining added)

The reference to "significance" is important given the task in front of the PUB. Not all changes are material for either the biophysical or socio-economic environments. Ecosystems have a degree of resiliency and human communities a degree of adaptability, and it is therefore important to focus on those effects that may threaten that resilience or capacity to adapt. Secondly, the "relative" significance is also material since the consequences of the changes to environmental conditions resulting from the PDP must be compared to the potential alternatives that could fulfill the need.

Manitoba Métis Federation

In its response to the PUB request, the MMF requested that I provide a definition of macro environmental impact, which was submitted to the PUB as follows:

> macro environmental impact means: the collective adverse changes to the air, land, water, flora and fauna, including the potential significance of these changes, their equitable distribution within and between present and future generations, and their implications for ecological processes, biodiversity and life support systems of the environment. [7]

In preparing this definition, I relied on the requirement of the NFAT Terms of Reference to assess the "alignment of the Plan and alternatives to … the Principles of Sustainable Development as outlined in the *Sustainable Development Act*", which involve:

- management for equitable benefit within and between generations (Principle 2 – Stewardship, and Principle 3 – Shared Responsibility and Understanding);
- significant adverse environmental effects (Principle 4 – Prevention), where significance typically refers to effects that are not only large in "scale, scope or capability" but that are also, for example, of long duration or irreversible; and
- the need to maintain ecological processes, biodiversity and life support systems of the environment (Principle 5 – Conservation and Enhancement), which suggests the need for consideration of the impact of the plan and its alternatives in the context in which they would occur, suggesting the need for consideration of cumulative environmental changes.

Finally, I cautioned against the use of a "summary", which implies a summation of the environmental changes. In general, this is not possible since the kinds of environmental changes will be different between the PDP and the alternatives and cannot simply be "summed" for the PDP and the alternatives and the end results readily compared. This was the basis for proposing the term "collective" in the definition, which was accepted by the PUB, and which implies a bringing together of the consequences of the environmental changes where their characteristics are maintained and distinguishable.

[7] Letter of MMF to PUB Order 67/13, dated July 2, 2013, at p.1 of attached memo "Meaning of Macro Environmental Impact".

2.3 APPLYING THE DEFINITION OF MACRO ENVIRONMENTAL IMPACT

In Order 92-13, the PUB provided the following definition of macro environmental impact for use by participants in the NFAT:

> macro-environmental impact: the collective macro-environmental consequences of changes to air, land, water, flora and fauna, including the potential significance of these changes, their equitable distribution within and between present and future generations.[8]

Based on the contributions of Manitoba Hydro and the CAC, the explanations provided previously on behalf of the MMF, and the definition itself, I understand the definition to imply the following with respect to these key terms:

- Collective: a bringing together of the consequences resulting from all components of the PDP or of the alternative plans that maintains their defining features
- Consequences: includes potential and likely, positive and adverse, direct and indirect, individual and cumulative, secondary and synergistic, where likelihood is determined by:
  - Probability of occurrence
  - Scientific uncertainty [9]
- Significance: consideration of the following criteria in relation to the "consequences of the changes":
  - Magnitude
  - Geographic extent
  - Duration and frequency
  - Degree to which the consequences of the changes are reversible or irreversible
  - Ecological context [10]

I am proposing use of the above understanding of significance provided by the Canadian Environmental Assessment Agency (formerly FEARO) since:

- It is in wide use across Canada, thereby supporting comparisons and use of findings across different jurisdictions; and

[8] Manitoba PUB, Order 92/13, at p. 14.

[9] Federal Environmental Assessment Review Office. November 1994. A Reference Guide for the Canadian Environmental Assessment Act: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects, at p. 193

[10] Ibid., at p. 192.

- It has been in use for nearly two decades, allowing comparisons and use of findings over time.

Manitoba Hydro has indicated[11] that defining and determining "significance" is a task exclusively of the environmental reviews carried out by the CEC and to use the accepted understanding of this term leads to duplication. This is only the case to the extent that the PUB repeats the actions of the CEC. This is not what I am proposing, as the recommendations and conclusions of the CEC will serve as an input into the PUB process, not a replacement for that process.

The challenge facing the PUB is that it needs to be able to compare the macro environmental impact of the resources composing the PDP to those composing the alternative plans. Other than for Keeyask, we do not have access to environmental assessment findings for the resources being considered in the PDP and the alternative plans. Having multiple definitions and uses of the term "significance" does not allow for a consistent understanding, consideration and comparison of the "consequences of changes". The use of the accepted definition of significance does not preclude the use of professional judgment, particularly in highlighting the uncertainties in the findings of significance from the environmental assessment conducted for the Keeyask Project, and also in evaluating information from comparative situations where resources similar to those proposed have undergone environmental assessment or similar reviews elsewhere.

[11] See MH/MMF I-053a, and MH/MMF II-041.

3 REVIEW OF NFAT INFORMATION

3.1 MANITOBA HYDRO

3.1.1 Environmental Effects

Chapter 2 of the NFAT describes the PDP facilities. With respect to the potential environmental effects, a "high-level summary" of information with respect to proposed mitigation measures, residual effects, and potential cumulative effects is presented for each of the four components of the PDP.

In response to CAC/MH I-231a, Manitoba Hydro provided a more detailed high-level summary of effects to air, land, water, flora and fauna in relation to each of the components of the PDP as well as for natural gas and wind resources.

The materials in the NFAT and the responses to information requests though helpful to obtaining a preliminary understanding of the "consequences of changes to air, land, water, flora and fauna" are not sufficient to allow for "an assessment as to whether the Plan is justified as superior to potential alternatives that could fulfill the need." Other than a brief restatement of the conclusion to the Keeyask Project EIS given from the Proponent's perspective, there is limited information concerning the potential significance of the environmental changes, or how these environmental changes are equitably distributed within and between present and future generations.

Hydro also presents and considers the effects individually for each of the components, and not collectively. Some insignificant effects may indeed be significant when considering multiple impacts, multiple project components, or multiple developments interacting cumulatively or synergistically.[12] For example, the CEA Agency noted in its recently released operational policy statement on cumulative effects that a "cumulative environmental effects assessment should consider those VCs [valued components] for which residual environmental effects are predicted

[12] Hegmann, G., C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, L. Kingsley, W. Ross, H. Spaling, and D. Stalker. 1999. Cumulative effects assessment practitioners guide. Prepared by AXYS Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency. Hull, Quebec, at p.30.

after consideration of mitigation measures, regardless of whether those residual environmental effects are predicted to be significant".[13]

I anticipate that some of these shortcomings will be addressed with the submission of the report of the CEC in relation to the environmental assessment of the proposed Keeyask Project. However, the conclusions and recommendations to government provided by the CEC, though necessary to the NFAT, will apply only to a single component of the PDP and only to those plans in Table 9.3 of the NFAT that contain Keeyask as a plan component. The findings of the CEC will not apply at all to those alternative plans that do not contain Keeyask.

3.1.2 Multiple Account Analysis

The MA-CBA, discussed in Chapter 13 of the NFAT, presents the results of the PDP as compared to alternative plans with and without new U.S. interconnection capacity and new export sale commitments; and with and without new hydro generating capacity to meet domestic load growth. As noted by Hydro:

> [MA-CBA] uses a set of evaluation accounts to move from a Manitoba Hydro to a broader Manitoba social perspective. The objective is to provide a systematic, comprehensive assessment of all of the benefits and costs to Manitobans in a manner that can assist the NFAT panel address the question of overall socio-economic benefit. [14]

The MA-BCA assesses the preferred and alternative plans in terms of a series of evaluation accounts, of which "environment" is one. In describing this environment account, Hydro notes that:

> the focus of this account is not the impacts in themselves, but rather the externality they represent – the external net benefit or cost to Manitobans not reflected in the market valuation or other accounts.[15]

The challenge with this approach is that the impacts and their residual effects do matter. In fact, Manitoba Hydro acknowledges as much shortly thereafter:

[13] CEAA (Canadian Environmental Assessment Agency). 2013. Operational Policy Statement, Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012. http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=1DA9E048-1

[14] Manitoba Hydro. August 2013. Needs For and Alternatives To ("NFAT"), Chapter 13, at p.2

[15] NFAT, Chapter 13, at p.12

> With respect to biophysical effects, the issue is whether there are residual impacts despite the mitigation and compensation built into the projects' plans and costs. [16]

It matters whether or not these residual effects pose unacceptable economic or other risks, or that they pose threats to the environment or to human health, or that there are too many significant adverse effects or cumulative effects to justify imposing them on local communities, on future generations or on Manitobans more generally. The CEA Agency highlights one of the limitations to the approach used by Manitoba Hydro in the NFAT:

> Although cost-benefit analysis could be used to justify proceeding with a project that is likely to cause significant adverse environmental effects, this justification can take place only after the likelihood of the significant adverse environmental effects has been determined.[17] (underlining added).

In my opinion, this presents a problem for the PUB, as it suggests that the "consequences of the changes to air, land, water, flora and fauna, including the potential significance of these changes" of each component of the PDP and of the alternative plans would need to have undergone an environmental assessment prior to the completion of the NFAT.

That is not going to happen. Even once the CEC produces its report concerning the proposed Keeyask Project, we will only have information concerning the residual changes and their potential significance of, at most, this single component of the PDP, which is a component in only some of the alternative plans. As discussed below in section 4, other means to determine the likelihood of significant adverse environmental changes or effects as well as the "consequences of these changes" need to be used in the absence of information from additional environmental assessments of resources composing the PDP and the alternative plans.

3.2 MNP

As an independent expert consultant, MNP was retained to, among other things:

> Perform a critical analysis of the macro environmental impacts and benefits of Manitoba Hydro's Preferred Development Plan and alternative Plans, specifically, the collective macro-economic consequences of changes to air, water, flora and fauna, including the potential significance of these changes,

[16] NFAT, Chapter 13, at p.13

[17] CEAA 2012. Reference Guide: Determining Whether a Project in Likely to Cause Significant Adverse Environmental Effects. https://www.ceaa-acee.gc.ca/default.asp?lang=En&n=D213D286-1&offset=3&toc=show

> their equitable distribution within and between present and future generations.[18]

Much of MNP's report is dedicated to analysing the preferred and alternative development plans relative to the effects of climate change, GHGs and other air emissions. This information is necessary and the findings confirm the GHG benefits of the PDP versus many of the alternatives.

Sections 1.2 and 1.3 of the MNP report detail the approach taken to address water regime changes, and macro environmental impact, respectively. A small number of valued environmental components (i.e. water regime change, lake sturgeon, caribou and other at-risk fauna) were evaluated for representative purposes using a list of significance criteria as follows:

- Magnitude of the impact
- Risk of occurrence
- Importance of the predicted impact for further MPUB consideration in MNP's opinion.

Section 10 of the MNP report provides a useful summary of the "most significant impacts" of the preferred development plan in relation to the identified valued components. This summary partially addresses the concerns raised about the lack of information concerning the significance of the effects of other components of the PDP.

However, some issues are left outstanding.

First, the list of criteria used by MNP for its determination of significance does not include a criterion of particular relevance to assessing hydroelectric generation projects, namely reversibility. While some components of the PDP, such as the transmission lines, roads or quarries, may be readily decommissioned and the lands eventually returned to a more ecologically productive condition, other components, such as generating stations, dams and reservoirs and their associated effects are effectively permanent. This is evidenced by the fact that proponents typically do not file dam or reservoir decommissioning plans and do not consider decommissioning costs. This is not the case, for example, for wind or natural gas facilities, which can be readily decommissioned. This issue of reversibility also appears to be underappreciated in the analysis of the intergenerational equity of the macro environmental issues in section 9 of the MNP report. For example, once wildlife species habitat is lost to

[18] Scope of Work for MNP NFAT Review Last Updated: September 20, 2013

reservoir inundation, it is lost indefinitely, and species populations will be indefinitely displaced and lowered. There will be fewer animals for predator species and for hunters and trappers. This is an effect that extends to future generations and should be considered effectively irreversible.

Secondly, other than the analysis of greenhouse gas emissions, there is no comparative analysis in the MNP report of the macro environmental impacts and benefits of the PDP and alternative plans with respect to other changes (i.e. land, water, flora and fauna). The analysis determined that the PDP "minimizes the effect of inequitable distribution of macro environmental impacts on future generations as this plan has the lowest overall GHG emissions and air pollutants."[19] Without knowledge of the macro environmental impacts of the alternative plans with respect to the consequences of other (i.e. non-GHG) changes to the environment, it is not possible to determine whether an alternative plan performs better overall than the PDP.

The primary finding of the evidence presented by MNP illustrates this problem:

> the net environmental benefits of Manitoba Hydro's (MH) preferred plan are found to outweigh its overall environmental costs in a regional and global context.[20]

Regardless of ones views on whether the PDP has "net environmental benefits", an additionally important question, and the one that matters most to the Board, is whether or not these net environmental benefits exceed those that could be obtained through pursuing an alternative plan.

3.3 SUMMARY

In summary, my review of the existing information concerning macro environmental impact indicates the following key concerns:

- The conclusions and recommendations to government provided by the CEC, though necessary to the NFAT, will apply only to a single component of the PDP and to those plans in Table 9.3 of the NFAT that contain Keeyask as a plan component. The findings of the CEC will not apply at all to those alternative plans that do not contain Keeyask.

[19] MNP. January 2014. NFAT Review: A Review of Manitoba Hydro's Macro Environmental Considerations, at p.75.
[20] *Ibid*., at p.1.

- Other means to determine the likelihood of significant adverse environmental changes or effects as well as the “consequences of these changes” need to be used in the absence of information from additional environmental assessments of PDP and alternative plan resources.
- The consideration of the “consequences of changes to air, land, water, flora and fauna” must consider a criterion of particular relevance to assessing hydroelectric generation projects, namely reversibility.
- The “net environmental benefits” of the PDP, if there are net benefits, must be compared to the net environmental benefits of the alternative plans to determine whether these net environmental benefits exceed those that could be obtained through the development of any of the alternative plans.

4 INFORMATION TO ASSIST THE PUB

4.1 POTENTIALLY RELEVANT INFORMATION

In light of the summary of concerns identified above with respect to the existing information available to the Board to conduct "a critical analysis of the macro environmental impacts and benefits of Manitoba Hydro's Preferred Development Plan (PDP) and alternative Plans", I have considered additional relevant information for use by the Board.

1. Prior hydroelectric projects on the Nelson River.

The information provided during the environmental assessment of the Keeyask Project, in the NFAT, and in the analysis conducted by MNP is predictive information. That is, it is based on the collection of baseline data and information, analysis and professional judgment about potential changes in the future. Information respecting the actual environmental effects of the existing hydroelectric facilities on the Nelson River (i.e. Kelsey, Kettle, Limestone, Long Spruce and Wuskwatim) can also be very valuable to understanding the likely macro environmental effects of the PDP, which would be constructed in a similar landscape.

2. Similar hydroelectric complexes on other river systems.

The PDP is not the first example of a multi-facility hydroelectric complex on a boreal river system in Canada. Other jurisdictions have developed similar schemes and are also currently contemplating or recently contemplated the merits of additional hydroelectric facilities on these river systems. The considerations and findings in these other jurisdictions with respect to macro environmental issues are of potential value to the Board in its consideration of the macro environmental impact from the PDP and the alternative plans.

In addition to the above information pertaining to hydroelectric resources, I have identified potentially relevant information concerning the macro environmental impact of wind resources, as these resources have not been adequately considered by either Hydro or MNP in their respective comparative analyses. This information is discussed in my submission to the PUB pertaining to the macro environmental and socio-economic considerations of wind resources.

4.2 PRIOR HYDROELECTRIC PROJECTS ON THE NELSON RIVER SYSTEM

4.2.1 Historic Facilities

Probably the best place to begin to attempt to understand the "consequences of changes to the air, land, water, flora and fauna, including the potential significance of these changes" that would result from the PDP is with the existing hydroelectric facilities on the Nelson River, and the transmission infrastructure in the general region.

The relevance of these existing facilities stems from the fact that they are located in the same biophysical context as the proposed PDP. What has been learned about the existing facilities in terms of changes to environmental conditions is very relevant to trying to understand the macro environmental impact of the Keeyask and Conawapa facilities to be located directly upstream and downstream, respectively, of the existing facilities. (see Appendix A for a summary of these facilities and infrastructure).

4.2.2 Scope of Available Information

NFAT

In an attempt to identify information concerning the environmental changes of the existing hydroelectric facilities on the Nelson River, I searched for any information related to these facilities in the NFAT filings. While I was able to locate some information indicating that Manitoba Hydro is studying existing conditions within the reservoirs,[21] there was no specific information respecting the likely effects of the prior developments that could assist in understanding the potential macro environmental impact of additional hydroelectric development as part of the PDP or the alternative plans.

Environmental Impact Statement

Recognizing that this NFAT process is not intended to duplicate the environmental assessment of the Keeyask Project, I reviewed only the aquatic portion of the environmental impact

[21] E.g. in relation to lake sturgeon see NFAT, Appendix 2.1, at p.1.

statement[22] and the historical overview portions of the Cree Nation environmental evaluation reports dealing with hydroelectric developments. [23] [24] [25]

My review indicates that the EIS and environmental evaluations describe the adverse nature of the effects of the prior development in very general terms and provide overall perspectives on the implications of these effects for use of the affected lands and waters.

> Past project effects have substantially altered the existing environment from that known historically, as such the current heritage resources environment along the river within the open water hydraulic zone of influence may not represent that which was present prior to hydroelectric development. [26]

Some potential differences between the proposed Keeyask Project and the existing facilities in terms of environmental changes are also presented.[27] The behaviour of fish species within the existing reservoirs is also used to attempt to understand the behaviour of fish in the future Keeyask reservoir.[28] In other instances, the EIS acknowledges comparison to other components of the Nelson River system:

> The magnitude and the spatial and temporal extent of effects were determined through several methods, including: use of Stephens Lake, a reservoir environment similar to the Keeyask reservoir, as a proxy; comparison to empirical data from other reservoirs (e.g. Limestone and Long Spruce reservoirs in Manitoba, the Robert-Bourassa reservoir in Québec, and the lower Churchill River reservoir in Newfoundland and Labrador); and, where applicable, empirical models developed on the basis of observed relationships in the study area and elsewhere.[29]

While these types of information are useful to understanding the potential effects of the proposed Keeyask Project, they do not provide the kind of detail necessary to fully appreciating the nature and scope of the consequences of the changes that have resulted from the prior developments in a manner that would assist in characterizing the potential effects of potential future hydroelectric projects on the Nelson River.

[22] Keeyask Generation Project: Response to EIS Guidelines. Section 6.4 Effects and Mitigation: Aquatic Environment.

[23] Cree Nation Partners. January 2012. Keeyask Environmental Evaluation, at p.12 and at Appendix 2, p.123.

[24] York Factory First Nation. June 2012. Kipekiskwaywinan: Our Voices, at p.62-63.

[25] Fox Lake Cree Nation. September 2012. Environmental Evaluation Report, at p.4-7.

[26] *Ibid*., at p.182.

[27] *Ibid*., at p.223.

[28] *Ibid*., at p.269.

[29] *Ibid*., at p.238.

Other Documents

It may be the case that Manitoba Hydro has characterized the residual effects of the prior developments in other documents. My review of materials on the company website confirmed the existence of some programs designed to monitor environmental quality in the existing reservoirs.[30] However, these programs do not seem to be designed with the overall intention of understanding the residual environmental effects of the existing facilities.

4.2.3 Summary

The apparent lack of comprehensive information concerning the residual environmental effects of the existing hydroelectric facilities is unfortunate. This kind of information would be very valuable in characterizing the potential consequences of changes to the environment resulting from future hydroelectric developments on the Nelson River, whether in relation to the PDP, to the alternative plans, or to some other future hydroelectric development in the Province.

Other utilities, including Hydro-Quebec[31] and BC Hydro, have made and continue to make efforts to characterize the residual effects of previous developments. BC Hydro's fish and wildlife program for the Columbia River[32] is particularly relevant as it considers cumulative environmental effects as an aggregate of multiple dam and reservoir footprints on the same river basin as an integrated ecological system.[33]

In summary, there does not appear to be sufficient information pertaining to the residual effects of the existing hydroelectric facilities on the Nelson River to provide meaningful insight into the potential effects of the hydroelectric components of the PDP or the alternative plans. This situation may change in the future, particularly as a result of the recommendations

[30] http://www.hydro.mb.ca/environment/programs/events.shtml?WT.mc_id=2314

[31] Hayeur, G. 2001. Summary of knowledge acquired in northern environments from 1970 to 2000. Hydro Québec, Montreal, September 2011.

[32] http://www.bchydro.com/content/BCHydro/en/toolbar/about/sustainability/environmental_responsibility/compensation_programs/columbia_region.html

[33] Moody, A., P. Slaney and J. Stockner. 2007. Footprint Impact of BC Hydro Dams on Aquatic and Wetland Primary Productivity in the Columbia Basin. AIM Ecological Consultants Ltd. in association with Eco-Logic Ltd. and P Slaney Aquatic Science Ltd. Prepared for Columbia Basin Fish & Wildlife Compensation Program.

provided by the CEC in relation to the environmental assessment of the Bipole III project, and that the Minister accepted,[34] in particularly recommendations 11.1 and 13.2:

> 11.1 Manitoba Hydro implement a cumulative effects assessment approach that goes beyond the minimal standard of the 1999 CEAA guidelines and is more in line with current "best practices." [35]
>
> 13.2 Manitoba Hydro, in cooperation with the Manitoba Government, conduct a Regional Cumulative Effects Assessment for all Manitoba Hydro projects and associated infrastructure in the Nelson River subwatershed; and that this be undertaken prior to the licensing of any additional projects in the Nelson River sub-watershed after the Bipole III Project. [36]

The information that could come out of a regional cumulative effects assessment could greatly assist the Board in understanding the residual effects of the existing facilities and using that information to predict the macro environmental impact of the PDP. This information will not be available for the current process. However, in the event that the PDP does not proceed or is delayed for several years, I recommend that the Board make use of the findings of this cumulative effects assessment program.

[34] Letter from Minister Gord Mackintosh to Shannon Johnson (Manitoba Hydro), dated August 14, 2013 re: Environmental Act Licence No. 3055.

[35] Manitoba Clean Environment Commission. June 2013. Report on Public Hearing: Bipole III Transmission Project, at p.129.

[36] Ibid., at p.130.

4.3 SIMILAR HYDROELECTRIC COMPLEXES ON OTHER RIVER SYSTEMS

4.3.1 Identification of comparable situations

There are several large rivers in Canada that have been developed with multiple generation, transmission and river diversion projects. In order to identify comparable hydroelectric complexes to the proposed PDP, I began by considering the historical hydroelectric development context on the Nelson River, summarized in Appendix A. To focus the analysis, I defined several criteria that: reflect the existing developments on the Nelson River; acknowledge that the development context has substantial implications for Aboriginal peoples; and recognize that new developments are currently being considered. I then used these criteria to screen potential hydroelectric complexes on several rivers in boreal regions across Canada, as indicated in the following table.

Table 4-2: Hydroelectric Complexes in Canada

River Systems	Churchill River (Labrador)	Romaine River (Qubec)	Manicouagan River (Quebec)	La Grande River (Quebec)	Lower Mattagami River (Ontario)	Peace River (BC)	Columbia River (BC)
Evaluation Criteria							
Multiple large generation facilities and/or river diversions built over several decades	Y	N	Y	Y	Y	Y	Y
High voltage transmission facilities	Y	Y	Y	Y	Y	Y	Y
New generation, diversion and/or transmission facilities assessed in the past decade	Y	Y	N	Y	Y	Y	N
Existing or proposed generation facilities on the main stem of the river system	Y	Y	Y	Y	Y	Y	Y
Substantial implications for Aboriginal groups	Y	Y	Y	Y	Y	Y	Y
Located in boreal ecosystems	Y	Y	Y	Y	Y	Y	Y
Reviewed by an independent panel	Y	Y	?	Y	N	Y	?
Meets all Criteria	**YES**			**YES**		**YES**	

The inclusion of the final criterion – “reviewed by an independent panel” – reflects my desire to seek out the highest levels of informed advice provided to governments in Canada. As is the

case with the Nelson River developments, there is a considerable volume of information available concerning these similar hydroelectric complexes. Considering the available time and resources, I focused my review on the observations, conclusions and recommendations of these independent regulatory proceedings. My preoccupation was not so much with the particularities or idiosyncrasies of the specific cases since these may be different as a result of project design or environmental context, but on the findings that would have more general application to consideration of the macro environmental impact of these other proposed developments in the context of the available alternatives – the same task before the PUB.

4.3.1 La Grande River (Quebec)

Historic Facilities

Begun in the early 1970s, the hydroelectric generating stations on the La Grande River in northern Quebec, collectively referred to as the James Bay Project or La Grande Complex, constitute the largest such development in Canada. According to the Société d'énergie de la Baie James, the agency responsible for the development of the Project, it consists of the following:

- eight hydroelectric generating stations with a total installed capacity of 15,240 MW, producing 78.3 TWh of electricity annually
- six 735-kV AC transmission lines and one ± 450-kV DC transmission line, for a total length of around 7,400 km
- partial diversion of the Caniapiscau and Eastmain Rivers into the La Grande River
- over three hundred retaining structures (dams and dykes)
- the development of thousands of kilometres of new roads, airports and other infrastructure [37] [38]

The implications of the La Grande Complex for the local Cree Nations were extensive, though the lack of a comprehensive environmental assessment at the time of the development of the Complex has prevented a full appreciation of the social effects for the Cree Nations.[39]

[37] http://www.hydroquebec.com/sebj/en/lagrande.html

[38] http://www.hydroquebec.com/hydloandfriends/publications/the-la-grande-hydroelectric-complex/index.html

[39] See http://www.gcc.ca/archive/article.php?id=38

Nonetheless, the effects generally parallel many of those experienced by the Aboriginal groups in Manitoba in relation to the Nelson River hydroelectric developments.[40]

The Eastmain-1 Powerhouse and Rupert Diversion

Project Description

In 2004, Hydro Quebec proposed additional hydroelectric facilities in Cree territory, as envisioned under the James Bay and Northern Quebec Agreement (JBNQA).[41] These new facilities, known as the "Eastmain-1 Powerhouse and Rupert Diversion" entailed the construction of Eastmain-1-A powerhouse and Sarcelle powerhouse, as well as the partial diversion of the Rupert River into Eastmain-1 reservoir, which had previously been diverted into the La Grande Complex. The proposed Project is in many ways similar to the diversion of the Churchill River into the Nelson River in Manitoba, in that it was intended to increase the production of electricity at existing facilities on a neighbouring river.[42] Hydro Quebec described the Project in the EIS as follows:

> The water diverted from the Rupert River will be channelled through the Rupert forebay and tailbay into Eastmain 1 reservoir, where it will power the turbines at Eastmain-1 and Eastmain-1-A powerhouses. The flow will then continue on to Opinaca reservoir, at the outlet of which, as per the option exercised by the Crees, a powerhouse will be constructed on the right bank near the existing Sarcelle control structure. Downstream of Opinaca reservoir, the diverted waters will flow through Lake Boyd and Sakami Lake, and then into Robert-Bourassa reservoir, to be turbined at Robert-Bourassa and La Grande-2-A. The flow will then be channelled into La Grande 1 reservoir and turbined once more at the La Grande-1 facility before emptying into James Bay via the Grande Rivière. It should be noted that the Rupert diversion will go into operation at least one year before Eastmain-1-A powerhouse. This will enable Hydro-Québec Production to increase its average annual output by some 8.5 TWh: 2.3 TWh from Eastmain-1-A, 0.9 TWh from Sarcelle powerhouse and 5.3 TWh from the increase in overall output from Robert-Bourassa, La Grande-2-A and La Grande-1. [43]

[40] http://keeyask.com/wp/the-project/environmental-assessment-process/eis/keeyask-cree-nations-enviro-evaluation-reports

[41] For more information on the JBNQA see: http://www.gcc.ca/pdf/LEG000000006.pdf

[42] https://www.hydro.mb.ca/corporate/water_regimes/churchill_river_diversion.shtml

[43] Eastmain-1-A Powerhouse and Rupert Diversion – Environmental Impact Statement Volume 1: Chapters 1 to 9 – December 2004, at p.1-6.

Aboriginal Groups

The Project was developed pursuant to the *Agreement Concerning a New Relationship Between le Gouvernement du Québec and the Crees of Québec* (NRA). The *Boumhounan Agreement*, a sub-agreement of the NRA that pertains specifically to the Project, was signed between the Crees of Québec, Hydro-Québec and Société d'énergie de la Baie James. The main provisions of the *Boumhounan Agreement* are as follows:

- The Crees consent to the construction, operation and maintenance of the project, subject to the provisions of the *Boumhounan Agreement*.
- The Project is subject to the environmental and social protection regime stipulated in Section 22 of the JBNQA.
- Hydro-Québec undertakes to carry out remedial and mitigation measures, implement the specific guarantees, assurances and undertakings, and provide the economic and community benefits stipulated in the *Boumhounan Agreement*.[44]

Of note, once the Project was accepted by means of a special resolution of the Hydro-Québec Board of Directors and once the necessary permits and approvals were obtained, Hydro-Québec agreed that it would waive the possibility of building the Nottaway-Broadback-Rupert (NBR) project, which is provided for in the JBNQA. The following table from the EIS[45] compares the Project to the NBR.

Table 1-2: Comparison of project characteristics

Characteristics	Eastmain-1-A/Rupert	Nottaway-Broadback-Rupert[a]
Reservoirs	Creation of two diversion bays along the course of the Rupert diversion	Four major reservoirs in addition to the forebays of the powerhouses
Total area flooded	346 km^2	6,497 km^2
Number of dams	4	Approximately 20
Number of dikes	74	Over 130
Source :Complexe Nottaway-Broadback-Rupert, *Rapport préliminaire d'impact sur l'environnement et le milieu social*, Volume 4, December 1982		

a. Diversion variant: Variant III
Reservoirs on the Rupert: R-10 and R-11
Powerhouses: on the Rupert (R-10 and R-11), on the Broadback (B1, B2, B3, B4, B5, B6, B8), and Quénonisca and Evans generating stations

[44] Ibid, at p. 1-10.

[45] Ibid, at p. 1-11.

As noted by Hydro-Quebec in the EIS:

> Although the partial diversion of the Rupert will have impacts, the abandonment of the NBR project in favour of Eastmain-1-A/Rupert is a major plus for the Crees.[46]

The decision by Hydro-Québec and the Cree Nations to move forward with the negotiation of the *Boumhounan Agreement* suggests the following:

- Historic agreements, like the JBNQA, can be renegotiated as circumstances change;
- The framework for dealings between the Crown and Aboriginal peoples is part of an ongoing relationship and can change over time; and
- It is not uncommon for large hydroelectric utilities to reconsider their initial plans in light of changing circumstances.

Environmental Assessment

A Joint Review Panel assessment of the Eastmain-1 Rupert Diversion was carried out over several years leading to submission of a Panel Report in November 2006. The environmental assessment was conducted pursuant to the *Agreement Concerning the Environmental Assessments of the Eastmain-1-A and Rupert Diversion Project*, put in place to prevent duplication and overlap and to coordinate and align the assessment and review processes of different jurisdictions.

The five-member Panel was mandated to conduct a review of the environmental effects of the Project, including in the context of the need and alternatives to the Project, and to report to the federal Minister of the Environment. The review included preparation of directives (terms of reference) for the assessment, review of the EIS, and hearings in several Cree communities, as well as in Chibougamau and Montréal. The key relevant findings of the Panel are discussed below.

Alternatives to the Project

> The Panel concludes that, while wind power is a worthwhile complement to Quebec's core hydroelectric system, replacing viable hydroelectric projects with wind power cannot be justified under current conditions.[47] (underlining added)

[46] Ibid, at p. 1-10.

Those "current conditions" have changed considerably with respect to wind resources, as discussed in other submissions to the Board.[48] Interestingly, since the time of developing the Project, Hydro Quebec has constructed and contracted for nearly 3000 MW of wind resources.[49] As a result of developing both the Project, the Romaine Hydroelectric Complex and wind resources, coupled with the continued decline in load growth in domestic and export markets, Hydro Quebec will be running a large surplus for many years.[50]

This situation illustrates for the PUB the importance of considering future trends in the costs of the alternatives to the PDP, both in terms of creating unnecessary and expensive surpluses but also in avoiding unnecessary and permanent imposition of adverse environmental effects on the receiving environment and communities.

Project Justification

> The Panel concludes that, to date, there is no alternative or combination of alternatives that can guarantee the same operating and economic benefits as the proposed project. However, it considers that economic grounds alone are not sufficient to justify approval of the project since the project must also be considered environmentally and socially acceptable.[51] (underlining added)

The Panel reached a somewhat similar conclusion to that reached by Manitoba Hydro in its NFAT submission:

> Manitoba Hydro has compared the following development plan against alternative plans and has concluded that it is in the best long-term interests of Manitobans…[52]

However, the two caveats included in the justification statement above indicate that the Eastmain-1 Panel established macro environmental requirements that the proposed Project had to satisfy regardless of its operational and economic benefits.

[47] Federal Review Panel for the Eastmain-1-A Diversion Project. 2006. Environmental Assessment of the Eastmain-1 and Rupert Diversion Project ("Eastmain-1 Panel Report"), at p.ii.

[48] La Capra Associates. January 24, 2014. Needs for and Alternatives to (NFAT) Review of Manitoba Hydro's Proposal for the Keeyask and Conawapa Generating Stations, Technical Appendix 2: Generation Alternatives, at p. 2-7.; Knight Piesold. January 23, 2014. Knight Piesold Independent Expert Consultant Report (Redacted), at p.47.

[49] http://www.hydroquebec.com/distribution/en/marchequebecois/parc_eoliens.html

[50] Hydro Quebec. 2009. Strategic Plan 2009-2013, at p.18.

[51] Eastmain-1 Panel Report, at p.iii.

[52] NFAT, Chapter 1, at p.2.

These macro environmental requirements speak to the "trade-off rules" noted by Dr. Gaudreau and Dr. Gibson in their Framework for Sustainability-based Assessment:

> Explicit and principled consideration of trade-offs is also an important component of sustainability assessment. The essential rules for trade-off considerations centre on open deliberations, emphasis on avoidance, and preclusion of trade-offs that displace significant adverse effects to future generations. But as with generic sustainability requirements and criteria, trade-off rules need to be specified for the context.[53] (underlining added)

One of those "trade-off rules" is "Avoiding Trade-offs":

> • treat potential trade-offs as a regrettable last resort while seeking mutually reinforcing and lasting cumulative contributions for the most positive overall result and avoiding significant adverse effects[54]

In assessing the PDP and the alternative plans with respect to macro environmental impact, it is my view that the experience of the Eastmain-1 Panel indicates that where significant environmental effects are anticipated, all reasonable steps must be taken to avoid trading off these environmental effects, including taking measures that could allow for the evolution of "an alternative or combination of alternatives" that would not require such trade-offs.

Cumulative Effects

> In terms of the quality of life of the Cree, the negative impacts of the project, combined with the effects of previous hydro-electrical projects, could exacerbate problems relating to opening and developing the land and harvesting traditional foods. The Panel believes that although the impact of the project appears marginal when looking at the big picture, the communities will still suffer consequences. [55] (underlining added)

This observation speaks to the tendency to view additional impacts in the context of larger impacts that occurred historically and in the context of a prior and different cultural understanding with respect to what is acceptable to impose on people and places, rather than

[53] K. Gaudreau and R.B. Gibson. 2014. Framework for Sustainability-based Assessment for the Public Utilities Board's Needs For and Alternatives To (NFAT) Assessment of Manitoba Hydro's Preferred Development Plan and Alternatives, at p.6

[54] Ibid., at p.30.

[55] Eastmain-1 Panel Report, p.xxi

viewing these impacts in the current context or even attempting to project forward to what future generations may consider justifiable.

> It feels that the cumulative impact is real, but difficult to quantify, making it impossible to specify the relative significance of the marginal cumulative impact and the causes of change attributable to the project. …. It therefore had to rely on its own judgment in this respect.[56]

This observation of the Panel is consistent with observations of many independent reviews of hydroelectric facilities, namely that information respecting cumulative effects is not sufficient to draw defensible conclusions about macro environmental consequences, whether adverse or beneficial. In my opinion, the PUB may also be relying in this instance on "its own judgement" in respect of the potential cumulative effects of the proposed PDP. The NFAT has not provided information relevant to consideration of the "collective environmental consequences" that may result from the PDP, relying instead on the future submission of the materials from the CEC review of the Keeyask Project, a single component of the PDP.[57]

> The Panel is of the opinion that the cumulative impacts of the La Grande Complex, coupled with the effects of the increased flow of the Rupert River, should be evaluated for the Chisasibi, Eastmain and Wemindji communities.
>
> …the Panel finds that the data that are currently available are insufficient to quantify the cumulative impacts on James Bay and Hudson's Bay or separate them from the major factors affecting these ecosystems, including inter-annual variability and climate change.
>
> … the Panel considers that a formal analysis of these impacts cannot be conducted without establishing a large-scale research and follow-up program, a measure which the Panel recommends.
>
> … The Panel believes that it would be important to initiate discussions on a more systemic approach to the analysis of cumulative impacts or on the possibility of making greater use of strategic environmental assessment in the evaluation of governmental policies and programs. [58]

[56] Eastmain-1 Panel Report, at p.xxi.

[57] See MMF/MH I-053a.

[58] Eastmain-1 Panel Report, p.xxi.

These recommendations are similar to those provided by the CEC in relation to the environmental assessment of the Bipole III project, and that the Minister accepted,[59] in particularly recommendations 11.1 and 13.2:

> 11.1 Manitoba Hydro implement a cumulative effects assessment approach that goes beyond the minimal standard of the 1999 CEAA guidelines and is more in line with current "best practices." [60]
>
> 13.2 Manitoba Hydro, in cooperation with the Manitoba Government, conduct a Regional Cumulative Effects Assessment for all Manitoba Hydro projects and associated infrastructure in the Nelson River subwatershed; and that this be undertaken prior to the licensing of any additional projects in the Nelson River sub-watershed after the Bipole III Project. [61]

The findings of the Eastmain-1 Panel support the concern that the cumulative environmental effects related to large-scale hydroelectric developments cannot be determined without a comprehensive research and follow-up program related to the existing facilities, which does not yet exist in relation to the Nelson River developments. In my opinion, without this knowledge of the existing conditions and the extent of change already imposed, the degree of certainty associated with the potential "collective consequences of changes" resulting from additional hydroelectric development on the Nelson River would be necessarily low.

Overall Finding

> …the Panel believes that the anticipated environmental and social impacts will be numerous and widespread, but the impacts are definable and can be mitigated in a satisfactory manner if all of the necessary conditions are put into effect. For these reasons, and considering the project's clear benefits, the Panel finds that the acceptance of these impacts is justifiable. [62] (underlining added)

The underlined conditions suggest that the bar was high for approving the Eastmain-1 Project. The impacts can be mitigated only if all the necessary conditions are put into effect, and justifiable only if there are clear benefits, presumably compared to the adverse effects but also compared to the alternatives available.

[59] Letter from Minister Gord Mackintosh to Shannon Johnson (Manitoba Hydro), dated August 14, 2013 re: Environmental Act Licence No. 3055.

[60] Manitoba Clean Environment Commission. June 2013. Report on Public Hearing: Bipole III Transmission Project, at p.129.

[61] Ibid., at p.130.

[62] Eastmain-1 Panel Report, at p.xxiv.

Dissenting Opinion

A member of the Panel did not agree with the majority decision in the case of the Eastmain-1 Project. I have also considered this Panel member's observations, conclusions and recommendations of relevance to macro environmental issues.

> • **Adaptive Management**. In order to limit the impact of the diversion of the Rupert River on fish habitats, an ecological instream flow regime is planned that would be synchronized around three periods of biological activity of the main fish species present in the river. The proponent has also agreed to respect the principle of adaptive management for this instream flow regime. The application of this principle would allow, if need be, for the revision of this regime if an impact is detected *a posteriori*, either during environmental monitoring by the proponent or as observed by users of the territory. However, such a measure does not allow one to determine, in advance of the project's approval, the potentially adverse effects if changes in the values of this regime aimed at protecting habitats or the sustainability of fish resources were to prove unrealistic in terms of the project's economic efficiency. … The project's economic profitability must be assessed on the basis of environmental requirements before permits are obtained, otherwise the project would be funded on "environmental credit," in which case it would be unacceptable for the project to go ahead. [63] (underlining added)

This raises an important consideration for the Board in evaluating the PDP. The onus is on Manitoba Hydro to demonstrate that the macroenviromental risks have been substantially addressed so as not to threaten either the economic viability of the PDP or threaten the economic advantage (if any) that the PDP may have over the alternative Plans (if any) that have lower macro environmental impacts.

> • **Sum of effects of the project**. Given the magnitude of the follow-up and monitoring required, some of which will serve to confirm the hypotheses on which the very design of the project is based, it will be several years before we will be able to determine the accuracy of these hypotheses and the success of the mitigation and compensation measures. Only then will we be able to fully judge whether the project's advantages outweigh its disadvantages. [64] (underlining added)

The issue being raised here in this dissenting opinion speaks to the nature of hydroelectric resources, namely that once they are developed they cannot readily be undeveloped or substantially altered. In assessing the macro environmental impact of the PDP and the

[63] *Ibid*., at p.381.

[64] *Ibid*., at p.383.

alternative plans, I recommend that the Board pay particular attention to the degree of uncertainty assigned to the predicted effects of the Keeyask by the CEC, and that effects that are considered moderately or likely to occur be assumed to occur.

> • **Loss of a natural and cultural heritage**. On a historical level, the Rupert River is part of one of the major arteries linking the St. Lawrence River and James Bay watersheds. It was one of the rivers most frequently travelled by explorers transporting commercial goods, including furs. The Crees have used it for centuries and it continues to play an essential role in their culture and way of life. Archaeological sites attest to its use as far back as the period of prehistoric human occupation. … Despite the mitigation measures proposed by the proponent, therefore, the partial diversion of the Rupert River represents a major negative cumulative effect on Quebec's natural and cultural heritage and raises questions about whether limits should be imposed on hydroelectric development, particularly on Eeyou Istchee territory. [65] (underlining added)

The notion of limits in the case of further hydroelectric development within the La Grande Complex is consistent with the CEC recommendation for a cumulative effects assessment, discussed above, prior to the licensing of any additional projects in the Nelson River sub-watershed.

The context surrounding what happened after the approval of the Eastmain-1 Rupert Project is of particular relevance for the PUB. In this instance, the Panel acknowledged that the "anticipated environmental and social impacts will be numerous and widespread", the Panel was aware that "under current conditions" alternatives could not yet be justified, but it proceeded to find these impacts justifiable without proposing a plan to avoid the trade-offs for a period of time to allow the situation to evolve.

As a result, those impacts are now imposed indefinitely without any lasting benefit to Quebeckers as a whole, since electricity from the Eastmain-1 Project is surplus to domestic requirements and sold on export markets at a cost considerably below production costs.

[65] *Ibid*., at p.388.

4.3.2 Churchill River (Labrador)

Historic Facilities

Owned and operated by the Churchill Falls (Labrador) Corporation, the Churchill Falls Project is one of the largest hydroelectric generating stations in the world, having a capacity of 5,428 MW and producing approximately 34 TWh of electricity annually. Constructed in the late 1960s, the Project resulted in profound changes on the landscape and ecology within the reservoir, downstream of the powerhouse in the Churchill River, as well as downstream in the rivers that were diverted into the reservoir above the generating station and control structures. In a community review of the effects of this Project,[66] the Innu of Labrador made similar observations to those noted by similarly affected Aboriginal groups in Manitoba.[67]

Commissioned in 1971, the Churchill Falls Project consists of the following components:

- A 5428 MW underground generating station
- A large reservoir totaling approximately 5750 km^2 in area
- Partial diversion of the Naskapi River
- Partial diversion of the Kanairiktok River
- Numerous dykes and controls structures
- Three 500 kV AC transmission lines from Churchill Falls generating station to Montreal
- The Town of Churchill Falls[68] [69]

The Lower Churchill Project

Project Description

In late 2006, Nalcor Energy registered the first of several components of Lower Churchill Project for environmental assessment. The Project consists of the following components:

- Lower Churchill Hydroelectric Generation Project

[66] The Innu Nation Community Consultation on the New Mishta-shipu Hydro Project. 2000. Power Struggle: An Innu Look at Hydro Developments in Nitassinan Final Report.

[67] See http://keeyask.com/wp/the-project/environmental-assessment-process/eis/keeyask-cree-nations-enviro-evaluation-reports

[68] http://www.nalcorenergy.com/chuchill-falls-at-a-glance.asp

[69] Hatch. 2010. Churchill Falls Dam Break Study, Volume 1 – Main Report

  - Gull Island Generation Project, a 2250 MW facility on the Churchill River downstream of the existing Churchill Falls Project, generating 11.9 TWh/year
  - Muskrat Falls Generation Project, a 824 MW facility on the Churchill River downstream of the proposed Gull Island Generation Project, generating 4.8 TWh/year
  - A 735 kV AC transmission line between Gull Island and Churchill Falls (203 km)
  - A 345 kV AC transmission ling between Gull Island and Churchill Falls (203 km)
  - Two 345 kV AC lines between Muskrat Falls and Gull Island (60 km)
- Labrador Island Transmission Link
  - An AC to DC converter station at Muskrat Falls
  - A ± 350 kV DC transmission line from Muskrat Falls to the Strait of Belle Isle (approximately 400 km)

The Labrador Island Transmission Link also continues onto the Island of Newfoundland, and electricity is eventually exported to Nova Scotia via the Maritime Link, which is also part of the Project. For the purposes of this review, I considered only those components within Labrador, and focused on the assessment of the Lower Churchill Hydroelectric Generation Project, since this was the only component considered by an independent review panel.

Aboriginal Groups

The Lower Churchill Hydroelectric Generation Project was developed pursuant to the Tshash Petapen (New Dawn) Agreement between the Province of Newfoundland and Labrador, the Province's Crown Corporation Nalcor Energy, and Innu Nation, the association representing the Innu of Labrador. The main components of the Tshash Petapen Agreement are as follows:

- A Land Claim Agreement in Principle
  - Land selection and rights of the Innu to quantities and categories of land
- Upper Churchill Redress Agreement
  - Payments to Innu Nation in relation to the Churchill Falls Project
  - A comprehensive release by Innu Nation for any and all past, present and future claims in relation to the Churchill Falls Project
- Lower Churchill Impacts and Benefits Agreement
  - Payments to Innu Nation in relation to the components of the Lower Churchill Project within Labrador
  - Other benefits to the Innu Nation (e.g. business opportunities)

- A comprehensive release by Innu Nation for any claims in relation to the Lower Churchill Project

Other Aboriginal Groups potentially affected by the Lower Churchill Project include the Labrador Inuit (Nunatsiavut Government), the southern Labrador Inuit (Nunatukavut) and Innu resident in Quebec who use lands in Labrador.

Environmental Assessment

A Joint Review Panel assessment of the Lower Churchill Project commenced in late 2007 and concluded in August 2011 with submission of the Panel Report to the Provincial and Federal Minsters of Environment. The environmental assessment was conducted pursuant to a harmonization agreement between the two levels of government.

The five-member Panel was mandated to conduct a review of the environmental impact statement in accordance with EIS Guidelines issued by the Ministers, determine the sufficiency of the EIS and hold public hearings. A total of 30 days of public hearings were held in Goose Bay and surrounding communities, in the Innu community of Sheshatshiu, in several Inuit communities, in Sept-Îles, Québec, as well as in St. John's. The key relevant findings of the Panel Report are discussed below.

Need, Purpose and Rationale

> the Panel concluded that Nalcor had not demonstrated the justification of the Project as a whole in energy and economic terms, and that there are outstanding questions related to both Muskrat Falls and Gull Island regarding their ability to deliver the projected longterm financial benefits to the Province, even if other sanctioning requirements were met. The Panel therefore recommended that the Government of Newfoundland and Labrador carry out separate formal financial reviews before sanctioning either Muskrat Falls or Gull Island to confirm whether the component being considered for sanction would in fact deliver the projected long-term financial benefits.[70]

These observations recognize the inherent challenges in determining the long-term financial benefits of hydroelectric projects as a result of long lead times and long financing periods, among other factors. They also demonstrate that during the reviews of hydroelectric projects,

[70] Report of the Joint Review Panel. August 2011. Lower Churchill Hydroelectric Generation Project, Nalcor Energy, Newfoundland and Labrador (Lower Churchill Panel Report), at p.xiii.

which are necessarily lengthy as a result of the complexity of issues involved, circumstances can change materially.

In the case of the Lower Churchill Project, during the review process, the initial preferred option to develop the larger Gull Island facility followed by the much smaller (and much more expensive in terms of unit energy cost) Muskrat Falls Project was reversed. Because the preferred option had been put forward as one of several possible options, the Panel proceeded to assess these variants since it was obligated to assess the Project "as proposed" by the Proponent.

In the current instance, such a reversal of the Keeyask and Conawapa generating stations is not contemplated as part of the PDP. However, some changes to the PDP as initially proposed have already occurred in relation to the Wisconsin Public Service (WPS) export and transmission investment. Further changes may yet occur prior to the conclusion of the process.

In the event the PUB recommends the proceeding with the PDP, I recommend that the PUB clearly indicate its understanding of the description of the PDP that is being recommended and, as appropriate, indicate any changes to the PDP that would be inconsistent with the findings of the PUB with respect to the associated macro environmental impact (e.g. changes that would make the PDP acceptable or unacceptable, based on macro environmental impact).

Alternatives to the Project

> …the Panel concluded that Nalcor's analysis, showing Muskrat Falls to be the best and least-cost way to meet domestic demand requirements, was inadequate and recommended a new, independent analysis based on economic, energy and environmental considerations. … The Panel also recommended consideration of Integrated Resource Planning as a better planning approach compared to the traditional approach of forecasting loads and then finding the lowest cost solution for meeting them. [71]

The "new, independent analysis" recommended by the Lower Churchill Panel is similar in some ways to the NFAT process currently underway in relation to the PDP. However, a submission [72] during the current NFAT proceeding has also noted that the review of the PDP also suffers from similar shortcomings to the approach used in the case of the Lower Churchill Project.

[71] Lower Churchill Panel Report, at p.xiii.

[72] Elenchus Research Associates Inc. January 2014. A Review of Manitoba Hydro's Demand Side Management Plan, at p.1.

The use of a proper integrated resource planning (IRP) process is not only material to ensuring that DSM is properly considered as a resource option, but it is also material to ensuring that the macro environmental impact of DSM is properly evaluated. The environmental effects of DSM are substantially lower than all of the supply side resources contemplated in the PDP and the various alternative plans. As such, the decision not to include DSM as a resource option is to implicitly accept greater macro environmental impact from the outset and greater macro environmental impact than is necessary. In my opinion, that is unacceptable. Not developing DSM resource options and evaluating them through an IRP process is a fundamental shortcoming of the NFAT process.

Greenhouse Gases

> The Panel notes that greenhouse gas emissions from the Project would be significant if considered in isolation. There is considerable uncertainty over the extent of displacement of higher greenhouse gas emitting sources of energy; however, there is every reason to expect that Project emissions would be more than offset through displacement of higher greenhouse gas sources of energy. [73]
>
> The Panel concludes that the opportunity to displace greenhouse gas intensive power is one of the great potential benefits of the proposed Project. How much of this potential is realized depends on the markets the power is sold into, whether it explicitly replaces coal-based power production, and whether the potential of utilizing the power from this Project to back up wind generation and other intermittent renewable power production is maximized. [74] (underlining added)

Two of the potential environmental benefits of large-scale hydroelectric development are described above: the potential to offset greenhouse gas emissions from other sources and the potential to integrate intermittent renewables into the electricity system. I recommend that the Board indicate in its report its conclusions respecting the long-term net greenhouse gas emissions of the PDP and alternative plans, noting any further emission reductions that could be realized for each of the plans through a more integrated approach to consideration of DSM or other demand-side measures.

[73] Lower Churchill Panel Report, at p.56.

[74] *Ibid*., at p.59.

Aquatic Environment

> The Panel concludes that … the Project would result in a potentially irreversible, significant adverse environmental effect to fish habitat and the final fish assemblage in both reservoirs. [75]
>
> The Panel concluded that effective monitoring would be challenging because of the need for good baseline data, enough resources to support the needed level of effort over many years, and setting appropriate thresholds to trigger further action. [76]
>
> the Panel questioned Nalcor's certainty that riparian and wetland habitat would re-establish and concluded that the residual adverse effect of the Project on these habitats, even with the proposed compensation strategy, would be significant. [77] (underlining added)

It is important to acknowledge that the reservoirs for the Lower Churchill Project are much larger in size, namely ~200 km^2 for Gull Island and ~100 km^2 for Muskrat Falls. However, the concerns raised about the irreversibility of effects on the aquatic environment, the challenges to effective monitoring, and the implications for riparian ecosystems resulting from inundation and changes to the flow regime apply to varying degrees to all hydroelectric reservoirs.

Terrestrial Environment

The Joint Review Panel for the Lower Churchill Project reached the following conclusions with respect to the terrestrial environment:

- the overall loss of terrestrial habitat is significant
- the lack of recovery strategies and identification of critical habitat for some of these listed species make a final significance determination premature
- the Project would cause a significant adverse environmental effect on the Red Wine Mountain caribou herd
- the Panel is not in a position to make a cumulative significance determination because a proper cumulative effects assessment for the George River herd was not carried out
- no final determination was possible with respect to listed bird species

[75] *Ibid*., p. 83.
[76] *Ibid*., p.xviii.
[77] *Ibid*., p.xix.

While many of the conclusions of the CEC regarding the Keeyask Project may differ as a result of the smaller reservoir size, the findings of the Joint Review Panel for the Lower Churchill Project illustrate that:

- large-scale hydroelectric projects can be associated with many significant environmental effects; and
- adequate information is often unavailable to make a confident determination with respect to the "consequences of changes to…land…flora, and fauna".

Cumulative Effects

> At the end of this process, it is the view of the Panel that Nalcor's approach to cumulative effects was less than comprehensive and that participants raised valid concerns that contributed to a broader understanding of the potential cumulative effects of the Project. …
>
> Participant input regarding the residual effects of the Churchill Falls development highlighted the limitations of Nalcor's approach of including the effects of past projects in baseline conditions, without clearly acknowledging these effects. Generally, Nalcor's approach illustrates the limitation of project-specific cumulative effects assessment, namely that the end result is the potential for incremental decline in the biophysical and socio-economic environments with each successive development. …
>
> The Panel recommends that, if the Project is approved, the provincial Department of Environment and Conservation, in collaboration with the provincial Department of Labrador and Aboriginal Affairs and other relevant departments, identify regional mechanisms to assess and mitigate the cumulative effects of current and future development in Labrador. [78] (our underlining)

The findings and recommendations of the Lower Churchill Panel are in many ways similar to those of the Eastmain-1 Rupert Panel, namely that cumulative effects of the interaction between existing and proposed hydroelectric projects are poorly understood and contribute to uncertainties regarding the "consequence of the changes" to the environment and the "potential significance of those changes."

[78] *Ibid*., at p.xix

Cultural Heritage

> The Panel concludes that the Project would cause a significant adverse effect to culture and heritage after mitigation particularly with respect to the "loss of the river" as a highly valued cultural and spiritual landscape. This effect … would be irreversible and would last for the duration of the Project.

I draw this conclusion to the attention of the Board because it was mentioned also in the dissenting opinion for the Eastmain-1 Rupert Panel and was a substantial issue in the review of the proposed Site C Clean Energy Project, discussed below.[79] In the case of the Rupert River, on which there has been no prior hydroelectric development, it is perhaps not surprising that diversion of a "pristine" river should raise concerns. However, in the case of the Churchill River in Labrador, the Churchill Falls Project already inundates about 50% of the Churchill River and the area is essentially unusable and culturally unrecognizable. Similarly, 60% of the Peace River in British Columbia is already inundated by the existing reservoirs with essentially no use by the affected First Nations. And yet, despite the extensive loss of the existing river valleys, inundation of the remaining portions was still considered highly significant. This reality speaks to the enduring and exceptional cultural value of large river valleys.

In reviewing the Terms of Reference for this proceeding, I noted that cultural and spiritual impacts are not captured by either the definition of macro environmental impact or by the definition of socio-economic impact in Order 92/13. Yet, in the case of the three large hydroelectric projects I considered in this review, these issues were considered to be of very high importance. As such, I recommend that the Panel be open to considering information in regards to potential cultural and spiritual impacts of the PDP or of the alternative plans that may come forward during the hearings phase of this process.

4.3.3 Peace River (British Columbia)

Historic Facilities

BC Hydro owns and operates two hydroelectric generation facilities on the Peace River in northeastern British Columbia. Developed beginning in the 1950s, pursuant to British Columbia's Two Rivers policy, the W.A.C. Bennett Dam was completed in 1968 and the Peace

[79] Treaty 8 First Nations (T8FNs) Community Assessment Team. 2012. Telling a Story of Change the Dane-zaa Way. (Site C EIS, Volume 3, Appendix b7), p.vi-xxii. CEAR #421 http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919

Canyon Dam in 1980. Similar to the La Grande River and Churchill River developments, the Peace River hydroelectric projects have had substantial implications for local Aboriginal groups.[80]

The Peace River hydroelectric developments include the following:

- The W.A.C. Bennett Dam, with a total installed capacity of 2,730 MW
- The Peace Canyon Dam, with a total installed capacity of 694 MW, located approximately 23 km downstream from the WAC Bennett Dam
- Williston Reservoir behind the WAC Bennett Dam, totaling 1761 km^2
- Dinosaur Reservoir behind the Peace Canyon Dam, totaling 8 km^2
- Three 500 kV AC transmission lines and several interconnecting lines at lower voltages, totaling over 1500 km

Site C Clean Energy Project

Project Description

In May 2011, BC Hydro filed a project description with Provincial and federal agencies to initiate an environmental assessment of its proposed Site C Clean Energy Project. The Project consists of the following components:

- The Site C generating station, a 1100-MW facility on the Peace River approximately 83 kilometres downstream from the existing Peace Canyon Dam, generating 5.1 TWh/year
- Two 500 kV AC transmission lines between Site C and Peace Canyon Dam (77 km)
- An 83 km^2 reservoir above the proposed dam, extending to the tailrace of the Peace Canyon Dam
- Realignment of several highways sections totaling approximately 30 km[81]

Aboriginal Groups

The Project has the potential to affect several Aboriginal groups, with 6-8 Treaty 8 First Nations being the primarily-affected Aboriginal groups.[82] Of these First Nations, most are opposed to

[80] *Ibid*., at p. 86-99.

[81] Site C Clean Energy Project Environmental Impact Statement Volume 1: Introduction, Project Planning, and Description Section 4: Project Description. CEAR #421 http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919

the proposed Project. BC Hydro has entered into preliminary discussions with a couple of First Nations and indicated its intended objectives for these discussions during the recent Joint Review Panel hearings, as follows:

- To provide cash payments, both lump sum and payments streams over time
- To support education, training, and community infrastructure
- To consider land compensation through Crown land transfers
- To implement land protection measures or special land management designations to compensate for lost lands[83]

Environmental Assessment

A joint review panel assessment of the proposed Site C Project was initiated in May 2011 and is continuing with submission of a Joint Review Panel report in April 2014. The environmental assessment was conducted pursuant to a Joint Review Panel Agreement between the Provincial and Federal governments.

The three-member Panel was appointed in August 2013 and mandated to conduct a review of the environmental effects of the Project, and to report to the federal Minister of the Environment. The review included a sufficiency review of the EIS, and hearings in several Dane-zaa and Cree communities, local municipalities, as well as Prince George and Peace River, Alberta.

Since the Panel has yet to issue its report, the materials below present the findings of the Proponent with respect to significant adverse environmental effects and some key relevant observations of the Panel and participants during the environmental assessment and hearings process respecting cumulative effects and perspectives on previous hydroelectric developments.

Significant Effects Identified by BC Hydro

BC Hydro identified a number of significant adverse environmental effects associated with the development of its proposed Site C project, as follows: [84]

[82] *Ibid*., Volume 5: Asserted or Established Aboriginal Rights and Treaty Rights, Aboriginal Interests and Information, Environmental Management Plans, and Federal Information Requirements Section34: Asserted or Established Aboriginal and Treaty Rights, Aboriginal Interests, and Information Requirements

[83] CEAR #2201, p.24, lines 5-21. http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919

- Fish and Fish Habitat
  - Potential for loss (i.e. extirpation) of several harvested fish species in portions of the reservoir and affected tributaries as a result of changes to fish habitat and the fish assemblage
- Wildlife resources
  - At risk population of migratory bird species and their habitat would be affected by the creation of the reservoir
  - Cumulative effects of the Project with the residual effects of other projects and activities on the loss and fragmentation of wildlife habitat, disturbance or displacement, and mortality for certain species
- Vegetation and Ecological Communities
  - Potential alteration and fragmentation of unique terrestrial ecosystems and loss of rare plant species
  - Cumulative effects of the Project with the residual effects of other projects and activities on future loss of rare plants and rare and sensitive ecosystems
- Current Use of Lands and Resources for Traditional Purposes
  - Loss of some important multi-use, cultural areas and valued landscapes for local First Nations
- Greenhouse Gas Emissions
  - Cumulative effects of the Project related GHG emissions, though relatively small, with the GHG emissions from the many source globally

In addition to a number other residual effects that were determined not to be significant, the Proponent also identified what it viewed as potential positive environmental benefits of the project (e.g. increased total fish biomass) but did not conclude that any of these were significant.

It is important to note that the above list reflects only the views of the Proponent, and that the Joint Review Panel may reach somewhat different conclusions. Similar to the Lower Churchill Project and the Eastmain-1 Rupert Diversion, proceeding with the development of large-scale

[84] Summarized from BC Hydro. January 2013. Site C Clean Energy Project: Environmental Impact Statement Executive Summary, at pp.34-35.

hydroelectric projects very often requires justification of many significant environmental effects.

Cumulative Effects

BC Hydro in conducting its cumulative environmental effects assessment determined that the effects of the existing hydroelectric facilities could be considered to be "reflected" in the description of current environmental conditions. The primary reason provided by BC Hydro for taking this approach was a lack adequate data concerning conditions prior to the development of the existing dams. The Panel questioned this approach:

> [PANEL MEMBER] BEAUDET: Some groups said, you know, that there was existing data and you disagreed. … Now, the Lower Churchill also did the same thing as you did. And they had lots of participant views that disagreed. I'd like to know more about the arguments that you've used and managed; they must be magical. And managed to convince the agency and environmental assessment office of the Province to go ahead and exclude the two dams. [85]
>
> MS. BEAUDET: Do I understand that the major argument was that you didn't have the data? I mean, the Peace Canyon Dam had the Environmental Impact Assessment done. The Bennett Dam -- when you build a dam, you have data. I mean, even if it's 1957, you would have data. [86]

The observations are in many ways similar to those of the Eastmain-1 Rupert Panel and the Lower Churchill Panel, namely that cumulative effects of the interaction between existing and proposed hydroelectric projects are very often not properly assessed and this contributes to uncertainties regarding the "consequence of the changes" to the environment and the "potential significance of those changes."

Perspectives on Previous Developments

> MS. SUSAN YURKOVICH [BC Hydro]: As a third dam on the Peace River, the project would make valuable use of the existing Williston reservoir to generate 35 percent of the output of the Bennett Dam with 5 percent of the reservoir footprint. [87]

[85] CEAR #2697, at p.194, l.22 to p.195, l.17. http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919
[86] CEAR #2697, at p.197, l.24 to p.198, l.13. http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919
[87] CEAR #2059, at p.53, l.23 to p.54, l.2. http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919

The above comments, made by the BC Hydro Vice President form one of the Proponent's key arguments in favour of the proposed Project, namely that the proposed Project is better than the ones that came before it.

During the hearings, Parks Canada representatives made the following comments in regards to the effects of the prior dams and reservoirs:

> MR STEVE OATES [Parks Canada]: Okay. I think our main concern is that the -- by incorporating the flow regulation and the impacts associated with that with the existing two dams into the baseline, it assumes or presupposes that the impacts of the existing dam operations are to a certain extent acceptable, and I think we would rather have seen a more robust assessment … specifically focused in on what is the actual impacts of operating the two existing dams in terms of how they actually flow manage… [88] (underlining added)

These comments from Parks Canada are consistent with those raised in their written submissions to the Panel:

> BC Hydro's approach to cumulative effects assessment for the Site C project is based on accepting the present state of the Peace River and the PAD as the baseline condition upon which to add the incremental impacts from construction and operation of the Site C dam. This approach doesn't fully consider the cumulative impact from all BC Hydro's flow management operations against an unregulated, undammed river. The point here is that the WAC Bennett dam was proposed, and constructed, in a time when no environmental assessment legislation or process was in place. If the Bennett dam project was [sic] proposed today it is very unlikely that such dramatic regulation of the flow regime on the Peace River would be found to be justifiable in the circumstances. The project would then either be modified to limit the scope of the impact to the hydrology of the Peace River, or the project would be cancelled.[89] (underlining added)

These observations by Parks Canada raise similar concerns to those raised for the Eastmain-1 Rupert Diversion Project, namely that viewing additional impacts in the context of larger impacts that occurred historically and that are or may no longer be acceptable is not appropriate.

[88] CEAR #2420, p.293, l.13 to p.294, l.3. http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919

[89] CEAR #922 http://www.ceaa-acee.gc.ca/050/documents-eng.cfm?evaluation=63919

Secondly, the views expressed suggest an evolving perspective about what is acceptable in terms of macro environmental and socioeconomic impacts from hydroelectric developments. This evolving perspective exists also in the utility industry itself, as proponents move towards project redesigns intended to reduce effects as in the case of Eastmain-1 and the Keeyask Project, smaller-scale renewables, and a greater emphasis on demand-side management. In my opinion, as costs of the alternatives continue to decline and as the means for addressing capacity requirements improve, the trend towards viewing the impacts of prior hydroelectric developments more negatively is likely to continue. How future generations view the choices we make today may be very different than the way we see them ourselves.

5 CONCLUSIONS

In reviewing the available evidence for this proceeding with respect to the determination of macro environmental impact, it is clear that the challenge facing the PUB is that it needs to be able to compare the macro environmental impact of the resources composing the PDP to those composing the alternative plans.

Much of the analysis in the PDP and evidence submitted respecting macro environmental impact focuses only on the "consequences of changes" for air. Regardless of ones views on whether the PDP has "net environmental benefits" in terms of greenhouse gas emissions, an additionally important question, and the one that matters most to the Board, is whether or not these net environmental benefits exceed those that could be obtained through pursuing an alternative plan.

The conclusions and recommendations to government provided by the CEC, though necessary to the NFAT, will apply only to a single component of the PDP and to those alternative plans that contain Keeyask as a plan component. The findings of the CEC will not apply at all to those alternative plans that do not contain Keeyask.

As a result, other means to determine the likelihood of significant adverse environmental changes or effects as well as the "consequences of these changes" need to be used in the absence of information from additional environmental assessments of PDP and alternative plan resources.

The apparent lack of comprehensive information concerning the residual environmental effects of the existing hydroelectric facilities on the Nelson River is unfortunate. This kind of information would be very valuable in characterizing the potential consequences of changes to the environment resulting from future hydroelectric developments on the Nelson River, whether in relation to the PDP, to the alternative plans, or to some other future hydroelectric development in the Province.

The PDP is the largest hydroelectric development that has been contemplated in the Province for several decades. It is my view that the observations of other independent tribunals who have considered similar developments and contemplated similar issues and trade-offs is valuable to the Board in the absence of detailed environmental assessment information for some components of the PDP and of the alternative plans. I encourage the board to consider the conclusions and recommendations of these other independent tribunals in carrying out its review.

APPENDIX A

Table A-1: Historic and proposed facilities on the Nelson River system[90]

Date[91]	Existing Component	Salient Data
1961	Kelsey Generating Station	▪ 250 MW ▪ Three 138-kV AC lines to Thompson ▪ One 138-kV AC line feeding Split Lake ▪ Two 138-kV AC lines to Gillam (which feed Gillam, Ilford, Churchill)
1974	Kettle Generating Station	▪ 1220 MW ▪ 138 kV AC to Radisson Converter Station ▪ ±450 kV DC to Winnipeg
1977	Churchill River Diversion	▪ A control dam at Missi Falls, the natural outlet of Southern Indian Lake, controls the outflow and also raises the lake level three metres. ▪ An excavated channel from South Bay of Southern Indian Lake to Issett Lake creates a new outlet to allow Churchill water to flow into the Rat River-Burntwood River-Nelson River system. ▪ A control dam at Notigi on the Rat River regulates the flow into the Burntwood-Nelson system.
1979	Jenpeg Generating Station	▪ 129 MW ▪ Transmission line 230-kV to Ponton
1979	Long Spruce Generating Station	▪ 230 kV AC to Radisson Converter Station ▪ 230 kV AC to Henday Converter Station ▪ ±450 kV DC to Dorsey Converter Station
1990	Limestone Generating Station	▪ 1340 MW ▪ 230-kV AC to the Henday Converter Station ▪ 500-kV DC to Winnipeg
2012	Wuskwatim Generating Station	▪ 200 MW ▪ One 230-kV line from Wuskwatim to Birchtree Station (Thompson); ▪ Two 230-kV lines from Wuskwatim to Herblet Lake Station
Date	**Approved Component**	**Salient Data**
2019	Bipole III	▪ ±450 kV DC from Keewatinoow Converter Station to Riel Converter Station ▪ 230 kV transmission line linking the Keewatinoow Converter Station

[90] https://www.hydro.mb.ca/corporate/facilities/generating_stations.shtml; https://www.hydro.mb.ca/corporate/water_regimes/churchill_river_diversion.shtml

[91] Indicates in-service date

		to Henday Converter Station and the Long Spruce Switching Station
Date	**Approved Component**	**Salient Data**
2020	Keeyask Generating Station	▪ 695 MW ▪ Keeyask Transmission Project
2026	Conawapa Generating Station	▪ 1485 MW ▪ Conawapa Transmission Outlet Project
2026	North-South Transmission Line	▪ Upgrades to existing 230 kV AC system and existing DC system ▪ New 230 kV to support additional 185 MW of north-south transmission
2020	Manitoba-Minnesota Transmission	▪ 500 kV AC transmission from Dorsey Station to US border

Tab 108

Why we need Bipole III

Dr. David R. Swatek, Manager, System Planning

Pei Wang, System Analysis /Controls & AC/DC Planning Engineer

Alastair Fogg, Manager, Bipole III Project Controls

The Existing Bipole I and II System

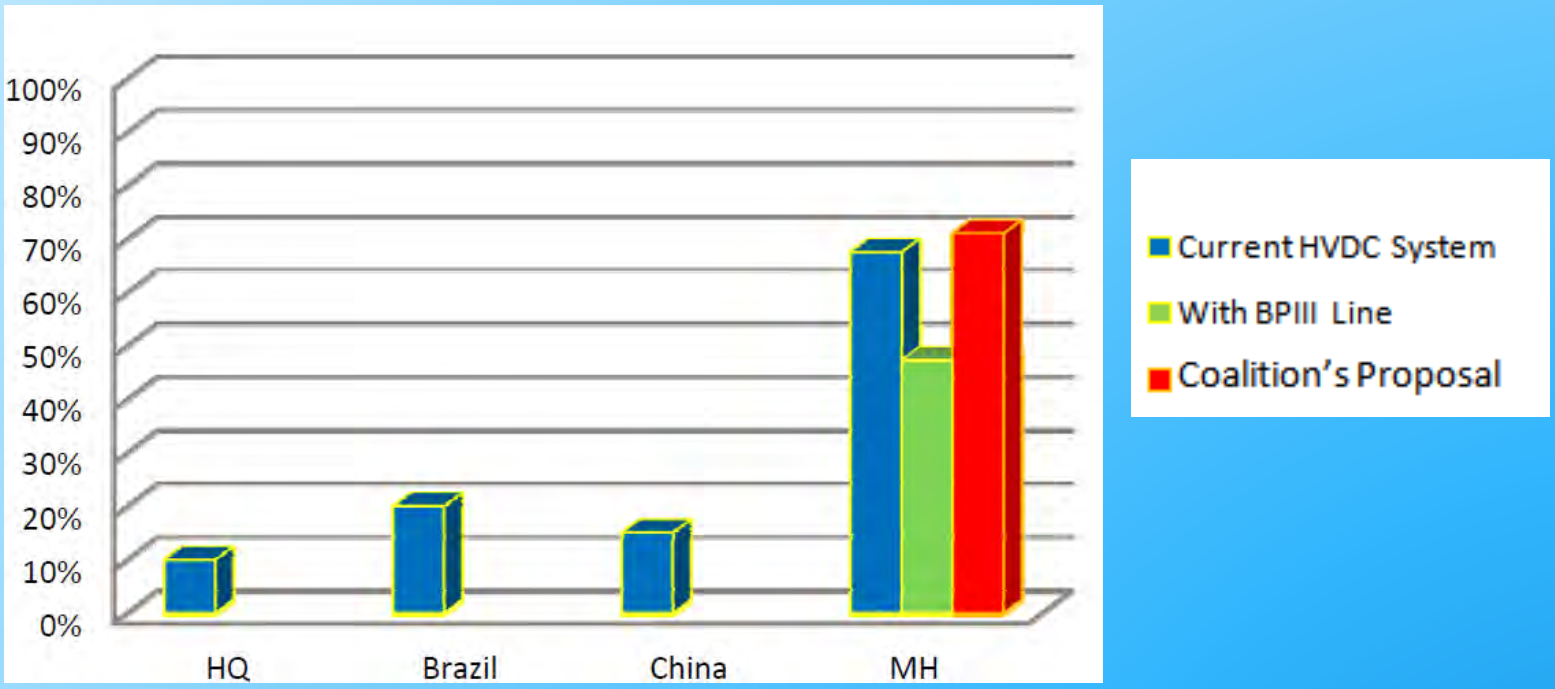




- Link to 70% of the Province's generating capacity
- Bipole I and II HVdc lines constructed on the same Right-of-way (same corridor)
- 900km overhead lines, difficult terrain and access in the north
- Terminated at a common station – Dorsey (inverter)

Manitoba Hydro

Maximum Percentage Power through a Single Facility



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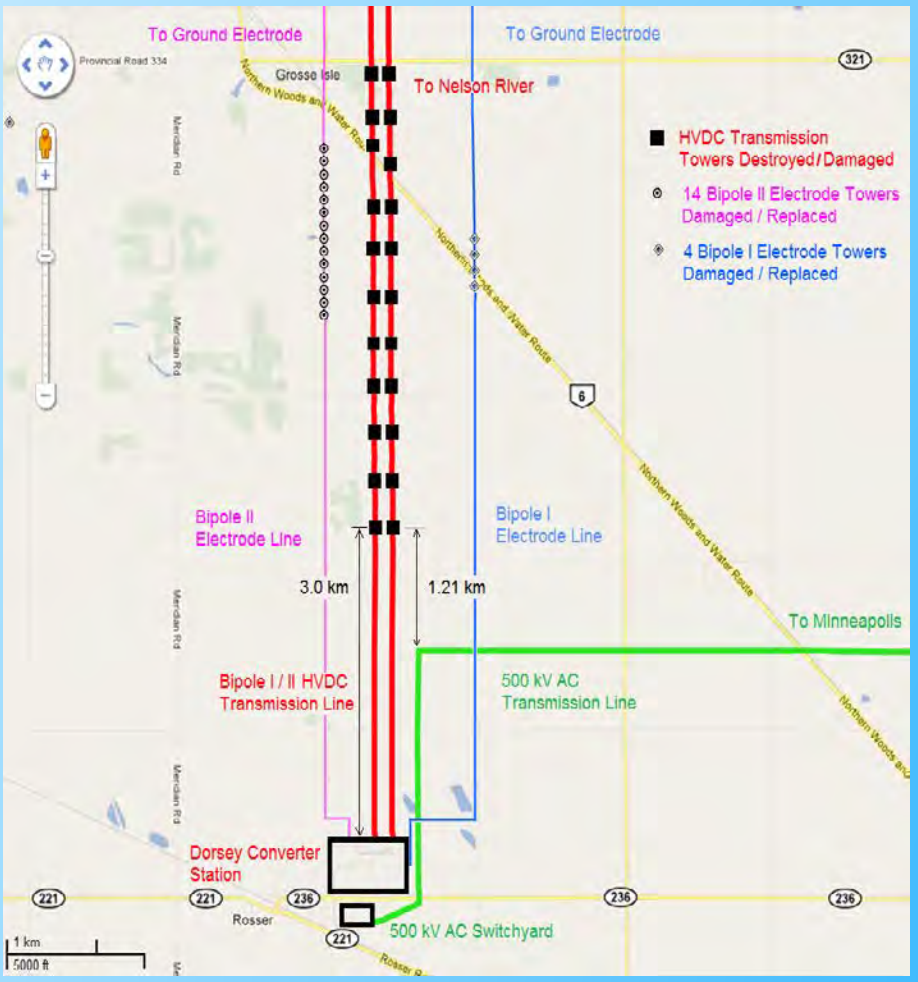
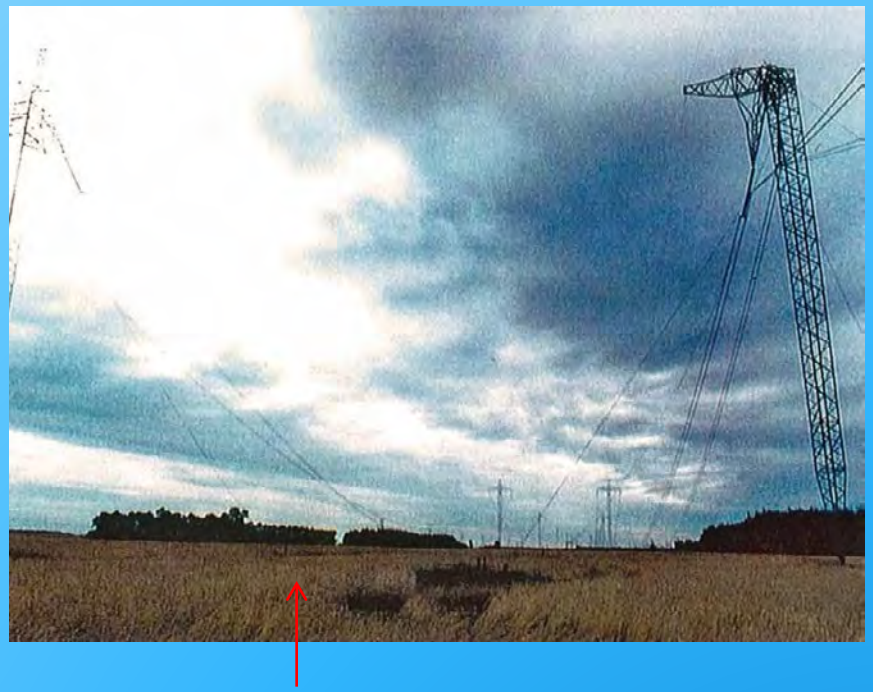
Manitoba Hydro

Reliability Risk –1996 Wind Event





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- Dorsey is currently single terminus point for HVDC system
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- With the tower bases locked in ice, torsional forces at the base bent members.
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Governing Criteria

- Generation Planning Criteria: i.e. 12% reserves, low flow years.
- NERC Transmission Reliability Standards
  - TPL-001 (N), TPL-002 (N-1), TPL-003 (N-2)
- HVDC Adequacy Criteria
  - "spare pole over load" (1986 criteria),
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- Composite Reliability
  - Loss of Load Expectation (LOLE): 0.1 day/year guideline
    - Guideline since 1996 / explicit reporting requirement since 2012
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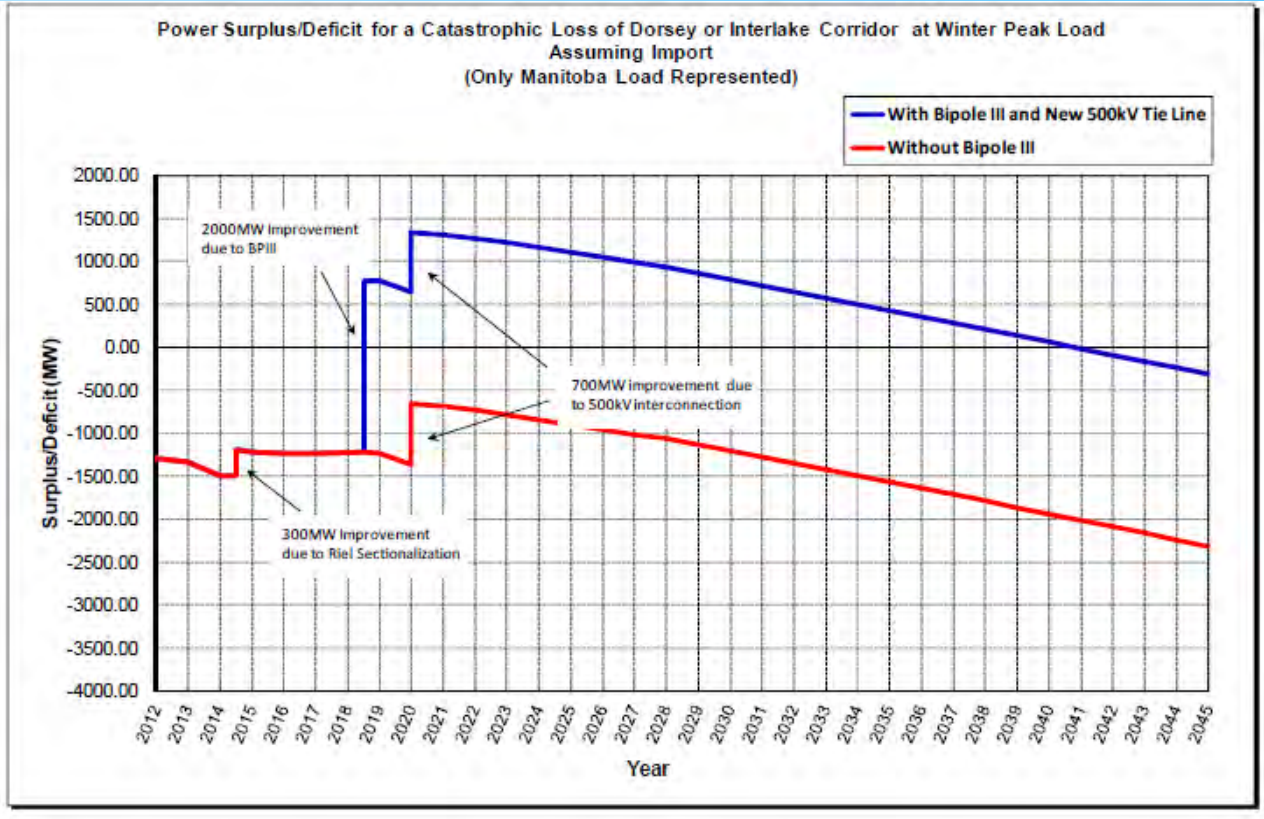
TPL-004 Deterministic Analysis – Supply Deficit



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Manitoba Hydro

Probabilistic Analysis – Weather Hazards

- Manitoba Hydro has worked closely with field experts to evaluate weather hazards (Tornados, wide front wind, ice and etc) and other risks of losing the existing HVDC system after the 1996 event.

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*MH used a more optimistic 50 year return period for LOLE studies

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- A probabilistic adequacy analysis was performed to evaluate the impact of Bipole III. (2012)
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- Bipole III significantly improved the system reliability with LOLE meeting the 0.1 day/per year guideline. (draft report, 2012)
- Together with new proposed 500kV tie line and Keeyask G.S, a reliable performance of Manitoba hydro system is ensured in the long term (probabilistic adequacy analysis was provided during 2014 NFAT)

Questions ?



Manitoba Hydro

Tab 109

2017/18 & 2018/19 ELECTRIC GENERAL RATE APPLICATION

Manitoba Hydro Undertaking #54

Manitoba Hydro will provide the presentation Dr. Swatek presented on the risks of reduction associated with the construction of Bipole III.

Response:

Please find attached the presentation on the need for Bipole III delivered by Dr. Swatek during the 2014/15 & 2015/16 General Rate Application oral hearings (Exhibit MH-57). The presentation was delivered on June 3, 2015 (Transcript pages 2108 – 2123).

Manitoba Hydro offered to re-file this presentation and is providing additional information below, to assist in understanding the system reliability that Bipole III brings to the Manitoba Hydro HVDC transmission system when it comes into operation. Statistically, introducing Bipole III substantially reduces the risk of significant weather events impacting the HVDC transmission system and disconnecting southern Manitoba from the northern load generation as follows:

Tornados:

- Pre Bipole III: 1:17 year return period
- Post Bipole III: 1:3700 year return period

Synoptic (wide front) Wind:

- Pre Bipole III: 1:90 year return period
- Post Bipole III: 1:560 year return period

Combined Wind and Ice:

- Pre Bipole III: 1:20 year return period
- Post Bipole III: greater than 1:200 year return period

Why we need Bipole III

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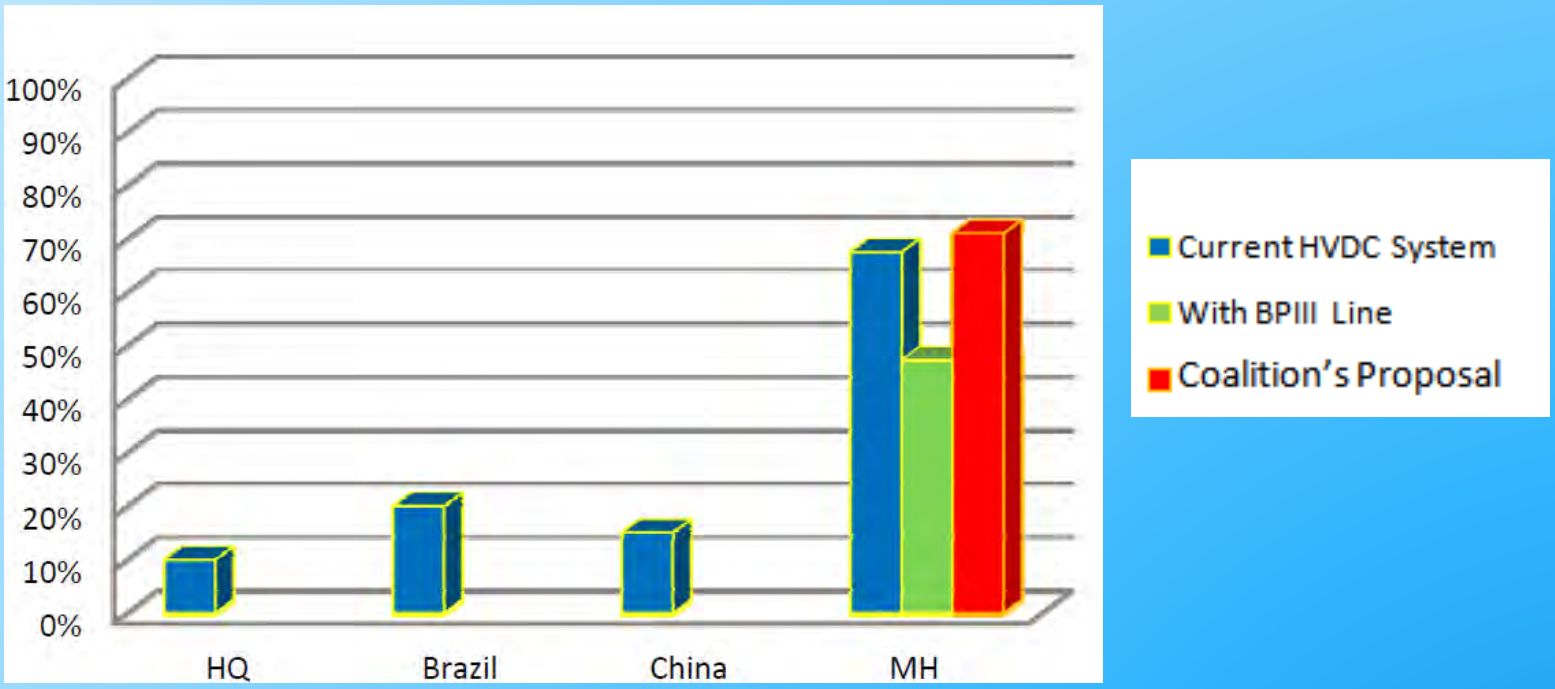

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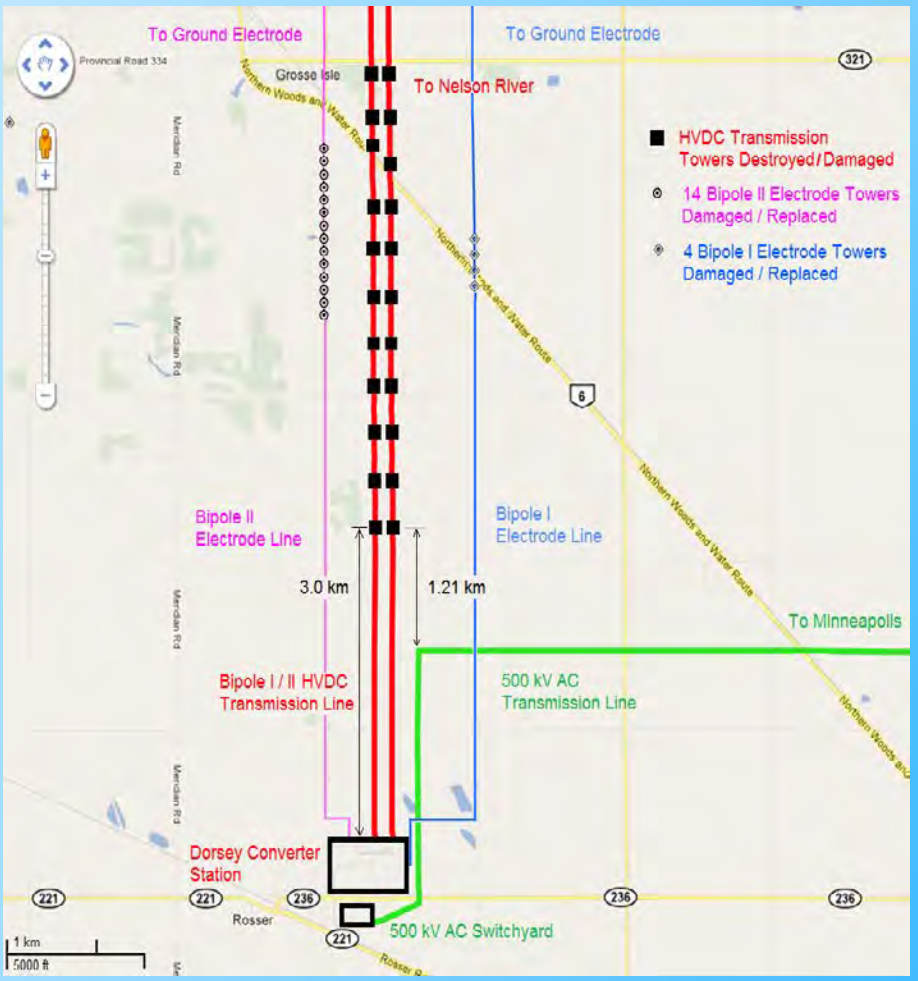

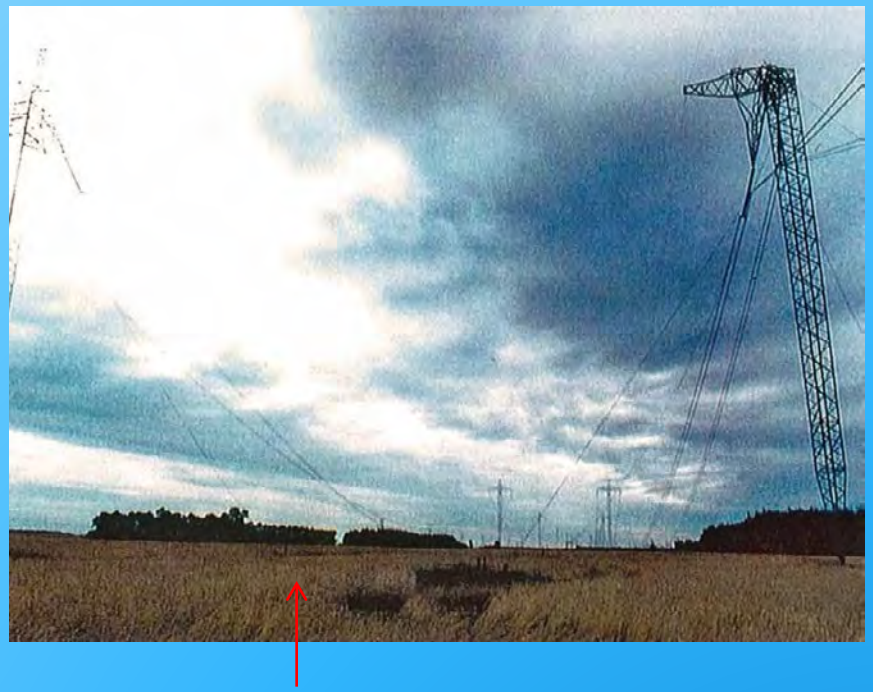

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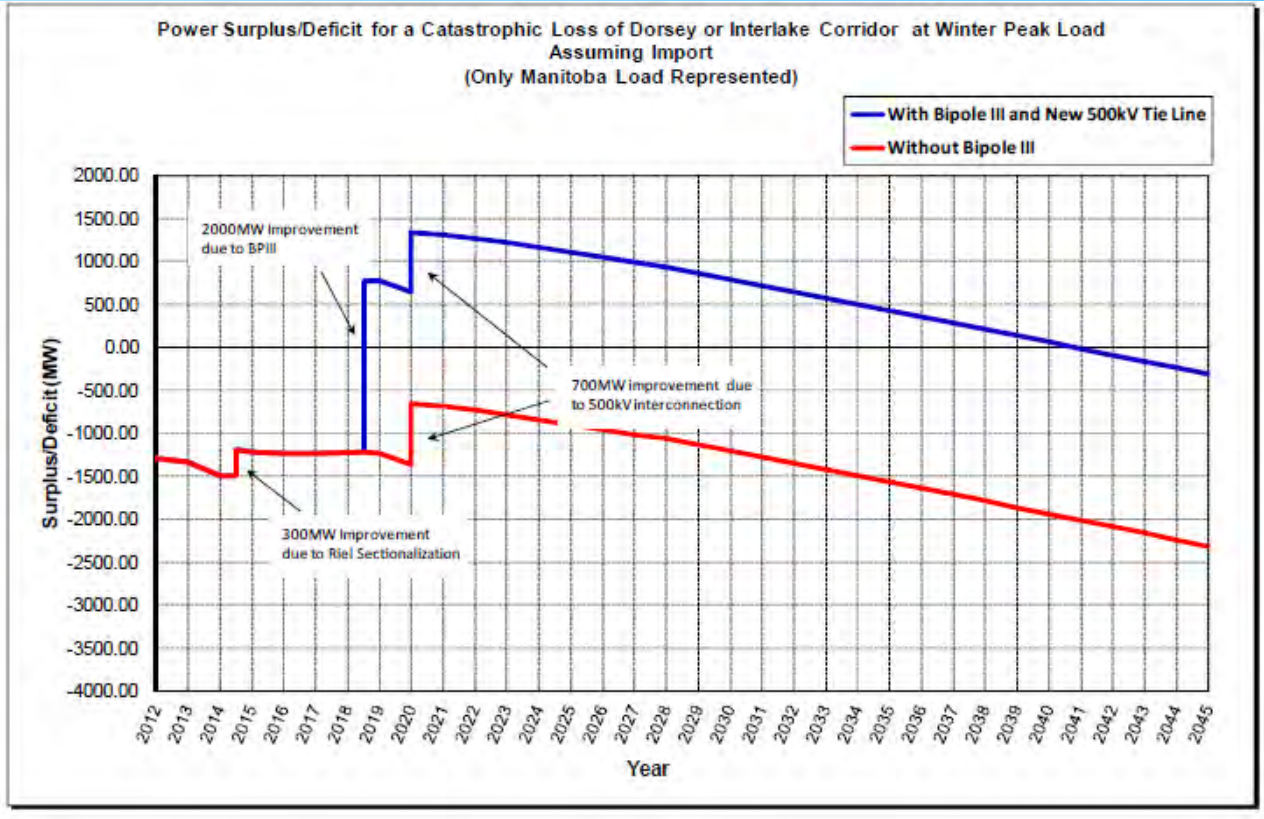

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Questions ?



Manitoba Hydro

Tab 110

NEEDS FOR AND ALTERNATIVES TO (NFAT)

REVIEW OF MANITOBA HYDRO'S

PREFERRED DEVELOPMENT PLAN (PDP)

REPORT PREPARED FOR

THE MANITOBA METIS FEDERATION

BY

WHITFIELD RUSSELL ASSOCIATES

FEBRUARY 12, 2014

Whitfield Russell Associates
4232 King Street
Alexandria, VA 22302
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INTRODUCTION AND CAVEATS

Whitfield Russell Associates ("WRA") was retained to review and analyze Manitoba Hydro's Preferred Development Plan ("PDP" or "Plan") on behalf of the Manitoba Métis Federation ("MMF"). In particular, WRA has focused its examination on the Terms of Reference - Needs For and Alternatives To ("NFAT") Review number 2.g as identified by the Manitoba Public Utilities Board ("PUB") in Procedural Order 67/13. This term of reference is as follows:

> 2. An assessment as to whether the Plan is justified as superior to potential alternatives that could fulfill the need. The assessment will take the following factors into consideration:
>
> . . . .
>
> g. The financial and economic risks of the Plan and export contracts and export opportunity revenues in relation to alternative development strategies;

However, the MMF has been frustrated in its attempts to evaluate the financial and economic risks of the PDP and export contracts by its inability to gain access to the vast majority of information that Manitoba Hydro provided to the Independent Expert Consultants ("IECs"). Because of this lack of access, the MMF has encountered considerable difficulty analyzing the details of the various alternative plans, their underlying assumptions, the costs and benefits of each alternative, and how these relate to the concerns of the Manitoba Métis Community. Many questions asked by the IECs were similar to those that MMF would have asked. And many of the answers came as follows:

> "This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro."[1]

Many other data responses were considered to be commercially sensitive and were therefore not made available to the general public. See, for example, responses to MMF/MH II-015, II-016d and II-019h. The opaqueness is exacerbated by redactions in the IEC evidence.

[1] See, for example, LCA/MH 1-029 thru 032, among many others. Also troubling is the lack of transparency with regard to pricing of exports versus costs of the two proposed hydroelectric generation projects, Keeyask and Conawapa.

Most troubling to the MMF is that, as noted in the Terms of Reference at page 4, the scope of the NFAT does not include the Bipole III high voltage direct current ("HVDC") transmission line and converter station project. Of particular importance is Manitoba Hydro's stance that Bipole III is needed primarily for reliability purposes, and thus (somehow), no NFAT review was needed for this particular facility. One would think that a "Need for and Alternative To" review would have been required for a $3.3 billion facility traversing a large portion of the Province.[2] According to PUB Order 5/12, however, the PUB decided that a needs analysis was not required for Bipole III, and, accordingly, the Terms of Reference in this proceeding exclude Bipole III and its converter stations from the scope of the NFAT.

Manitoba Hydro's underlying assumption that each and every alternative should include Bipole III has the effect of understating the cost of the Preferred Development Plan and greatly overstating the cost and relative economics of certain alternatives—primarily those that do not include future hydro generation or that involve deferrals of Northern hydro development.

In short, the PDP of Manitoba Hydro consists of building two large hydro generating stations on the Nelson River (Keeyask Generating Station in 2019 and the Conawapa Generation Station in 2026), both of which will make use of the additional transmission capacity added by Bipole III. The PDP also includes North-South Transmission Upgrades which involve changes to the alternating current ("AC") collector system of the hydro plants on the Nelson River, as well as additional AC transmission lines. Finally, the PDP includes a transmission link with the United States—the Manitoba-Minnesota Transmission Project, which will enable Manitoba Hydro to export substantial additional bulk power to various utilities in the Midcontinent Independent System Operator, Inc. ("MISO"). As part of the NFAT, Manitoba Hydro analyzed 15 separate alternative plans that could provide the necessary energy and capacity for Manitoba's forecasted domestic loads, as well as planned exports to MISO utilities.

Manitoba Hydro described the need for Bipole III as follows in Chapter 5 of the NFAT (at 25:8 – 26:2).

[2] See PUB/MH I-053a Revised for the estimated cost of Bipole III.

> Approximately 70% of Manitoba's hydro-electric generating capacity is delivered to southern Manitoba via the Bipole I and Bipole II HVDC transmission lines. Bipoles I and II share the same transmission corridor through the Interlake region over much of their length from northern Manitoba to a common terminus at the Dorsey Converter Station. The existing transmission system is therefore vulnerable to the risk of catastrophic outages of either (or both) Bipoles I and II in the Interlake corridor and/or at Dorsey due to unpredictable events, particularly severe weather. This vulnerability, combined with the significant consequences of prolonged major outages, caused Manitoba Hydro to pursue a major initiative to reduce dependence on the Dorsey Converter Station and the existing HVDC Interlake transmission corridor.

However, as will be discussed in more detail below, Manitoba Hydro's reasoning in support of the reliability need for Bipole III is flawed. Indeed, Manitoba Hydro's PDP will put more eggs in the Northern hydro basket, fill the reserve transmission capacity to be provided initially by Bipole III and return Manitoba Hydro to its dependence on the HVDC Interlake transmission corridor.

THE 78-YEAR STUDY PERIOD IS TOO LONG

Manitoba Hydro's use of an extremely long study period (78 years) serves the purpose of tilting its economic analysis in favor of long-lived assets such as hydro projects that are projected to generate substantial off-system sales revenue. Initially, Manitoba Hydro noted that "The next step was to develop and evaluate potential alternative development plans using the short-listed resource options. The number and size of resource options were selected to cover Manitoba's energy and capacity needs for the next 35 years." See Executive Summary at 17:14-16. However, actual economic evaluations were based on the much longer 78-year time period, as described in Chapter 9 at 7:15-18:

> The total study life used in this analysis is 78-years. For the total study life, Manitoba Hydro combines two approaches – a 35-year detailed evaluation and a long-life asset evaluation which extends from the end of the 35-year study period to the end of the service life of hydro-electric generation assets, as representing the longest-lived assets.

Manitoba Hydro's response to LCA/MH 1-189 notes that the 78-year study length was determined by using the weighted average life of the hydro plants (67) years, extending from the 2025, when the Conawapa Project was initially assumed to go into service. Attachment A of the

response to PUB/MH 1-020a indicates that other study periods of Manitoba Hydro tend to range from 10 to 35 years. Indeed, Manitoba Hydro's Integrated Financial Forecast ("IFF") uses a 20-year projection, while its Power Resource Plan looks forward 35 years.[3]

As a result, Manitoba Hydro's economic evaluations of its alternative plans mask the negative aspects of the financial burdens associated with capital-intensive hydro plans, and give unwarranted value to exports to the United States. Manitoba Hydro admits that these hydro-intensive plans cause a need for rate increases that, in the "medium" term (if 20 and 35 years are considered medium term), are projected to be higher than the rate increases necessary to support alternative resource plans with no hydro additions, or only one future hydro plant addition. For example, Manitoba Hydro states in Chapter 11 of the NFAT report:

> By 2035, following the in-service of both Keeyask and Conawapa, the cumulative rate increases for the Preferred Development Plan (green) begin to beneficially separate from the alternatives. By 2040, the cumulative rate increases for the Preferred Development Plan are lower than [those required in connection with] all other development plans as measured by the P10, P25, P50, P75 and P90 values.[4]

Therefore, nearly 26 years must elapse before the PDP lowers the cumulative rates paid by Manitoba consumers. Before 26 years, the cumulative rates required to support other alternative plans will be lower. And during these 26 years, many of the favorable conditions assumed to underlie these studies may not develop. Actual conditions could differ drastically from the favorable conditions assumed in Manitoba Hydro's studies. Furthermore, it is during this first quarter century initial period (e.g., until Manitoba loads increase and eat into its ability to export power) that revenues from exports are expected to be most significant in amount and value (as measured on a net present value basis). If assumed margins on export sales turn out to be overestimated, even greater rate increases will be required.

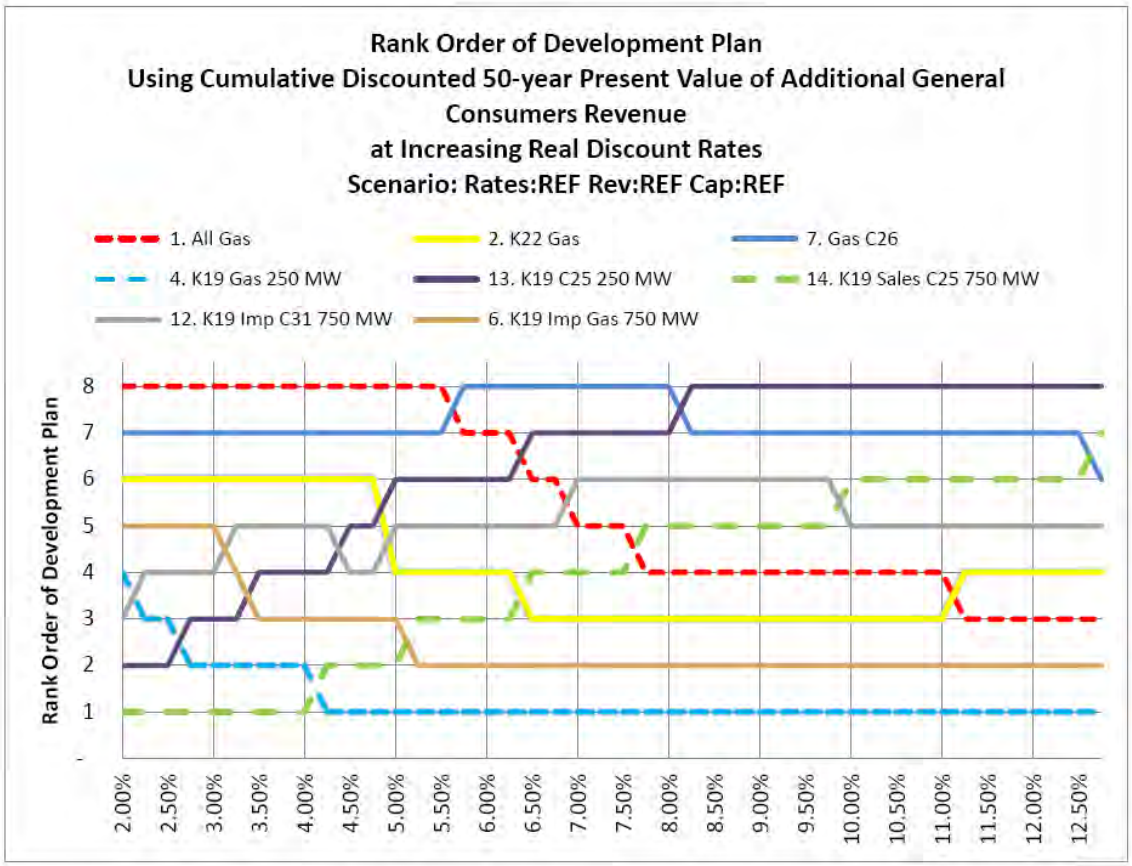
Manitoba Hydro's response to PUB/MH 1-149a REVISED shows the impact on customers of rates based on different alternative resource plans. It states:

[3] See NFAT Appendix B at 19.

[4] See Chapter 11 at 8:14-9:2.

> Figure 11.10 shows the impacts on customer rates (seen in Figure 11.1, 1 Chapter 11, page 8) on a present value basis and represents the projected cumulative present value of total general consumers' revenue for the 50 year study period. Figure 11.10 shows that:
>
> - In the near term, by 2020, the cumulative present values for the various alternatives are relatively similar.
> - By 2030, the cumulative present value of the capital-intensive plans that include both Keeyask and Conawapa are generally higher than [those associated with] the other alternatives.
> - Between 2030 and 2050, K19/Gas/250 (light blue) is projected to have the lowest cumulative present value at the P50 value.
> - From 2050 to the end of the study period, the preferred development plan (green) is projected to have the lowest cumulative present value at the P50 value.

This same data response indicates that Manitoba Hydro performed a sensitivity analysis of the discount rate on the various alternatives, and noted that "the Preferred Development Plan provides the lowest customer bill impacts on a present value basis up to a real discount rate of approximately 4.15%." What Manitoba Hydro did not say, however, was that another alternative, the K19 Gas 250 MW alternative was better at every single higher discount rate. See the table below, included in the data response as Figure 11.13:



One of the IECs, Elenchus, submitted a review of Manitoba Hydro's load forecast. In its report, Elenchus noted that (at i) "given the time frame of the NFAT analysis, it is our view that it is more reasonable to anticipate that there will be significant structural changes that could result in dramatically different domestic demand (and presumably export prices) in the coming decades." Elenchus also notes (at iii): "Forecasting over a 20-year time horizon has many associated risks." The fact that Manitoba Hydro has instead performed its economic evaluation of alternatives using a 78-year study period, including forecasting future energy prices and revenues, throws into doubt many, if not all, of its conclusions and plans. Elenchus mentions the possibilities inherent in increased demand side management and energy efficiency measures, as well as the real risk of distributed generation for lowering demand in the future.

The risks that Elenchus (and other IECs) describe are very real. For example, looking back to the decade of the 1990s, it is doubtful that forecasters predicted the recession period of 2008-2012, or the boom of shale gas production. Other recent changes include the rapidly decreasing

costs of wind power and solar power, as well as energy efficiency gains through the use of LED lights, which has led to lower load growth.

Manitoba Hydro admits itself that the excessive study period involves a lack of detailed inputs and assumptions, as stated in response to LCA/MH 1-218.

> The financial evaluation in Chapter 11 is a full revenue and cost analysis of Manitoba Hydro's entire electric operations, including the impacts of the current and proposed integrated hydro electric system, as compared to the incremental analysis, which includes the development plan specific inputs only, in the economic and uncertainty evaluations in Chapters 9 and 10. The 50-year period is an extension of the detailed 35-year evaluation period to be consistent with the long-term nature of hydro-electricity assets as well as provide a sufficient timeframe for which to analyze the benefits and costs for each development. Financial evaluation over a longer timeframe is limited due to the lack of availability of the detailed inputs and assumptions required by the financial model related to the entire integrated hydro-electric system both current and proposed rather than the availability of development plan specific inputs and assumptions.

If the economic study period is reduced to 35 years, the PDP is no longer the best plan, although Manitoba Hydro puts the best face on the PDP by stating that the "key conclusions from the probabilistic analysis provided in Chapter 10 do not change significantly whether assuming a total study life of 78 years, as provided in the NFAT submission, or a 35 year study period." See LCA/MH 1-397. This same response notes that "The Preferred Development Plan (Plan 14) and Plan 4 [K19/Gas24/250MW] have essentially the same incremental NPV under the reference scenario. Plan 4 has a higher expected value by $226 million." Emphasis added. Exactly how an amount that is $226 million higher is "essentially the same" as another amount remains unexplained.

La Capra Associates, Inc. ("LCA"), another IEC, has also discussed the risks relating to Manitoba Hydro's 78 year study period. Please see LCA's Technical Appendix 9A "Economic Analysis Part 1" at 9A-24f. In fact, LCA re-ran many studies using shorter study periods in order to better illustrate the impacts of the various alternative scenarios.

DETAILS ON EXPORT REVENUE AND PRICES ARE UNAVAILABLE OR INADEQUATE AND SUBJECT TO RISK

WRA has had a difficult time determining what portion of the net benefits of each alternative are related to the expected future sales to, and prices in, the MISO. Potomac Economics, one of the IECs, has found that Manitoba Hydro's forecast of future gas prices and export sales revenue are overstated, which has the effect of overstating the net benefit of the Preferred Development Plan. Potomac Economics stated at page 5 of its Expert Report on Export Prices and Revenues ("Report"):

> Our results generally forecast lower prices than Manitoba Hydro's consultants due to assumptions on key inputs. In particular, our models generally rely on lower natural gas price forecasts, lower growth rates of demand, and lower quantities of coal plant retirements.

Potomac Economics' Report also states later at page 11 that at least one consultant, the Brattle Group, used a much higher price for a combustion turbine to calculate the Cost of New Entry ("CONE") that was 70% higher than that used by Potomac Economics. Obviously, assuming a higher price for a gas-fired combustion turbine will favor the PDP and place gas-fired alternatives at a disadvantage. However, a prospective buyer of Manitoba Hydro's dependable power will not be misled. It will evaluate a purchase from Manitoba Hydro based on the real, lower cost of a gas-fired combustion turbine.

Importantly, Potomac Economics noted the following at page 45 of its Report:

> Manitoba Hydro's Consultants provide forecasts to 2034. However, Manitoba Hydro projects revenues until 2080. To calculate the forward revenues, Manitoba Hydro assumes a growth rate for the years 2035-2049 based on the compound average growth rate ("CAGR") for the years 2030-2034, but declining to a growth rate of zero by 2049. Basically, growth rates in prices are linearly interpolated between the value equal to the average CAGR for the years 2030-2034 and zero value for 2049. After 2049, growth rates in prices are assumed to be zero.
>
> With regard to capacity prices, we find no basis for assuming the real price will increase after 2034. For reasons stated above, such prices may even decline. For energy prices, we find it difficult to recommend an approach that would be reliable given the long-term nature of this assumption. We recommend that alternative post 2034 growth rates be

> examined in order to understand the sensitivity of the results to alternative growth assumptions. At least one such sensitivity should be a zero real growth rate, which would effectively assume that fuel prices and C02 prices escalate at the rate of inflation after 2034. [Emphasis added]

WRA was not allowed to view any detailed material on Manitoba Hydro's forecast energy and capacity prices. Although Manitoba Hydro's NFAT Appendix 9.3 provides documentation on each alternative (and on each sensitivity study) on an annual basis, the tables show only Net Average Flow Related Gross Revenue (in millions of 2014$). According to Appendix 9.3 at 87, this gross revenue includes only revenues from exports.

> Gross revenue incorporates the revenue from both firm export power sales and the sale of short-term opportunity export energy. Gross revenue does not include domestic revenue as it is common to all development plans. Expected export revenues are generated from the SPLASH model and are a function of the makeup of each development plan within the context of the whole Manitoba Hydro generation and transmission system and the interconnected markets.

Because the energy contract prices from the firm export sales have not been made available in usable form,[5] and because the Electricity Export Price Forecasts are deemed commercially sensitive (see response to PUB/MH 1-056a), WRA has not been able to delve into the details of the economic alternatives. However, material that has been provided makes clear that electric export prices over the past five years have fallen drastically, and that forecasts of export prices over time have demonstrated the same reductions. Although Manitoba Hydro concludes that its PDP, with its long study length and reliance on as-yet-unrevealed amounts of energy at as-yet-unrevealed prices to provide much of its value, is the best for the Province, that conclusion appears to be based upon a shaky foundation.

Recent sales to the United States have suffered the effects of the Great Recession. One table from the response to PUB/MH 1-008 REVISED illustrates how the past exports to the U.S. have fallen in price over the past six years, particularly the opportunity sales (which do not include prices under the firm export contracts). This table compares the revenues per megawatthour ("MWH") average price.

[5] PUB/MH 1-280 provides a summary table of the volumes, term and pricing assumptions used in the Integrated Financial Forecasts ("IFF") for 2009 and 2012 for the export term sheets/contracts.

NFAT PUB/MH I-008 Revised

TOTAL U.S. SALES

	U.S. Dependable Sales			U.S. Opportunity Sales			U.S. System Merchant Sales		
Year	GWh	CAD $M	AvgPrice	GWh	CAD $M	AvgPrice	GWh	CAD $M	AvgPrice
2000/01	4,895	199	40.69	4,511	167	36.95	0	0	0.00
2001/02	4,767	263	55.15	5,083	247	48.66	0	0	0.00
2002/03	4,947	277	56.09	2,713	115	42.30	0	0	0.00
2003/04	5,245	259	49.45	507	35	69.42	0	0	0.00
2004/05	5,633	290	51.44	3,218	171	54.48	109	1	10.64
2005/06	4,044	240	59.25	8,879	401	45.12	0	0	0.00
2006/07	3,654	218	59.67	5,877	270	46.24	0	0	0.00
2007/08	3,921	209	53.22	6,618	289	44.19	0	0	0.00
2008/09	4,087	233	57.12	5,622	237	43.24	0	0	0.00
2009/10	3,263	186	56.99	7,224	160	22.28	33	2	0.00
2010/11	3,377	172	51.09	6,062	146	24.44	5	0.3	37.82
2011/12	3,742	175	46.79	5,616	117	21.13	80	3	35.21
2012/13	3,636	177	48.69	4,690	113	23.62	63	2	29.92

Manitoba Hydro's responses to questions concerning forecast export revenues indicate that its estimates of projected revenues have continually been getting smaller. In almost every case, the prices have dropped, contributing to the drop in expected revenues. Note that these projections only go out 20 years, whereas the NFAT evaluations extend out over a 78-year study period. The response to PUB/MH I-058b illustrates how the prices have fallen over the last few IFFs.

Price/Volume Components for Unit Revenues for Total Export Sales														
(Nominal Canadian Dollars/MWh)														
IFF-09 to IFF-10														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**						
IFF 09 ($/MW.h)	66.9	71.7	74.0	90.9	92.3	95.0	105.3	105.6						
IFF 10 ($/MW.h)	58.7	62.0	66.8	81.1	86.4	91.1	95.6	108.4						
% Total Change	-12%	14%	-10%	-11%	-6%	-4%	-9%	3%						
Total Change ($/MW.h)	-8.3	-9.7	-7.2	-9.7	-6.0	-3.9	-9.7	2.8						
Change due to Price ($/MW.h)	-9.8	-11.4	-9.1	-12.7	-12.7	-13.9	-12.7	-9.9						
Change due to Volume ($/MW.h)	2.4	2.6	3.0	3.6	3.8	7.0	-0.7	9.5						
Change due to Other ($/MW.h)	-0.8	-1.0	-1.2	-0.7	2.9	3.0	3.7	3.3						
IFF-10 to IFF-11														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**					
IFF 10 ($/MW.h)		62.0	66.8	81.1	86.4	91.1	95.6	108.4	111.2					
IFF 11 ($/MW.h)		42.5	50.4	61.9	68.8	75.3	81.1	88.1	94.3					
% Total Change		-31%	-24%	-24%	-20%	-17%	-15%	-19%	-15%					
Total Change ($/MW.h)		-19.5	-16.3	-19.3	-17.6	-15.7	-14.5	-20.3	-16.9					
Change due to Price ($/MW.h)		-16.4	-13.9	-15.2	-12.8	-10.7	-9.1	-7.6	-7.5					
Change due to Volume ($/MW.h)		-1.1	-2.1	-4.0	-4.8	-5.0	-5.5	-12.7	-9.5					
Change due to Other ($/MW.h)		-2.0	-0.3	-0.1	0.0	0.0	0.1	0.0	0.2					
IFF-11 to IFF-12														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**	**2024/2025**	**2025/2026**
IFF 11 ($/MW.h)			50.4	61.9	68.8	75.3	81.1	88.1	94.3	96.4	99.8	102.5	110.6	106.3
IFF 12 ($/MW.h)			41.4	48.1	52.4	57.2	61.8	66.5	76.5	82.0	85.6	89.6	93.2	90.6
% Total Change			-18%	-22%	-24%	-24%	-24%	-25%	-19%	-15%	-14%	13%	-16%	-15%
Total Change ($/MW.h)			-9.1	-13.7	-16.4	-18.1	-19.4	-21.6	-17.8	-14.5	-14.2	-12.9	-17.4	-15.8
Change due to Price ($/MW.h)			-6.6	-10.5	-12.0	-13.1	-13.8	-14.6	-13.6	-11.3	-10.6	-9.1	-11.0	-11.2
Change due to Volume ($/MW.h)			-1.7	-2.2	-2.4	-2.9	-3.1	-4.3	-2.5	-1.6	-1.9	-1.9	-4.0	-2.4
Change due to Other ($/MW.h)			-0.8	-1.0	-2.0	-2.1	-2.5	-2.7	-1.8	-1.6	-1.6	-1.9	-2.4	-2.2
IFF-12 to NFAT														
Total Export Sales	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**	**2017/2018**	**2018/2019**	**2019/2020**	**2020/2021**	**2021/2022**	**2022/2023**	**2023/2024**	**2024/2025**	**2025/2026**
IFF 12 ($/MW.h)			41.4	48.1	52.4	57.2	61.8	66.5	76.5	82.0	85.6	89.6	93.2	90.6
NFAT ($/MW.h)			40.3	46.7	49.8	53.0	55.5	59.2	72.0	77.9	80.5	82.4	84.8	80.8
% Total Change			-3%	-3%	-5%	-7%	-10%	-11%	-6%	-5%	-6%	-8%	-9%	-11%
Total Change ($/MW.h)			-1.1	-1.4	-2.6	-4.2	-6.3	-7.4	-4.5	-4.0	-5.2	-7.2	-8.4	-9.8
Change due to Price ($/MW.h)			-2.1	-3.5	-5.0	-6.6	-9.1	-11.0	-5.8	-4.3	-5.2	-7.2	-8.2	-9.4
Change due to Volume ($/MW.h)			0.5	1.4	1.7	1.6	2.0	2.5	0.3	-0.6	-0.8	-0.9	-1.2	-1.1
Change due to Other ($/MW.h)			0.5	0.6	0.7	0.8	0.8	1.2	1.0	0.8	-0.8	0.9	1.0	0.7
Source: PUB/MH I-058b														

As noted above, these IFF estimates result from a succession of 20-year forecasts that only go out to 2031/32 (in the most recent cases). As can be seen in the table, expected prices have fallen from an amount estimated for 2019/20 at $105.60/MWH in IFF09 to $66.50/MWH in IFF12 and even further to $59.20/MWH in the NFAT. And, according to Potomac Economics, even these amounts of revenue are based upon unduly high forecasts for energy and capacity prices.

The PUB made the following notable comments about downward trends in export sales in its 2012-13 Annual Report (emphasis added):

> Manitoba Hydro's primary export market is the market operated by the Midwest Independent System Operator (MISO), which, over recent years, has seen reduced load-growth, an increase in subsidized wind power from U.S.-based wind farms, increased utilization of combined-cycle combustion turbine gas generation, imports into the Midwest Independent System Operator market from other U.S.-based utilities, and no increase in exports from Manitoba Hydro. **Since 2008/09, spot market export prices have decreased from about 8.0¢/kWh to an average of 3.2¢/kWh.**

The PUB's 2012-13 Annual Report goes on to state (at 10):

> Opportunity export sales prices have fallen significantly since the onset of the recession in 2008, driven in part by reduced growth in industrial demand, and also the advent of commercial production [of] natural gas from shale deposits.

That Annual Report also states (at 6-7):

> Wuskwatim Generation came on-line in 2012/13 with a Board-calculated (all-in) incremental in-service cost of $160/million/yr (10.5 ¢/kWh). This was estimated by the Board to be about three times the then current average export revenue rate.
>
> . . . .
>
> Because of low export prices, Manitoba Hydro is now forecasting losses for the first ten years of operations of Wuskwatim. At the time of the hearing, those losses were projected to total $341 million as Manitoba Hydro forecasts the project will not be profitable until 2023.

If Wuskwatim will not be profitable until 2023, what does this portend for the profitability of Keeyask in 2019/20, much less Conawapa? As noted by Elenchus, among others, the electric industry may be facing a paradigm shift with the increase in distributed generation, particularly behind-the-meter solar units, on the future loads of utilities themselves. Numerous articles have documented this new trend and its ramifications for electric utilities.[6]

Because of the confidentiality associated with Manitoba Hydro's use of its long-term generation system simulation model (called SPLASH) to simulate its system operations for 35 years[7] into the future, WRA does not have access to the input or output files, nor the actual input assumptions in any detail.[8] Manitoba Hydro describes its economic evaluation process in Appendix 9.3 at 29 as follows:

> Manitoba Hydro's SPLASH model utilizes an optimization technique to maximize net flow related revenue to the system by simulating the operation of reservoirs and hydroelectric generation plants utilizing a monthly time step. The expected price signals

[6] See, for example, http://www.forbes.com/sites/pikeresearch/2013/08/26/distributed-generation-poses-existential-threat-to-utilities/ and http://www.eei.org/ourissues/finance/Documents/disruptivechallenges.pdf

[7] See Appendix 9.2 at 2.

[8] For example, prices for export sales have been redacted from the versions of the export contracts provided.

> from the export market are provided to the model for on-peak and off-peak time periods for each month of the year. The capability of the interconnections to each market region is provided in order to limit the rate at which export energy can be transmitted. The SPLASH model determines the net production cost on a monthly basis for a series of years into the future. The net production cost is derived from the variable cost characteristics of the various generation sources and revenue is derived from export sales. A simulation of system operation is undertaken for each of the 99 flow conditions between the years 1912 and 2010 which are assumed to be representative of the range of flow conditions that may occur in the future.

Furthermore, the "components that make up net average flow related revenue are calculated using Manitoba Hydro's system simulation computer model known as SPLASH." See Appendix 9.3 at 87. The SPLASH model provides the detailed economic evaluation for the first 35 years of the study period. See Appendix 9.2 at 2 and Appendix 9.3 at 3, quoted below:

> The total study life used in this analysis is 78 years. For the total study life, Manitoba Hydro combines two approaches – a 35-year detailed evaluation and a long-life asset evaluation which extends from the end of the 35-year study period to the end of the service life of hydro-electric generation assets, as representing the longest-lived assets.
>
> . . . .
>
> Beyond the 35-year study period, replacement capital costs are assumed for assets that reach the end of their economic lives before the end of the long study period (78 years). In addition, a net production cost approximation (also referred to as net average flow related revenue) is used beyond the 35-year study period which includes:
>
> - extending fixed operating and maintenance costs throughout the economic life of all assets (including major capital O&M investments for large hydro-electric resources), and
>
> - extending the average net revenues of the last three years associated with the economics of a development plan to capture the expected ongoing incremental revenues between development plans to the end of the study period.

Therefore, the speculative nature of export prices forecast for the outermost years makes them even more suspect, as Manitoba Hydro just extends a trend line from the last 3 years of the 35-year study period to capture continuing differences between costs and revenues. And as made clear by LCA at Appendix 9A-15, Manitoba Hydro did not forecast its load increasing after the first 35 years of the study. Instead, Manitoba Hydro assumed that demand would remain steady, thereby removing any assumption that Manitoba's loads would increase over time and absorb the hydro power internally, thereby reducing revenues from exports.

Below is an illustration of the export revenues per MWH to U.S. as found in the Ref-Ref-Ref tables for three cases (All Gas, K19 Gas 250 MW, K19 Sales C25 750 MW) from Appendix 11.3. Also note that Manitoba Hydro's financial evaluations used a 50 year life, rather than the 78 year study period assumed in its economic evaluations.

Total Export Sales to USA Average Unit Revenue/Cost ($/MWH)			
	All Gas	K19 Gas 250 MW	K19 Sales C25 750 MW
Year	Plan 1	Plan 4	Plan 14
2013	30.83	30.83	30.83
2014	33.37	33.37	33.37
2015	40.86	40.86	40.56
2016	47.58	47.57	47.13
2017	50.50	50.50	50.15
2018	53.55	53.64	53.44
2019	56.09	56.24	55.95
2020	58.71	60.03	59.69
2021	65.50	71.57	72.54
2022	69.51	77.06	78.50
2023	72.42	79.49	81.05
2024	75.46	81.37	82.96
2025	78.23	84.17	85.35
2026	64.18	75.22	81.05
2027	63.92	76.76	84.00
2028	65.14	77.26	85.45
2029	66.10	79.30	87.75
2030	66.80	81.84	89.81
2031	69.07	84.43	91.87
2032	74.01	86.16	94.09
2033	74.92	90.67	96.17
2034	75.38	93.49	98.16
2035	75.35	96.34	100.15
2036	74.88	93.43	100.97
2037	75.08	94.48	99.67
2038	79.19	96.65	100.54
2039	77.86	102.50	102.18
2040	77.10	105.35	103.86
2041	83.68	107.90	107.19
2042	85.05	113.78	110.64
2043	86.51	117.66	114.02
2044	89.06	121.29	117.46
2045	95.86	123.59	120.93
2046	97.16	130.08	124.63
2047	98.86	133.47	128.27
2048	99.24	137.60	131.65
2049	109.99	147.63	137.78
2050	111.97	150.29	140.26
2051	113.99	152.99	142.78
2052	116.04	155.75	145.35
2053	118.13	158.55	147.97
2054	120.26	161.40	150.63
2055	122.42	164.31	153.34
2056	124.62	167.27	156.10
2057	126.87	170.28	158.91
2058	129.15	173.34	161.77
2059	131.47	176.45	164.69
2060	133.84	179.64	167.65
2061	136.25	182.87	170.67
2062	138.70	186.16	173.74
Source: Appendix 11.3 at 1-2; 164-165; 272-273			
Nominal $, includes dependable sales, plus opportunity sales			

By relying primarily on surplus capacity additions of large, costly hydro plants based on its expectation of benefits arising from potentially unrealistic high export energy prices, Manitoba Hydro would forgo the flexibility it might otherwise have (i) to adjust to a situation in which loads turn out to be much smaller than those it currently forecasts, (ii) to locate plants where they would be more useful and valuable in reducing losses and the needs for transmission additions, and (iii) to reduce exposure to long transmission lines needed to deliver the output of remote hydro additions to Winnipeg and the US. Indeed, Manitoba Hydro's initial rationale for building Bipole III is that, because so much of its generation is located on the Nelson River, far from the major loads in Winnipeg, it needed a backup path to cover the simultaneous loss of Bipoles I and II. By building Keeyask and Conawapa in the same general area, Manitoba Hydro will fill up its backup transmission path and put even more of its eggs in one remote basket, creating the potential for trapping even more generating capacity in the North after an extreme combination of HVDC transmission outages and creating the need for even more backup transmission capacity on Manitoba Hydro's interconnections with the United States. A less risky approach would involve building gas plants in locations closer to the Winnipeg load center where power is needed and the transmission system is networked. Plus, gas plants could be distributed across its service area, reducing the concentration of large blocks of generation in a single transmission-constrained region. Indeed, by planning to build natural gas plants closer to Winnipeg, Manitoba Hydro would avoid any "need" to build Bipole III, which is driven by its high-risk plan to build excess hydro capacity and move even more hydro power to the U.S. market in the hope of making profitable sales.

If Manitoba Hydro insisted that it needed a backup for the simultaneous loss off Bipoles I and II, it could reinforce the capability of its interconnection with the U.S. instead of building Bipole III.

THE COSTS OF BIPOLE III SHOULD BE ATTRIBUTED ONLY TO THOSE ALTERNATIVES WHICH REQUIRE THE EXTRA TRANSMISSION CAPACITY IT PROVIDES

In its Environmental Impact Statement ("EIS") before the Clean Environment Commission ("CEC"), Manitoba Hydro attributed the need for, and the cost of, Bipole III primarily to system reliability. This reliability-based need for Bipole III will be discussed in a later section. But now the real purpose for Bipole III has become apparent. Based upon the economic evaluations of alternatives provided in the NFAT, it is clear that Bipole III is being built primarily to carry the output of Keeyask and Conawapa to both Manitoba loads and to loads in the United States, not to enhance reliability. The long period of negotiation over the export contracts indicates a longstanding intent to build additional hydro on the Nelson River.

Manitoba Hydro's decision to attribute the need for, and the cost of, Bipole III primarily to system reliability has had the effect - advantageous in Manitoba Hydro's eyes - of laying the groundwork for - and diverting attention from - its longstanding plans to build Keeyask and Conawapa. Those plans in fact depend upon Bipole III. Pre-building Bipole III supports the ostensible economic rationale for those plans by attributing a zero cost for Bipole III, and therefore much reduced transmission costs, in those plans. That attribution lowers the ostensible cost below that which Manitoba Hydro will actually incur under the PDP when building Keeyask, Conawapa and Bipole III together. The PDP is Alternative 14 of the NFAT, which calls, in part, for:

i. 2,180 MW (2,025 MW net) of new hydroelectric generation to be constructed at the northern end of the Nelson River (i.e., the 695 MW (net 630 MW) Keeyask Generating Station in 2019 followed by the 1485 MW (net 1395 MW) Conawapa Generating Station) in 2025 and

ii. the output of that new hydroelectric generation to be delivered to the Winnipeg load center by means of Bipole III and the existing HVDC system, as well as upgrades to the collector system and upgrades to the North-South AC transmission system. Much of that output will be redelivered to wholesale buyers in the United States through a new

interconnection with the United States (the 750 MW, 500 kV AC Manitoba-Minnesota Transmission Project).

Manitoba Hydro ignores the cost of Bipole III when assessing its preferred plan through a simple cost allocation sleight of hand: by assuming that the cost of Bipole III will represent a sunk cost under every alternative resource expansion plan. Through this sleight of hand, Manitoba Hydro has given its preferred plan, which must have Bipole III to work, the appearance of being more cost-effective than it really is by not including the costs for Bipole III and has added unwarranted costs to the plans that do not need Bipole III. The cost of Bipole III should instead be attributed only to those plans (including the PDP) that call for the Conawapa Project alone, or both the Keeyask and Conawapa Projects.

A prior 35-year analysis of the expected benefits of proposed northern hydro generation combined with construction of the Bipole III transmission line indicated that the All Gas scenario would be preferred at a 10% real discount rate (assuming that the in-service date ("ISD") of Bipole III was delayed to the 2024 ISD of new hydro generation (Conawapa or Gull), and that the costs of Bipole III were added to the costs of the new hydro generation).[9] See Attachment PUB/MH 1-024, Manitoba Hydro's 2004/05 Power Resource Plan ("PRP") at pages 10-11, attached as Appendix 1. While the hydro generation assumptions in that prior study are different from those in the NFAT (e.g., Conawapa or Gull versus Keeyask and/or Conawapa), the results of those analyses indicate that delaying Bipole III and adding the Bipole III costs to the hydro generation makes the hydro alternatives less desirable. The first part of the study (at 10), assumed Bipole III was built East of Lake Winnipeg. The second part of the study assumed Bipole III's costs were 46% higher with a Western route around Lake Winnipeg, and showed that the All Gas alternative was preferable. In addition, these studies were run using very different assumptions from those in the NFAT (e.g., lower cost estimates for Conawapa and Bipole III, as well as export prices presumably much higher than those used today).

[9] At a 6% discount rate, Conawapa (with 5 units or 10 units) or Gull (including SCGT1X-35, 39) were more favorable than an "all SCCT Sequence."

By adopting the analytical approach for the NFAT that Bipole III is a sunk cost, Manitoba Hydro has biased its analysis in favor of the PDP. Under the PDP, Bipole III will be built first (for commercial service by 2017/2018 and ostensibly for reliability reasons alone), but, in a happy coincidence for Manitoba Hydro, the capacity of Bipole III will be treated as if it is a "free good," available free of charge (although paid for by Manitoba Hydro customers) to accept the output of Keeyask in 2019 and of Conawapa in 2026.

However, the cost of Bipole III is not a "sunk cost." Bipole III has not yet been built but is instead presumably in the early stages of construction with an estimated in-service date of 2017/2018. Much could undoubtedly be saved by cancelling it or deferring its in-service date.[10]

It is not correct to assume that the cost of Bipole III is a neutral factor in assessing all resource plans because not all resource plans require construction of Bipole III in 2017/2018. Many resource plans will not require Bipole III until much later - or at any time. For example, an "all gas" alternative would not need Bipole III at all because that alternative involves adding thermal generation near the Winnipeg load center instead of adding new hydroelectric generation at locations remote from the Winnipeg load center along the Nelson River. Yet the cost of Bipole III is included in Manitoba Hydro's Plan 1, its "all gas" alternative. In a proper analysis, the cost of Bipole III would not be needed at all in the "all gas" alternative (and should not be attributed to that alternative). On the other hand, the cost of Bipole III should be explicitly added to the cost of the PDP because the transmission line is necessary for that alternative to work.

RECOGNIZING THE COST OF BIPOLE III AND OTHER SUNK COSTS WOULD UNDERMINE THE PREFERRED DEVELOPMENT PLAN

Bipole III is projected to cost $3.3 billion and enter service in 2017/2018. See the response to PUB/MH I-053a Revised. Moreover, about $1.0 billion of the projected total cost of Keeyask has also been ignored in Manitoba Hydro's analysis because those costs are also considered sunk

[10] A twelve (12) year delay of a $3.3 billion investment amortized over 30 years at 5% (assuming a 2% annual escalation in the investment cost) would save $970 million, about the cost of a new 500 kVAC Manitoba-U.S. interconnection.

costs.[11] The $3.3 billion in outlays for Bipole III are projected to be incurred early in Manitoba Hydro's study period (from the present through 2017/2018), and thus the NPV of those outlays will be roughly equal to their $3.3 billion cost.[12]

The $3.3 billion cost of Bipole III exceeds the incremental benefits which the Preferred Development Plan is said to produce under many scenarios as compared to the benefits of the "All Gas Plan." Accordingly, adding the $3.3 billion cost of Bipole III to the NPV of the PDP will make it less attractive than the all-gas plan in many scenarios. See the tabulation of relative benefits in Table 2 at page 23 of 42 of the NFAT Executive Summary. The PDP is Plan 14. In only a third of the scenarios studied does the PDP yield incremental benefits that are more than $3.3 billion greater than the benefits associated with the "All Gas Plan." Those scenarios are based on assumptions of low discount rates and/or high energy prices - both of which assumptions give greater value to off-system sales of power to the United States made possible by adding Keeyask and Conawapa. That is, use of the low discount rate will lend greater value to off-system sales projected to be made at high prices far into the future than would a high discount rate. If the study period were 35 years instead of 78 years, the Preferred Development Plan would produce fewer benefits than would Plan 4 (K19/Gas25/250 MW).[13]

Bipole III has a similar effect on the other resource plans. For example, the $3.3 billion cost of Bipole III exceeds the incremental benefits which the Preferred Development Plan will produce

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[11] As noted in Chapter 11 at 5:20-27:

> As such, all costs (incurred or estimated) prior to June 2014 that were required to protect the in-service dates for Keeyask and Conawapa are considered as "sunk" in the economic evaluation. The financial evaluation, however, recognizes these costs need to be included in the revenue requirement at an appropriate point in time.

By expending $1.0 billion on Keeyask even before it was formally selected and approved as an element of the PDP, Manitoba Hydro has provided further support for the notion that development of Keeyask was pre-ordained. Manitoba Hydro's decision to ignore those potentially imprudent expenditures on Keeyask (because they are sunk costs) obviously favors any alternative that includes Keeyask. By not including expenditures on Keeyask to date in its analysis, Manitoba Hydro has further biased that analysis in favor of the PDP.

[12] NPV, or Net Present Value, is "the difference between the present value of the revenue and the present value of the cost. It is the amount of money, if invested today at a stated discount rate, that would grow to an amount sufficient to finance and to provide a return on the investment over the life of the project. When comparing alternatives, the incremental NPV represents the incremental net benefits (or net costs) associated with the increment of investment made for a higher cost investment option,…" See NFAT Chapter 9 at 3:17-22

[13] See LCA/MH 1-397.

under many scenarios as compared to the benefits of Plan 7 (SCGT/C26 - composed of simple cycle gas turbines plus Conawapa in 2026) and Plan 8 (CCGT/C26 - composed of more efficient gas-fired combined cycle generation plus Conawapa in 2026). Again, see the tabulation of relative benefits in Table 2 at page 23 of 42 of the Executive Summary. The incremental benefit of the PDP over the benefits produced by either the SCGT or the CCGT alternatives exceeds $3.3 billion for even fewer scenarios: only those based on assumptions of low discount rates AND high energy prices. Bipole III would be needed in these gas-fired scenarios but not until eight years later than now planned - in 2026 when Conawapa enters commercial service. Pursuing either of those combination Conawapa/gas-fired scenarios would enable Manitoba Hydro to:

1. Defer for eight years the in-service date of Bipole III (or longer depending upon demand growth and trends in export prices), potentially leading to a further deferral and/or cancellation of Bipole III and Conawapa and

2. Build lower-cost SCGTs ($770/kW - See NFAT Chapter 7 at 31 of 39) and/or CCGTs ($1,295/kW - See NFAT Chapter 7 at 31 of 39) instead of Keeyask ($9,048/kW- See the response to PUB/MH I-053a Revised) and share reserves with MISO over the existing 500 kV interconnection; and thereby

3. Reduce economic risk.

As noted previously, Manitoba Hydro's economic analysis does not include other sunk costs already expended for other projects (particularly Keeyask and Conawapa) in its economic evaluations of alternatives. See NFAT Chapter 9 at 2:4-6. Therefore, considerable amounts of money are ignored when comparing alternatives. For Keeyask, the effect of sunk costs is pronounced as its sunk costs total approximately $1 billion. See Appendix 9.3 at 5. Manitoba Hydro ignored sunk costs in its economic evaluation because it claims that Manitoba Hydro's customers will need to pay these costs no matter what plan is chosen, whether or not Keeyask or Conawapa come to fruition. It appears that the sunk costs of Keeyask were incurred as a result of Manitoba Hydro's decision to "to protect the in-service dates for Keeyask and Conawapa."

As noted in NFAT Chapter 11 at 5:20-27:

> As such, all costs (incurred or estimated) prior to June 2014 that were required to protect the in-service dates for Keeyask and Conawapa are considered as "sunk" in the economic evaluation. The financial evaluation, however, recognizes these costs need to be included in the revenue requirement at an appropriate point in time. For plans in which a decision is made to proceed with Keeyask or Conawapa, the sunk costs form part of the cost to acquire the asset and are amortized over the life of the asset. For plans in which Keeyask or Conawapa is deferred beyond the evaluation period, sunk costs are assumed to be amortized over an 18-year period to 2031-32.

If Manitoba Hydro is allowed to recover these sunk costs (projected to be more than $1 billion) from its customers, no matter whether it sought approval for incurring these costs or incurred them without review by the PUB, this allowance will encourage Manitoba Hydro to continue to make resource decisions prior to receiving input from the public and its regulators. WRA notes that LCA also made reference to concerns about the sunk costs, as provided in Technical Appendix 9A at 9A-49.

DESCRIPTION OF NORTHERN HYDRO AND HVDC SYSTEM

The basic facts on the existing Northern hydro generating capacity (both before and after addition of the net capacity of Keeyask and Conawapa) are set forth as follows in the NFAT Business Plan at NFAT Chapter 5:

Hydro Project	Rated Capacity MW
Kettle	1220
Long Spruce	1007
Limestone	1335
SUBTOTAL	3562
Net Keeyask	630
SUBTOTAL	4192
Net Conawapa	1395
TOTAL	5587

Source: NFAT Table 5.1 and Executive Summary p. 4

The capability of the HVDC system is contained in various interrogatory responses, such as MMF/MH II-018a:[14]

HVDC Transmission MW Capacity

Bipole I	1854
Bipole II	2000
SUBTOTAL	3854
Bipole III	2300
TOTAL	6154

Source: MMF/MH II-018a

The comparison of the existing and planned capability of the HVDC system is also addressed in many of Manitoba Hydro's Responses to data requests, including MMF/MH II-017a, -018a and -019a.

For example, the response to MMF/MH II-017a states:

> The existing HVdc system was designed with the reserve criteria of "a dc pole spare over load". Bipole I and II have a total rating of 3854MW, which can carry power of the existing generation [3562 MW, which Manitoba Hydro characterizes as "about 3600 MW"] under normal conditions [but not in a contingency condition involving outage of a d.c. pole].

Response to MMF/MH II-019a states (emphasis added):

> The existing Bipole I & II HVdc system is rated at 3854 MW and can accommodate the capability of Kettle, Long Spruce and Limestone [about 3600 MW] under normal operating conditions, but does not meet the spare valve over generation criterion. **The existing HVdc system cannot provide transmission capacity for Keeyask power.** Please also refer to the response to MMF/MH II-016e.

It is not precise for Manitoba Hydro to state that "The existing HVdc system cannot provide transmission capacity for Keeyask Power." It is more precise to state, as Manitoba Hydro did in

[14] These Bipole capacities are thermal capacities that do not take account of (i) the reconfigurations that Manitoba Hydro has developed in order to account for outages of valve groups or (ii) possible upgrades to the North-South AC Transmission System.

the response to MMF/MH II-007b (emphasis added) that "No **firm** capacity is available to transfer power from Keeyask or Conawapa over the existing HVdc system." Non-firm transmission capability is available.

According to Manitoba Hydro, Bipole III must be added before the existing HVDC will be able to meet reserve criteria. However, once Keeyask and Conawapa are added, the transmission capacity of the three-Bipole HVdc system will be nearly filled, and, once again, Manitoba Hydro will be unable to meet the reserve criteria of "a dc pole spare over load." Manitoba Hydro has introduced a different concept for assessing the reliability and firmness of the three-bipole system with Keeyask and Conawapa, the "spare valve over generation criterion."

The net effect upon reserve capacity of the three-Bipole system after the additions of Keeyask and Conawapa is as follows:[15]

Comparison of Northern Hydro and Capacity of Bipoles

Bipoles I and II	3854
Existing Generation	3562
Remaining Cap	292
Keeyask	630
Needed Cap	-338
Bipole III	2300
Excess Cap	1962
Conawapa	1395
Remaining Cap	567

Note that the rated capability of Bipoles I and II exceed the capability of the existing generation connected to those HVDC lines by 292 MW, whereas loss of a DC pole (rated 1000 to 1150 MW) would wipe out that 292 MW spare capacity. Accordingly, the existing system does not meet the reserve criteria of "a dc pole spare over load."

[15] The response to MMF/MH II-020c states:

> Bipole III will provide 2000 MW north-south capacity. Under normal operation, there will be approximately 1670 MW spare capacity on the three-bipole system with the addition of Keeyask. Keeyask will add 630 MW of new capacity to the system.

Approximately 300 MW of Kettle's generating capacity could be disconnected from the HVDC system and reconnected to the North-South AC system for transmission south to the Winnipeg load center. See NFAT Chapter 2 at 53-54, the response to PUB/MH 1-042f and the response to MMF/MH II-003. Thus, the existing system should be able to accommodate about 592 MW of the 630 MW of generation that is planned to be added at Keeyask without upgrading either Bipole I or II or adding Bipole III.[16]

In addition, the rated capability of both Bipoles I and II could be upgraded to carry the additional generating capacity that would be added at Keeyask. Note that the capacity of Bipole I is 1854 MW while operating at +/-465 kV whereas the ultimate capacity of Bipole III will be 2300 MW while operating at +/-500 kV. If there is sufficient ampacity in the Bipole I conductors, its capacity could conceivably be increased by 446 MW to 2300 MW by upgrading its terminal equipment (converters) to operate at higher voltages and to carry greater currents.[17] Such an upgrade of Bipole I plus the spare capacity in the existing system would provide 738 MW of capacity, more than the 695 MW needed for delivering Keeyask. Another 300 MW of transmission capacity could theoretically be obtained by upgrading the rating of Bipole II from 2000 MW to 2300 MW. HVDC transmission line capacity can be increased with installation of new valves, higher rated conductors, and other features.[18]

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[16] According to several sources, such as NFAT Chapter 2 at 4, Keeyask's net generation will be 630 MW, rather than 695 MW.

[17] There is likely considerable ampacity available because the design was based on some level of losses. However, using that ampacity may mean excessive sag, and higher voltage may not be possible without first upgrading towers and insulators.

[18] In order to provide one with a sense of what Manitoba Hydro may be able to do with Bipoles I and II, it is worthwhile to examine what has been accomplished over the period since the early 1970s on the HVDC line of the Pacific Northwest-Pacific Southwest Intertie ("PDCI"). This HVDC line extends 846 miles from the Celilo Converter Station on the Columbia River in Oregon south through Nevada to Sylmar, near Los Angeles.

The PDCI was initially designed as +/-400 kV and 1800 amps, a transmission rating of 1440 MW at the sending end. The original mercury arc valves were up-rated to 2000 amps after a few years of operating experience.

The next step was to raise the operating voltage from +/-400 kV to +/-500 kV by adding a 4th valve at each end in order to achieve a 2000 MW transmission rating. Not much in the way of modification was required on the transmission line because it had originally been designed with plenty of insulation margin.

By 1989, the Bonneville Power Administration ("BPA") proposed adding parallel thyristor converters at both ends of the line to raise PDCI's rating to 3100 MW. See http://en.wikipedia.org/wiki/Pacific_DC_Intertie

Apparently, the firm transmission capability of the HVDC system is not critical to Manitoba Hydro's exports to the United States, as described in the response to CAC/MH II-075a (emphasis added).

> Manitoba Hydro's firm export contracts require Manitoba Hydro to provide firm transmission service on the AC network to facilitate energy and capacity transfers according to the system criteria associated with firm transmission service" [e.g., continued deliveries after loss of the single piece of equipment which most limits transfers - a loss referred to as the "most critical contingency"]. However, **Manitoba Hydro is not required to provide a similar level of firmness of transmission service on its HVDC system**.

THE PREFERRED DEVELOPMENT IS INEXTRICABLY LINKED TO, AND DEPENDENT UPON, BIPOLE III—THERE IS NO STANDALONE RELIABILITY FUNCTION OF BIPOLE III

The rationale given for building Bipole III was that Manitoba Hydro has too many eggs in one basket with 70% of its hydro-electric generating capacity being delivered to Southern Manitoba via the Bipole I and Bipole II HVDC transmission lines. Manitoba Hydro asserts that, because Bipoles I and II share the same corridor over much of their length, the existing transmission

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On February 29, 2012, **Power** reported that

> The Bonneville Power Administration (BPA) last week proposed a $428 million upgrade to the Pacific Direct Current Intertie, an 846-mile overhead transmission line that delivers hydropower and wind power between the Northwest and California. The line is one of the world's longest and highest capacity transmission links.
>
> The BPA said the upgrades would modernize equipment that was "cutting edge when installed more than 40 years ago," but which has since become so outdated that the public service organization had to source parts to repair the line from online auction website Ebay.
>
> The upgrades would also increase the line's capacity from 3,100 MW to 3,220 MW and help it avoid outages and "strengthen it against weather and other threats," the BPA said. Over the past several years, it said, older equipment at Celilo Substation, the northern terminus of the DC Intertie in The Dalles, Ore., has failed with increasing frequency.

system is vulnerable to a common mode failure such as catastrophic outages of either or both of Bipoles I and II. See NFAT at Chapter 5 at 25 of 61.

Manitoba Hydro's concern goes further. It contends that an outage of both Bipoles I and II could be a long-term event necessitating reliance on its thermal generation, remaining hydro-electric generation and import capacity in amounts that are insufficient to meet its demand during many times of the year. In Chapter 2.2.1 of its EIS to the CEC, it portrayed the consequences in dire terms:

> The potential consequences of such an outage of the existing HVdc transmission system are exacerbated by the very long estimated repair times. Wide front windstorm, fire, or tornado damage at Dorsey Station could cause an outage that shuts down the HVdc system for up to three years because of the time required to repair or replace equipment of such complexity. The duration of a similar outage of the Bipoles I and II lines, although not as severe and dire as a failure at Dorsey Station, could still easily cause an outage of six to eight weeks.
>
> In the event of an extended HVdc outage, supply would be restricted to the generation connected to the ac system and the possible imports on the ac interconnections with the United States and neighbouring provinces. Such a restricted supply of power would be significantly inadequate to meet provincial demand, particularly in the winter, and could necessitate rotating blackouts for months. The potential shortfall has been growing steadily over the years, as increased demands for power from new and existing customers have increased the system load requirement.[19]

There are several major flaws in Manitoba Hydro's arguments for the reliability need for Bipole III. They are as follows:

A. Under industry reliability standards, utilities do not need to design their systems to withstand a catastrophic event, such as loss of four elements of a transmission system at the same time (such as a total loss of Bipoles I and II), which is considered an N-4 event under North American Electric Reliability Corporation standards.

B. If Manitoba Hydro's major concern is the length of outage of both existing Bipoles, then it could plan for outages by clearing brush and placing equipment (such as

[19] The Riel Station, scheduled to enter service in 2014, is designed in part to preserve Manitoba Hydro's system import capability if there is a major outage at Dorsey. See NFAT Chapter 5 at 24 of 61. This upgrade mitigates one of Manitoba Hydro's major reliability concerns with the present configuration of Bipoles I and II.

cranes, other construction equipment and replacement towers, wires, switchgear, transformers, valves, etc.) in areas along the length of the lines and at the converter stations, so that reconstruction could begin immediately. Switchgear, transformers and valves should be protected from physical damage at their present location. The cost of staging equipment and supplies for Bipoles I and II would be far less than the cost of building Bipole III.

C. If Manitoba Hydro first built a second 500 kV interconnection to the United States, it could import more power during outages of one or more of the Bipoles, which is cheaper than building Bipole III. [20] Furthermore, the cost of building a second 500 kV interconnection has been estimated at approximately the same cost as would be saved by deferring Bipole III for twelve years.

A. Transmission Planning Standards

The North American Electric Reliability Corporation ("NERC") is responsible for developing standards that ensure the reliability of the bulk power system in North America. For transmission planning, NERC has established various standards, including the ability of a transmission system to withstand the loss of a single element (N-1) so that none of the equipment exceeds its applicable ratings and the system does not inappropriately drop firm load. If there is a loss of two elements at the same time, or one right after the other (an N-2 or N-1-1 event), the bulk power system may reach emergency ratings for short periods of time, and load can be dropped in a planned or controlled manner.[21] An extreme event, such as a catastrophic failure of both Bipoles I and II would involve the simultaneous outage of all four single poles of Bipoles I and II (called an N-4 event), and utilities need only evaluate such scenarios for risks and consequences.

[20] In the Manitoba Hydro Bipole III EIS, December 2012, the cost of an additional 1500 MW interconnection to the United States was estimated at $1.5 billion. See Section 2.3.4 at 2-12. The cost of 500 MW of gas-fired generation was estimated to cost $750 million. Bipole III was then estimated to cost $3.28 billion. See Section 2.3.2 at 2-10.

[21] See Standard TPL-001.01 at http://www.nerc.com/pa/Stand/Reliability%20Standards%20Complete%20Set/RSCompleteSet.pdf

Loss of a single pole of a Bipole is considered an N-1 event which has a less-than-1% probability of occurring (i.e., less than 1 X 10^{-2}). See the response to CAC/MH II-013b.[22] Although industry reliability criteria require that Manitoba Hydro continue to serve all firm load obligations after the occurrence of any single contingency (an N-1 event), those criteria do not require that it continue serving all firm load after an N-2 event, let alone, after an N-4 event. Nevertheless, Manitoba Hydro contended before the CEC that the risk posed by the contingency loss of both poles of both Bipoles I and II was an unacceptable risk justifying the expenditure of $3.3 billion.

Manitoba Hydro's contention before the CEC was never tested because of the CEC's limited mandate and terms of reference in relation to Bipole III (which the Manitoba Minister for Conservation and Water Stewardship clarified did not include an NFAT review).[23] However, while the Bipole III hearings were ongoing, the Manitoba Government announced that it had "asked the Public Utilities Board to conduct a Needs For and Alternatives To (NFAT) review of upcoming Manitoba Hydro projects including the Keeyask and Conawapa generating stations and their associated transmission facilities."[24] Despite this public commitment, and the reality that Bipole III is clearly an associated transmission facility for Keeyask and Conawapa, Bipole III was subsequently scoped out of the NFAT process for the PDP which is currently before the PUB.

The MMF has repeatedly raised concerns about the need for Bipole III, its selected route down the west side of the province that dissects the Manitoba Métis Community's "breadbasket" as well as the project's non-mitigatable impacts on the Métis community's rights, culture, economy and way of life on the west side corridor of the province (which have not been addressed).[25] As

[22] An N-4 event involving four independent events would have a probability of 1 X 10^{-8} or one chance in 100,000,000. However, Manitoba Hydro proposed to build Bipole III to guard against a common mode failure such as tornados or severe ice storms affecting all four poles which its studies determined could be expected to occur once every 17 years. In a common mode failure case, loss of each pole is not considered an independent event.

[23] See letter from Manitoba to CEC Chair dated August 23, 2012 with respect to the conduct of a NFAT in relation to Bipole III. Letter available at: http://www.cecmanitoba.ca/resource/hearings/36/Motion%20Decision2%20-%20Coalitionandencl1.pdf.

[24] Manitoba Government http://news.gov.mb.ca/news/index.html?item=15563.

a result of the Manitoba Government's approach, Bipole III has been segmented from the PDP and other plans related to Keeyask and/or Conawapa and was not examined in an NFAT proceeding. This creates a significant gap. Moreover, Manitoba Hydro did not and has not engaged in meaningful discussions with the MMF about mitigation of the impact of, or Métis benefit from Keeyask and/or Conawapa despite their being inextricably linked to and dependent upon Bipole III. Consequently, the need for Bipole III as well as the social and economic cost of the PDP on the Manitoba Métis Community remains unknown and has not been addressed in any process.

Manitoba Hydro has confirmed that it generally designs its system to comply with standard industry reliability criteria but appears to have considered and accepted laxer criteria with respect to the HVDC system upon addition of Keeyask and Conawapa. For example, Response to MMF/MH II-016a states:

> Manitoba Hydro adopts the NERC reliability criteria and definitions which apply to both the ac and dc system. Loss of a DC pole is considered as a single contingency (N-1). Manitoba Hydro system is designed to meet the NERC reliability performance criteria.

As noted previously, Manitoba Hydro's existing transmission HVDC system does not meet this N-1 criterion. If Manitoba Hydro loses one of its DC poles, it can no longer transmit all of its existing hydro power from the Nelson River. Indeed, this is why it appears that some (if not all) of its export contracts allow the exports to be dropped under system emergencies. Response to MMF/MH II-016b admits that loss of just one Bipole is a multiple contingency event:

> Loss of a bipole is considered as a multiple contingency, or N-2 (category C) event. Loss of both bipoles is an extreme event (category D). Manitoba Hydro system is designed to meet the NERC reliability performance criteria. NERC does not specifiy [sic] performance criteria for extreme events but requires that such events be evaluated for risks and consequences.

[25] For documents outlining the MMF concerns on these issues, see MMF Closing Argument and Affidavit of David Chartrand in CEC hearing on Bipole III at http://www.cecmanitoba.ca/hearings/index.cfm?hearingid=36#3. Further, following the Minister of Conservation and Water Stewardship's issuance of a license to Manitoba Hydro for the construction of Bipole III, the MMF appealed the Minister's decision and the issuance of the license under section 28(1) of the *Environment Act*. This appeal remains pending.

Indeed, NERC criteria state that no firm load should be lost at transmission levels following a single contingency (N-1), while firm load can be dropped following an N-2 contingency (a multiple contingency). Scenarios involving N-4 events (such as loss of both Bipole I and Bipole II) are expected to be catastrophic. Manitoba Hydro is not required by industry standards to design its system to meet such catastrophic N-4 contingencies. However, Manitoba Hydro expressed a concern about living with months of rotating blackouts, which is more of a capacity reliability issue than a transmission reliability issue. Manitoba Hydro chose to address that concern by building new transmission within Manitoba Hydro rather than by building stronger transmission ties to its U.S. neighbors or gas-fired generation near its Winnipeg load center. In its planning, Manitoba Hydro should be seeking the ability to draw upon a more diverse set of generating resources (e.g., those in MISO), not just more reliable access to pre-existing on-system generation.

Other information illustrates how Manitoba Hydro has begun to change its criteria for its transmission system. For example, the response to MMF/MH II-016e states:

> Manitoba Hydro has historically adopted the "a dc pole reserve over load criteria" stated in the 1986 Transmission Planning Criteria (H&TPD 86-1), as quoted "The present Criteria is to maintain a dc pole reserve toward meeting the Manitoba Firm load demand in conjunction with existing southern system generation under median flows". This criteria was applied to the development of Limestone generation.
>
> The reserve criteria is under continuous review by Manitoba Hydro. The past operating experience (significant outages of HVdc valve groups) and increasing economic benefit received from power exports have led to the criterion of maintaining "on-line valve group spare over generation" to cover value group outages. This "spare valve" criterion is considered to provide optimum reliability and economic benefits. The reserve criteria is currently under further investigation for the split Northern Collector System associated with Conawapa.

Now that it has secured approval for construction of Bipole III, Manitoba Hydro has greatly relaxed its concerns with risks posed by a contingency outage of a single pole of a Bipole, an entire Bipole, or both Bipole I and II. It now contends that

> The loss of 900-1000MW pole is a low probability event (< 1%) as stated in Appendix 13 of the NFAT submission, therefore it is not considered to be an economically attractive

> option to cover for this loss with an additional spare HVdc capability when evaluating the firm transfer capability of the HVdc system.

See the response to CAC/MH II-013b.

Manitoba Hydro admits that the odds of such an event (simultaneous long-term loss of Bipoles I and II) are low. Ordinarily, utility systems are designed to meet load except for one day in every ten years, the 1-day-in-10 year loss-of-load-probability standard. The risk of losing both existing Bipoles is much lower. At Chapter 2.2.2 of its EIS submission to the CEC, Manitoba Hydro stated:

> Studies (Teshmont 2001) have shown that with respect to Dorsey Station, there is a 1 in 29 year probability of outage due to fire and a 1 in 200 year probability of outage due to wide front winds. While mitigation measures have been put in place, which partially address fire vulnerability at Dorsey, there is little that can reasonably be done to mitigate vulnerability to wind and other weather events. The same studies (Teshmont 2001) revealed that the probability of the loss of the Interlake corridor is 1 in 17 years from a tornado, 1 in 50 years from icing and 1 in 250 years from wide front winds.

In other words, Manitoba found it necessary to expend $3.3 billion on the spare HVDC capability of Bipole III in order to lessen the consequences of an N-4 contingency outage of four poles of Bipoles I and II, which has a probability of one occurrence in seventeen years[26] but has now determined that it is not "economically attractive…to cover . . . with an additional spare HVdc capability" the contingency outage of a single 900-1000 MW pole of any Bipole, an event which has a failure rate of 5.75/year with an outage duration of 1.21 hours (Bipole I), or 6.02 failures per year of 2.16 hours duration (Bipole II). See NFAT Appendix 13.1 at 11.

B. Length of Outage

As described above by Manitoba Hydro in the proceedings before the CEC, Manitoba Hydro's main concern centered on the length of a possible outage of both existing Bipoles. Manitoba Hydro contended that an outage of the Dorsey Substation could last as long as three years, while

[26] Please note that the one in 17 year expectancy is for a tornado, which would not be expected to occur during Manitoba's peak winter months when loads are highest.

outages of the corridors themselves could last from six to eight weeks. However, multiple actions could be taken to reduce the risk of lengthy outages of either the Dorsey Substation or the transmission corridor.

It is notable that the firm that provided the probabilities of losses associated with outages of Bipoles I and II, as well as the Dorsey Substation, has ties to Manitoba Hydro and the Bipole projects themselves. Teshmont Consultants acted as the Owner's Engineer on each of the Bipole projects on behalf of Manitoba Hydro, and has already been hired as Owner Engineer for Bipole III.[27] Therefore, Manitoba Hydro asked the consultant that actually designed the original Bipoles I and II to critique its performance in relation to catastrophic events, and then hired that same consultant to design and build the project that was ostensibly justified via that same consultant's report.

In any event, the probabilities of catastrophic contingencies described by Teshmont are all less than the industry's loss of load probability standard of one day in 10 years. The worst outage for the Dorsey Substation was listed as a 1 in 29 year event for fire, while the worst outage for the Bipoles I and II transmission corridor was a 1 in 17 year event for a tornado. The Interlake corridor was also estimated to be at risk for an icing event of 1 in 50 years.[28]

And for each of these catastrophic events, Manitoba Hydro could take steps to reduce risks for far less money than it would cost to build Bipole III. For example, fire risk could be handled by removing brush in and around the fence of the Dorsey Substation, as well as the transmission corridor. Furthermore, the substation could be reinforced to withstand tornado forces, and Manitoba Hydro could acquire long-lead-time replacement components that cannot be protected and keep these parts in reserve. Equipment necessary in case of icing or wind storms could be purchased in advance, and staged at areas along the transmission lines in order to hasten the recovery of the facilities. Each of these activities would be far less costly than building a third Bipole that will traverse land important to First Nations and Métis people.

[27] See http://www.teshmont.com/expertise/hvdc-systems

[28] Manitoba Hydro EIS on Bipole III to the CEC, Chapter 2.2.2.

Finally, adding Bipole III plus Keeyask and Conawapa would put even more eggs in the Northern Hydro basket which would be vulnerable to a single event taking out all three Bipoles of all Northern Hydro generation (i.e., a "common mode" failure such as tornados or ice build-up) or the loss of Bipoles I and II while Bipole III is out of service for maintenance. Today, the simultaneous or overlapping loss of Bipoles I and II would deprive Manitoba Hydro of 3562 MW of Northern hydro generation whereas loss of all three Bipoles would deprive it of 5587 MW of Northern Hydro generation once Keeyask and Conawapa are placed in service. Although constructing Bipole III on a right-of-way ("ROW") separate from that used by Bipoles I and II reduces the risk of a common mode failure of all three Bipoles, some of the common mode events could be widespread enough to take out all three Bipoles.

C. A Second 500 kV Line to the US Provides Reliability

The shortfall that would result from losing both Bipoles I and II was depicted at Chapter 2.2.3 (at 2-6 and 2-7) of Manitoba Hydro's EIS submission to the CEC as about 1500 MW in 2017, growing to 2000 MW in 2025, as illustrated by Manitoba Hydro in the graph below:[29]

[29] The 1500 MW deficit in 2017/18 would occur at the time of Manitoba Hydro's winter peak demand which would be unlikely to coincide with a tornado or a brush fire. The load duration curve for 2017/18 shows that Manitoba Hydro's demand can be met with both Bipoles I and II out of service in 68% of the hours of 2017/18. See the Manitoba Hydro EIS on Bipole III, Chapter 2.2.3, Figure 2.2-2.

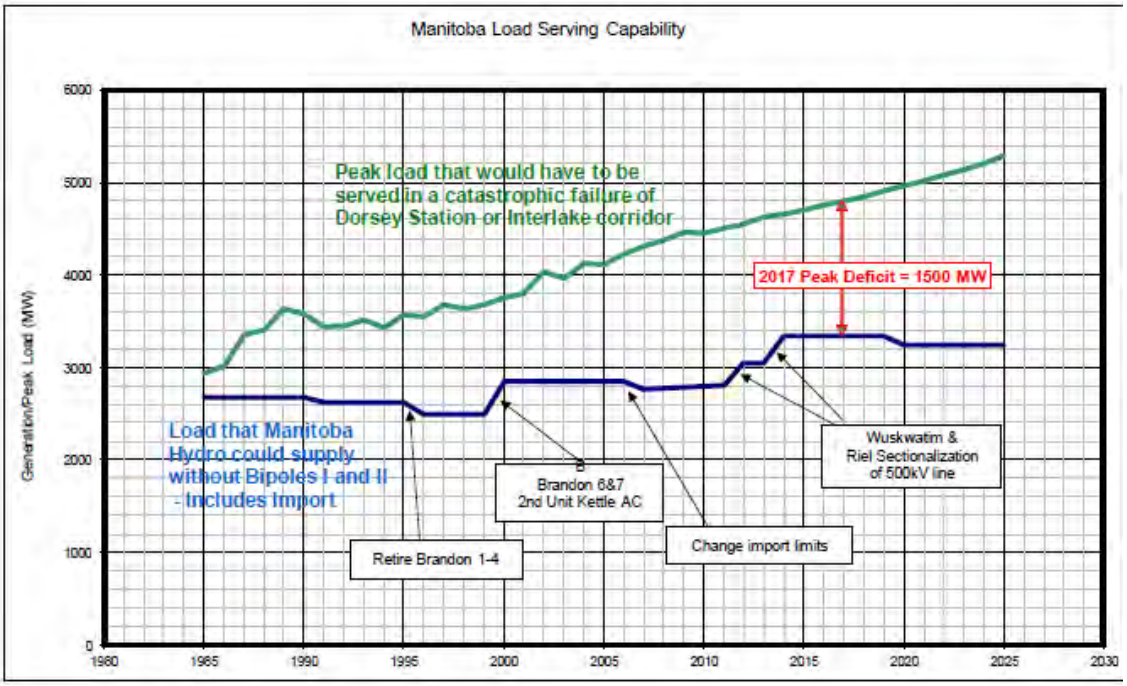

Figure 2.2-1: Load Serving Capability without Bipoles I & II

It appears from Figure 2.2-1 that Manitoba Hydro has been exposed to its alleged susceptibility to loss of Bipoles I and II since 1985 yet it will take more than 30 years to mitigate the impact of such a loss. Manitoba Hydro reports that, at the time of a September 1996 loss of both Bipoles (the only time such a catastrophic loss has occurred in over 35 years), it was able to arrange 985 MW of imports to cover the shortfall,[30] more than the 700 MW existing firm import limit from the United States and other Provinces. See NFAT Chapter 5 at 16 of 61.

Having identified the supposed need for addressing a low-probability event in its presentation to the CEC, Manitoba Hydro proposed two alternatives to building Bipole III (EIS submittal at Chapter 2.3 at 2-9):

2. The addition of up to 2000 MW of gas turbines in southern Manitoba.

3. The addition of up to 1500 MW of new import tie lines to the United States (USA) to provide access to US generation, which is assumed to be comprised mainly of natural gas-fired generation, plus the addition of another 500 MW of natural gas-fired generation in southern Manitoba.

[30] See Chapter 2.2.2 of the EIS for Bipole III at 2-4.

Both alternatives to Bipole III were rejected because of cost, but the rejection was not based on an apples-to-apples comparison. The addition of Bipole III brings with it no additional generating capacity, except for a reduction in losses of approximately 90 MW (see NFAT Chapter 4 at 44). That is, Bipole III only provides between 2000 MW and 2300 MW of backup transmission access to already-existing Northern hydro-electric generation in the low-probability event of simultaneous loss of Bipoles I and II. By comparison, each of the two alternatives would have provided 2000 MW of ADDITIONAL generating capacity. The alternatives were determined to be more expensive than Bipole III in large part because they included either (i) 2000 MW of additional firm gas-fired generation in Manitoba or (ii) 1500 MW of firm purchases from the United States plus 500 MW of additional gas-fired generation in Manitoba. Clearly, the two alternatives would have offered 2000 MW more long-term generating capacity value to Manitoba consumers than Bipole III will. In order to make the three alternatives comparable in terms of generating capacity, Manitoba Hydro should have added the costs of Keeyask and Conawapa to the cost of Bipole III, which likely would have made either alternative more attractive than Bipole III in combination with the additional hydro generation.

There were further flaws in Manitoba Hydro's analysis of the alternative that called for building an additional 500 kV AC transmission line to the United States. For example, there would be no need for Manitoba Hydro to line up 1500 MW of firm purchase commitments to cover a simultaneous outage of Bipoles I and II that was estimated to occur no more frequently than once in 17 years. Nevertheless, this alternative was rejected in large part because Manitoba Hydro contended that reliance on additional import capacity would require that, in addition to Manitoba Hydro's building the line to the United States, it would need to line up 1500 MW of costly long-term firm power purchase contracts tied to the cost of gas generation. The imported generation, combined with the 500 MW of gas-fired generation in Manitoba, was estimated to cost $2.99 billion. See the Bipole III EIS at Section 2.3.4 at 2-12.

In my experience, that contention is inconsistent with industry custom and practice. The right of Manitoba Hydro to rely upon interconnected utilities for support during contingencies – especially such extreme contingencies as outages of four poles of the Bipole HVDC system -- is

implicit in the interconnection process and is almost always made explicit in the bulk power contractual arrangements that accompany and govern such interconnections. There are numerous instances in which owners of large blocks of nuclear generation in North America experienced long-term outages or construction delays and obtained replacement power in bulk power markets. Manitoba Hydro could expect to pay a premium in some markets for such power but should obtain some protection from price gouging by MISO oversight of its markets and FERC regulation of interstate commerce in wholesale power.

In addition, any outage of both Bipoles I and II would require Manitoba Hydro to trip or back down the 3,562 MW of existing hydro-electric generation at Kettle, Long Spruce and Limestone, (NFAT Chapter 5 at 9 of 61), but this loss of generation represents a relatively small percentage of the 135,000 MW of generation in the MISO market and 167,000 MW of generation in the PJM market to which MISO is strongly interconnected.[31] Furthermore, apart from the position it took in its presentation to the CEC, Manitoba Hydro's position on the value and function of interconnections is consistent with the industry custom and practice I described. That is, Manitoba Hydro relies on its interconnections for just such events as loss of both existing Bipoles. As noted in the NFAT at 5.2.3 Reliability Benefits of Interconnections:

> Manitoba Hydro's interconnections provide significant reliability benefits in several ways:
> - sharing of generation contingency reserves
> - sharing of capacity resources due to load diversity
> - importation of energy during drought conditions or extreme supply loss in Manitoba
> - ability to supply cross-border load when this load is isolated from its system.

Moreover, NFAT Chapter 5 at 18 states:

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[31] As noted at NFAT Chapter 5 at 40 of 61:

> MISO's July 2012 historic peak load for the market footprint was 98,576 MW; registered generation capacity in July 2012 was 131,581 MW. About 63,000 MW or 48% of the registered generation capacity is coal-fired generation.

Entergy has recently joined MISO and added 23,000 MW of generation. NFAT Chapter 5- at 39 of 61. MISO has strong interconnections with PJM which Wikipedia summarizes as

> More than 830 companies are members of PJM, which serves 60 million customers and has 167 gigawatts [167,000 MW] of generating capacity. With 1,325 generation sources, 59,750 miles (96,160 km) of transmission lines and 6,038 transmission substations, PJM delivered 682 terawatt-hours of electricity in 2009. [Footnote cites 2010 PJM Statistics]

> Imports may also be required for reliability purposes during major supply loss events such as the loss of the entire Interlake HVDC transmission corridor.

Furthermore, Manitoba Hydro has long-established relationships with the opposite parties from the United States in its interconnection agreements. Over the decades since Manitoba Hydro began development of its Nelson River hydro-electric plants, those opposite parties have benefited greatly from their purchases of low-cost power and are well aware of the risks posed by the configuration of Manitoba Hydro's bulk power system. Quite apart from their contractual obligations and industry custom and practice, it would be imprudent of those opposite parties to deny Manitoba Hydro access to reasonably-priced replacement power in the event of a simultaneous contingency outage of both Bipoles I and II. Manitoba Hydro would be in a position to deny those opposite parties' extensions of their present favorable bulk power supply arrangements.

Indeed, the benefits of interconnections provide a basis to include a second interconnection to the United States. And Manitoba Hydro examined the benefits arising from two possible sizes of transmission facilities to the United States. One interconnection upgrade would enable Manitoba Hydro to export an additional 250 MW, while the other would create "750 MW additional transmission interconnection import/export capacity between Manitoba and Minnesota and Wisconsin with an ISD of 2020." See the NFAT Overview at 2 of 13.

Clearly, the 750 MW planned addition to Manitoba Hydro's import limit associated with the second planned 500 kV line to the United States would enable it to cover half the 1500 MW shortfall it could experience in 2017 from loss of both Bipoles, leaving it exposed to a shortfall of capacity in only about 10% of the annual load cycle. It also seems likely that Manitoba Hydro could increase that 750 MW addition to its import capability by adding reactive support to its interconnections with the United States.[32] Nonetheless, Manitoba Hydro rejected that alternative.[33]

[32] The response to MMF-MH I-037 states that "Adding series capacitors to the Richer to Moranville 230 kV line might increase the import limit by 50 to 100 MW." That response also states that the present 700 MW import limit is based on preventing voltage collapse in the United States following loss of the existing 500 kV line between Dorsey and Forbes, suggesting that the 700 MW import limit could be increased by adding reactive support to both

These data suggest that Manitoba Hydro could have achieved the desired level of backup transmission capacity by building the 500 kV Manitoba-Minnesota Transmission Project (with voltage support suitable to avoid voltage collapse in connection with substantial import levels), instead of building Bipole III and - as discussed below - at a cost lower than the $3.3 billion cost of Bipole III. The total cost of the proposed 500 kV Manitoba-Minnesota line is projected to be $1.05 billion, of which some U.S. utilities would pay a share.[34] As noted, the Bipole III EIS estimated the cost of a 1500 MW increase in import capability to be $1.5 billion.

In referring to the Manitoba-Minnesota Transmission Project, the NFAT Executive Summary at 6-7 of 42 states:

> This project is still in the study and negotiation phase. Manitoba Hydro will be responsible for the Manitoba portion of the interconnection, which is estimated to cost $350 million. Manitoba Hydro will also be responsible for some portion of the capital and ongoing operating costs associated with the U.S. portion of the facilities. For the Preferred Development Plan, it is assumed that Manitoba Hydro will be responsible for 40% of the capital and ongoing operating costs associated with the U.S. portion of the 750 MW interconnection facilities, with the remainder of the transmission costs to be borne by MP and WPS. The total cost of the U.S. portion of the 750 MW interconnection is in the order of $700 M (2020 base dollars, not including interest).

CONCLUSION

Manitoba Hydro's Preferred Development Plan has not been supported by Manitoba Hydro's NFAT submission and, if approved and built, will impose unnecessary and excessive risks on ratepayers. Manitoba Hydro's pursuit of a gas-fired alternative and/or imported power

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the existing and planned 500 kV interconnections with the United States. The cost of reactive support is typically far lower than the cost of a new 500 kV AC interconnection.

[33] "The [230 kV line to Rugby, North Dakota] project increased long-term import capability to 700 MW, and increased the export capability to the U.S. interface system operating limit of 2,175 MW, which is still in effect. It should be noted that 225 MW of the system operating limit is utilized for delivery of operating reserves and transmission reliability requirements and is not available for export purposes." NFAT Chapter 5 at 15 of 61.

[34] The N-2 loss of two 500 kV transmission lines would cause a blackout (or maybe not if an SPS is used and is successful) while the N-4 Bipole outage may or may not cause a blackout, but is primarily of concern because of the possibility of months of rotating blackouts (i.e., two very different kinds of impacts). A blackout is over in a few hours. Rotating blackouts for months are more severe.

(supported by enhanced import capacity on its interconnections with the United States) would be far lower in cost in the years through 2040, and lower in risk, than would pursuit of its PDP. The PDP would exacerbate the concentration of its generating resources along the Nelson River hundreds of kilometers north of its Manitoba Winnipeg load center and put more eggs in that basket.

In addition, Manitoba Hydro should cancel – or at least defer – construction of Bipole III. Manitoba Hydro could more cost-effectively guard against a simultaneous outage of Bipoles I and II by enhancing its import capacity through upgrades of its interconnections with the United States.

POWER PLANNING AND DEVELOPMENT DIVISION

Report on

THE 2004/05 POWER RESOURCE PLAN

Date: July 22, 2004

This report is intended **for internal use** by Manitoba Hydro only. External requests for information contained herein should be referred to Power Planning and Development Division.

3.Conawapa B axis versus DX axis:

The decision on which axis is to be developed for Conawapa would ultimately affect the capacity of the plant. Selection of the DX axis would likely provide 10% more capacity at Conawapa (1250 MW vs 1375 MW) allowing for greater hydro capability in the event the Gillam Island site is not developable. However, this would add additional investment risk to the Conawapa project. The recommendation of Conawapa for an in-service-date of 2024 allows sufficient time to re-evaluate the selection of the preferred axis prior to final commitment.

Other Risks:

Bipole III HVDC Line

Work is ongoing and the routing of the line is yet to be determined. Since the in-service-date of 2010 is not considered to be attainable and 2012 is more likely, the energy and capacity available from reduction in transmission losses resulting from construction and system operation of Bipole III line has been included for an in-service of 2012.

Recognizing that there is a risk of the Bipole III Line not being constructed in advance of new generation, a sensitivity was conducted in which the Bipole III Line is included with new northern generation developed to meet domestic load requirements. The costs and line benefits are now considered as part of the sequence economic analysis. For comparative purposes, all three northern hydro options (Conawapa, 5 unit Conawapa and Gull) have been included as these options would all depend on the Bipole III Line for transmission

Tables 3 below, tabulates the results of this scenario comparison. Under this sensitivity, SCCTs are most economic at the 10% discount rate but the Conawapa -2024 sequence is most economic at 6%.

Table 3
Expected Benefits Relative to all SCCT Sequence
(Bipole III Line costs and benefits included with northern hydro development ISD-2024)

Millions of 2004 PV Dollars, 2004 **EXPECTED** Export Prices

	Conawapa-24	Conawapa -24 (first 5 units of 10)	Gull-24 SCCT1X-35, 39
Incremental NPV @ **6% Discount Rate**	**589**	**416**	**310**
Incremental NPV @ **10% Discount Rate**	**1**	**-34**	**-40**
Incremental IRR	**10.0%**	**9.4%**	**9.1%**

This sensitivity assumes the Bipole III line being developed in 2024 would still be utilizing the East of Lake Winnipeg route. The loss reduction benefits are included but no monetary value is included for the reliability benefits.

Should the Bipole III line utilize the Interlake or West routes, the capital costs would be higher and the benefits resulting from loss reductions lower. A further sensitivity was conducted to estimate the impact on expected benefits of Conawapa, Conawapa 5 units and Gull should Bipole III Line be constructed on a West route. For this West route sensitivity, costs were estimated to be 46% higher and benefits from reduced losses were estimated to be 41% lower than if the line were construct east of Lake Winnipeg. Table 4 below, tabulates the results of this scenario comparison.

Table 4
Expected Benefits Relative to all SCCT Sequence
(Bipole III Line costs increase by 46% and benefits decrease by 41%, west routing, included with northern hydro development ISD-2024)
Millions of 2004 PV Dollars, 2004 **EXPECTED** Export Prices

	Conawapa-24	Conawapa -24 (first 5 units of 10)	Gull-24 SCCT1X-35, 39
Incremental NPV @ **6% Discount Rate**	**508**	**335**	**229**
Incremental NPV @ **10% Discount Rate**	**-38**	**-73**	**-79**
Incremental IRR	**9.4%**	**8.7%**	**8.2%**

Inclusion of at least some reliability benefits with the Interlake or West line would reduce or eliminate the cost impacts relative to the SCCT sequence. Thus, the additional costs for the Conawapa and Gull sequences would be larger but probably not sufficient to reverse the recommendation for Conawapa in 2024.

Higher Load Growth

The 2004 Medium High Load Growth scenario would result in deficits in the years 2008/09 and 2009/10, of 280 GWh and 410 GWh respectively. The addition of Wuskwatim in the year 2010/11 provides sufficient additional supply to maintain a net surplus of dependable energy until the year 2019/20. In the 2003/2004 IFF, under the High Load Growth scenario new resources were required (post Wuskwatim) one year earlier in the year 2018/19.

Lower Load Growth

If actual long-term domestic load growth turned out to be lower than the base load forecast, the requirement for new generation would be deferred from the current 2024 date under base load growth. For example, by applying the 2004 Medium Low Load Forecast, the need date for new generation would be 2048/49.

Tab 111

Needs For and Alternatives To

APPENDIX 9.3

Economic Evaluation Documentation

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Economic Evaluation Documentation

This appendix documents the inputs and assumptions associated with the economic evaluations of the NFAT development plans. The appendix is organized into three sections which are 1) Reference Scenario Analysis, 2) Probabilistic Analysis with Scenarios, and 3) Economic Summary Tables.

Section 1 – Reference Scenario Analysis, includes the following planning assumption details:

- Economic Lives of New Generation Resources
- Total Study Life
- Sunk Costs
- Net Present Value Calculation – Manitoba Hydro's Real Weighted Average Cost of Capital (RWACC)
- Electricity Export Price, Natural Gas Price and Carbon Price Forecasting Methodology
- Summary of Export/Import Contracts
- Wind Integration Costs
- Description of Marginal Costs
- Cash Transfers to the Province

Section 2 – Probabilistic Analysis with Scenarios, includes details and explanations associated with the economic uncertainty analysis in Chapter 10.

Section 3 – Economic Summary Tables, includes the following cash flow details:

- Hydro Generation, Thermal Generation, Wind Generation, Transmission Capital Costs
- Capital Taxes
- Fixed Operating and Maintenance Costs
- Gross Export Revenue
- Water Rentals
- Variable Production Costs of Thermal Generation – Fuel Costs, Variable O&M, Carbon Adders
- Power Purchases
- Net Revenue

1. Reference Scenario Analysis

The reference scenario analysis considered inputs and assumptions that are associated with the "most likely" outcomes for the factors affecting Manitoba Hydro's future. The economic evaluations associated with ***Chapter 9 Economic Evaluations – Reference Scenario*** are based on 2012/13 reference scenario planning assumptions with the exception of adjustments, primarily downwards, to the electricity export price forecast as described in Section 1.6.4 of this appendix. The economic evaluations associated with ***Chapter 12 Economic Evaluations – 2013 Update on Selected Development Plans*** are based on reference scenario 2013/14 planning assumptions.

Following is a general description of each of the 2012/13 and 2013/14 key planning assumptions used for reference scenario economic evaluations.

1.1. ECONOMIC LIVES OF NEW GENERATION RESOURCES

Table 1.1 provides the economic lives of new generation resources used in economic evaluations.

Table 1.1: Economic Lives of New Generation Resource Options

Hydro-electric Generating Stations	67 Years
Wind Generating Stations	20 Years
Simple Cycle Gas Turbines (SCGT)	30 Years
Combined Cycle Gas Turbines (CCGT)	30 Years
Individual turbines and generators for hydro-electric stations	25 Years
Transmission Stations	35 Years
Transmission Lines	50 Years

1.2. TOTAL STUDY LIFE

The total study life used in this analysis is 78 years. For the total study life, Manitoba Hydro combines two approaches – a 35-year detailed evaluation and a long-life asset evaluation which extends from the end of the 35-year study period to the end of the service life of hydro-electric generation assets, as representing the longest-lived assets.

The economic lives of assets developed in the different development plans may extend well beyond the 35-year planning period. While natural gas-fired generation resources are estimated to have economic lives of 30 years, hydro-electric resources are estimated to have economic lives of 100 years or longer, with the "weighted average" life of the plants being around 67 years when considering the different service lives of the mechanical and electrical equipment and the service lives of the concrete and earthen structures. For the 35-year study period, detailed forecast information related to the Manitoba Hydro system, is used.

Beyond the 35-year study period, replacement capital costs are assumed for assets that reach the end of their economic lives before the end of the long study period (78 years). In addition, a net production cost approximation (also referred to as net average flow related revenue) is used beyond the 35-year study period which includes:

- extending fixed operating and maintenance costs throughout the economic life of all assets (including major capital O&M investments for large hydro-electric resources), and
- extending the average net revenues of the last three years associated with the economics of a development plan to capture the expected ongoing incremental revenues between development plans to the end of the study period.

As an example, Figure 1.1 graphically shows the timing and value (in millions of 2014$) of replacement capital costs for the reference scenario All Gas plan and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)) over the total study life. The cash flow component of "Total Capital" for each plan is the basis for the chart and is provided in the Economic Summary Tables 001 and 009 (Preferred Development Plan and All Gas plan,

respectively) in Section 3 of this appendix. Similarly, Figure 1.2 graphically shows the timing and value (in millions of 2014$) of net average flow related revenue (see Section 3.2 of this appendix for a description of net flow related revenue) for the reference scenario All Gas plan and the Preferred Development Plan (K19/C25/750MW (WPS Sale & Inv)) over the total study life. The cash flow component of "Net Revenue" for the each plan is the basis for the chart.

Figure 1.1: Timing and Value of Replacement Capital Costs: Total Capital

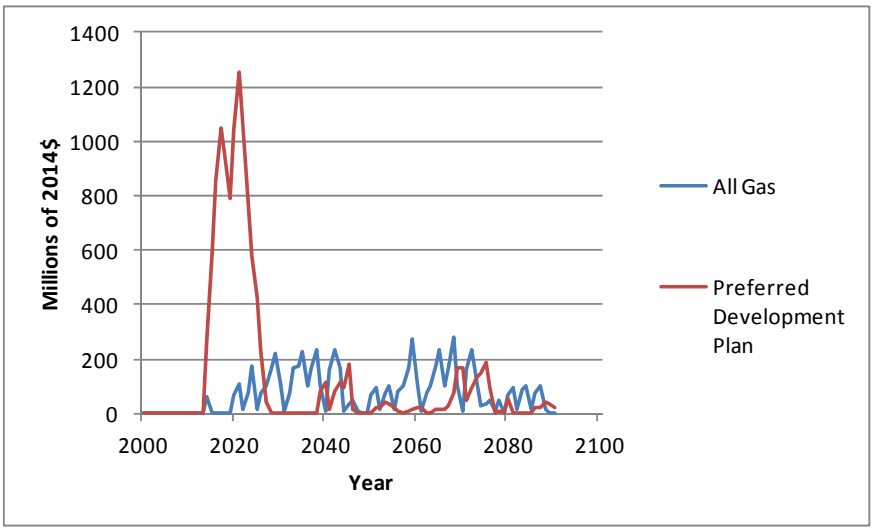
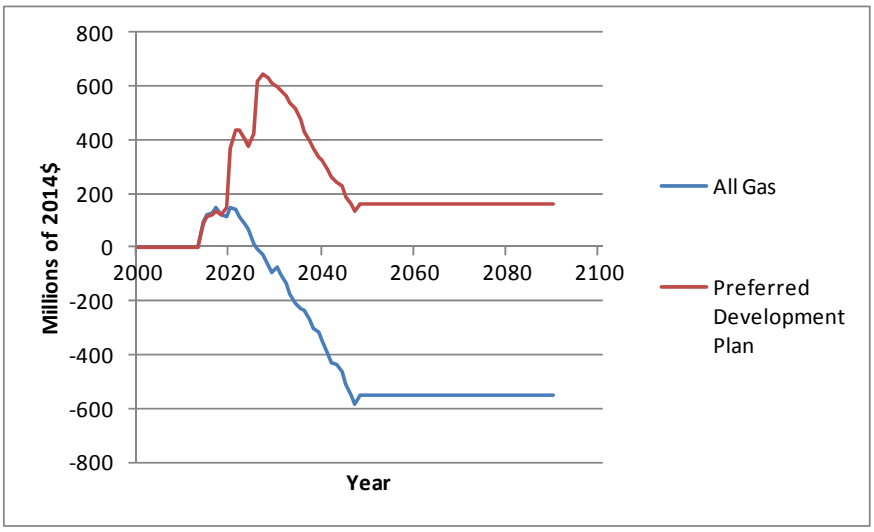


Figure 1.2: Timing and Value of Net Production Costs: Net Revenue



1.3. SUNK COSTS

When evaluating and choosing among alternative development plans, from an economic evaluation perspective, the appropriate measure is the incremental costs and benefits associated with one plan relative to another. This means that costs and benefits that are common to all development plans are not included in the analysis as these values are the same in each development plan. Likewise, sunk costs are not included in the economic evaluations as these represent money already spent or commitments that cannot be changed relative to the decision point when choosing among plans. While these costs could be included in the evaluations for all the development plans, the comparison of plans would yield the same result as not including the sunk costs in the evaluations. For the purpose of this submission, as appropriate for each development plan, all costs (incurred or estimated) prior to June 2014 will be considered as sunk and having been made to protect in-service dates for Keeyask and Conawapa generating stations. June 2014 was chosen because, according to the NFAT schedule, the NFAT panel report will have been made public and the Government of Manitoba will have made decisions on the development plans. Table 1.2 provides a summary of the capital costs, net of sunk costs, for Keeyask and Conawapa generating stations for the different in-service dates assumed in the NFAT evaluations.

Table 1.2: Capital Costs Net of Sunk Costs Used for Economic Evaluation Keeyask G.S. and Conawapa G.S. by In-Service Date (Billions of 2014 Base Dollars)

	Keeyask 2019	Keeyask 2022	Conawapa 2025	Conawapa 2026	Conawapa 2029	Conawapa 2031
Base Cost	$4.3	$4.4	$6.0	$6.1	$6.2	$6.3
Sunk Cost to June 2014	($1.0)	($1.0)	($0.3)	($0.3)	($0.3)	($0.3)
Evaluation Costs	$3.3	$3.4	$5.7	$5.8	$5.9	$6.0

1.4. NET PRESENT VALUE CALCULATION – MANITOBA HYDRO'S REAL WEIGHTED AVERAGE COST OF CAPITAL (RWACC)

The economic evaluation of development plans used standard economic analysis for project evaluation, known as net present value (NPV). Each development plan results in different streams of costs (cash outflows) and streams of revenues (cash inflows) occurring at different times. To compare development plans, all cash flows of costs and revenues are discounted to a present value which can then be compared on an equivalent basis. All cash flows of costs and revenues are discounted using a real discount rate which removes the effect of inflation common to all costs and revenues. Net Present Value (NPV) is the difference between the present value of the revenues and the present value of the costs. For the purpose of the NFAT economic evaluations, all present values are expressed in 2014 constant dollars.

The discount rate used in the NFAT economic evaluations is Manitoba Hydro's Real Weighted Average Cost of Capital (RWACC). Manitoba Hydro's RWACC is calculated using Manitoba Hydro's forecasted long-term interest rate (a 1% provincial guarantee fee is included in Manitoba Hydro's forecasted nominal long-term interest rate) associated with debt and the imputed interest rate associated with equity, which are then weighted by Manitoba Hydro's target capital structure of 75% debt and 25% equity. Table 1.3 demonstrates the derivation of Manitoba Hydro's weighted average cost of capital, both in nominal and real terms, for the rate used for the 2012 NFAT reference scenario economic evaluations. This results in a WACC of 7.05% in nominal terms and 5.05% in real terms. A long-term inflation rate of 1.9% is utilized to determine the WACC in real terms, i.e. without the effect of inflation.

Table 1.3: Derivation of Manitoba Hydro's Weighted Average Cost of Capital

Capital Source	Target Capital Structure	Nominal Rates		Real Rates	
	Weight	Rate	Weighted Rate	Rate	Weighted Rate
Long-Term Debt	75%	6.30%	4.73%	4.32%	3.24%
Equity	25%	9.30%	2.33%	7.26%	1.82%
Total	100%	_	7.05%	_	5.05%

Note – Total rates are rounded to the nearest 5 basis points.

The RWACC (discount rate) used throughout the NFAT submission for the 2012 reference scenario economic evaluations is 5.05%. The RWACC (discount rate) used in Chapter 12 for the 2013 update of the reference scenario economic evaluations is 5.40%, respectively.

To correspond to a June 2014 decision, all NPVs have subsequently been escalated to $2014 by the WACC (two years for the 2012 analysis, one year for the 2013).

1.5. ELECTRICITY EXPORT PRICE, NATURAL GAS PRICE AND CARBON PRICE FORECASTING METHODOLOGY

As part of its annual planning cycle, Manitoba Hydro prepares long-term forecasts of:

1) electricity export prices in order to determine the value of electricity exports from and imports into Manitoba,
2) natural gas prices used to estimate future operational costs associated with natural gas-fired generation in the Province of Manitoba, and
3) carbon prices used to estimate the cost premium associated with CO_2 emitting generation in the Province of Manitoba.

This section of Appendix 9.3 explains Manitoba Hydro's processes to forecast electricity export prices, natural gas prices, and carbon prices.

1.5.1. Electricity Export Price Forecast

Forecasting energy prices is complex as it not only requires specialized production costing and market simulation models but it also is dependent on anticipating public policy, technology and economic shifts. As it is impossible to foresee the future and because there are multiple perspectives on how public policy, technology and the economy will evolve, Manitoba Hydro has established a consensus based independent approach for electricity export price forecasting involving up to six industry expert consultants.

Each consultant uses a proprietary electricity price forecast model capable of simulating the expansion and operation of the power system over a period of time based upon forecasts of inputs and load demands. The power system modeled includes at least the Midcontinent Independent System Operator (MISO) market footprint. However some consultants choose to utilize a larger footprint in their work. Key inputs into these models include:

- Characteristics of the existing generation fleet, including generator size, fuel and fuel efficiencies (heat rate), and a transmission grid representation;
- Characteristics of the load, including the rate of load growth;
- Forecasts for thermal fuel costs (primarily coal and natural gas);
- Characteristics of new generation that could be built in the future, including capital costs, fuel types and efficiencies, and required rates of return on capital investment, as well as future transmission grid expansion;
- Forecasts for the value of emissions allowances for thermal generation, including SO_2 (sulfur dioxide), NO_X (nitrogen oxides) and CO_2;
- Other legislative requirements that may affect selection of the future generation sources - particularly renewable portfolio standard requirements (RPSs) which tend to have the effect of mandating some degree of wind development.

Manitoba Hydro requests that the consultants use their models to provide a long-term electricity price forecast at the Minnesota pricing hub (MINN Hub) which is an aggregation of generation and load pricing locations in the Minneapolis area. As Manitoba Hydro delivers and is paid for its surplus electricity at the Canada – U.S. border, a price adjustment from MINN Hub to the border is required. Manitoba Hydro modifies the MINN Hub price by an adjustment using historical transmission congestion and transmission line loss costs.

It should be noted that such long-term forecasts are attempting to forecast the average market price over the long term, and do not attempt to forecast any short-term volatility. That is, in the forecast period there will be years when prices will vary either higher or lower than the forecast associated with the economic cycle.

Electricity price forecast consultants normally forecast for a 20-year period. In recent years, Manitoba Hydro specifically requested and was provided a long-term 35 year forecast to match its 35 year detailed study life. While such a very long-term view may be necessary for making investment decisions related to hydro assets with a very long lifespan, there is great uncertainty in such long-term projections. Going forward starting with the 2013/14 forecast, due to this uncertainty, Manitoba Hydro has and will be requesting forecasts from the consultants for a 20 year period. Beyond 20 years, Manitoba Hydro has established a process to extrapolate the consensus forecast to the end of the 35 year detailed study timeframe as follows:

- The real annual compounded growth rate for the last five years of consultant forecast data was calculated.
- The compounded annual growth rate calculated was linearly regressed to 0%/year by the last year of the 35 year detailed study timeframe.

Each consultant is requested to provide a Reference, High, and Low electricity price forecast as follows:

- The "Reference" case should be the consultant's best (or most likely) estimate of future electricity prices;
- The "High" case should represent a plausible scenario reflecting the upper limit of prolonged pricing;
- The "Low" case should represent a plausible scenario reflecting the lower limit of prolonged pricing.

1.5.1.1. Electricity Export Price Forecast Products

Manitoba Hydro sells several products in the external markets. The two primary products are a) surplus energy and b) dependable energy and accredited capacity. Revenues from the sale of these products form the majority of Manitoba Hydro's export revenues. The Electricity Export Price Forecast indicates what unit price Manitoba Hydro can expect to receive for each of these products each year over the forecast period.

The pricing components of electricity include energy (the "Energy Component") and capacity (the "Capacity Component"). The price of energy reflects the average incremental operating and fuel costs of the marginal generator. In today's terms this price would be equivalent to the average MISO Day Ahead market price. The price for capacity reflects the forecast annual all-in cost of permitting, constructing and owning a generating facility.

Long-term price forecasts were prepared for three products:

1) On-Peak All-In Product,
2) On-Peak Long-Term Dependable Product, and
3) Off-Peak Energy Product.

Each product was forecast at the Manitoba - U.S. border (the MHEB pricing node). The on-peak period is defined using the 5x16 definition - that is energy supplied 5 days per week, 16 hours per day (which is Monday through Friday from 6:00 a.m. to 10:00 p.m. CST). The off-peak period represents all those hours not included in the definition of on-peak - which are the 5 days per week by 8 hours per day overnight hours during the week plus all weekend hours, including NERC holidays.

The On-Peak All-In Product includes energy based delivery for the 5x16 on-peak period and the necessary associated capacity. The On-Peak Long-Term Dependable Product represents a long-term sale which is sourced from Manitoba Hydro's dependable energy resources, including accredited capacity and must take 5x16, on-peak energy. The price for the On-Peak Long-Term Dependable Product includes a premium over the shorter term On-Peak All-In Product. The exact amount of the premium is confidential as it is commercially sensitive. However, it represents the additional value a purchaser is willing to pay for the specific price and product attributes associated with power purchased from Manitoba Hydro's dependable resources. The Off-Peak Energy Product is an energy only product whose value is based on delivery during the off-peak hours.

1.5.1.2. 2012/13 Electricity Export Price Forecast

For its 2012/13 forecast of electricity export prices, Manitoba Hydro obtained electricity price forecasts from five independent consultants. All five of the forecast consultants were also used for the 2011/12 price forecast and some of the consultants work has been used as far back as 2002/03. Equal weighting of each consultant's forecast was used to prepare the consensus forecast for 2012/13.

1.5.1.3. Adjusted 2012/13 Electricity Export Price Forecast

After the preparation of the 2012/13 Electricity Export Price Forecast, the outlook for long-term natural gas price deteriorated from that used in the forecast. Given that there is a strong

correlation between natural gas prices and electricity export prices, it was apparent by late 2012, that the long-term outlook for electricity prices could be lower than the electricity export price forecast that was developed in early 2012/13.

To address this issue of currency of information, preliminary indications were gathered at the end of December 2012 from available updates from the consultants presently used to develop the 2012 Electricity Export Price Forecast. Based on the advice received in December 2012, it was anticipated that the reference case 2013/14 forecasts for electricity export prices would be in the order of 8 percent lower than the consultants' respective 2012/13 outlooks for the reference case. However, the consultants generally confirmed that they did not anticipate any material changes to their outlooks of carbon policy/pricing.

Based on updated information available in December 2012, adjustments were made, on average, to the high, reference and low electricity export price forecasts for the On-Peak Energy Product from the 2012/13 Electricity Export Price Forecast as follows:

- High – increase by 3%,
- Reference – decrease by 8%, and
- Low – decrease by 32%.

The evaluations in the NFAT submission, with the exception of the 2013 update in Chapter 12, use the adjusted 2012/13 electricity export price forecast.

1.5.1.4. 2013/14 Electricity Export Price Forecast

Manitoba Hydro recognizes that the adjusted 2012/13 electricity export price forecast for the range of forecasts - high, reference and low (used in the NFAT analysis, with the exception of the 2013 update in Chapter 12) does not reflect the most current information.

The electricity export price forecasting process continues to use a consensus approach for 2013/14. In order to provide an independent perspective on future prices, for its 2013/14

forecast of electricity export prices, Manitoba Hydro obtained electricity price forecasts from six independent consultants. Of the six electricity export price consultants, four were used in both the 2011/12 and the 2012/13 price forecasts, with some of the consultants work used as far back as 2002/03.

The 2013/14 electricity export price forecast has resulted in, on average, approximate adjustments to the high, reference and low electricity export price forecasts for the On-peak Energy Product relative to the adjusted 2012/13 electricity export price forecast as follows:

- High – decrease by 7%,
- Reference – increase by 7%, and
- Low – increase by 41%.

1.5.2. Natural Gas Price Forecast Process

As with electricity price forecasts, Manitoba Hydro uses a consensus based approach for natural gas price forecasting in order to provide an independent perspective on future natural gas prices. This forecast is used to determine the price of natural gas used to fuel thermal generation in the Province of Manitoba.

For its 2012/13 forecast of natural gas prices, Manitoba Hydro obtained natural gas price forecasts from five independent consultants. These were the same consultants used for the 2011/12 price forecast. Some of the consultants work has been used as far back as 2002/03. Equal weighting of each consultant's forecast was used in the consensus forecast for 2012/13. The evaluations in the NFAT submission, with the exception of the 2013 update in Chapter 12, used the 2012/13 natural gas price forecast.

For its 2013/14 forecast of natural gas prices, Manitoba Hydro obtained natural gas forecasts from six independent consultants. Of the six natural gas price consultants, three were the same as in the 2012/13 natural gas price forecasts.

The 2013/14 natural gas price forecast has resulted in, on average, approximate adjustments to the high, reference and low natural gas price forecasts relative to the 2012/13 natural gas price forecast as follows:

- High – decrease by 5%,
- Reference – decrease by 6%, and
- Low – increase by 9%.

1.5.3. Carbon Price Forecast Process

Export Region

Manitoba Hydro's understanding of the timing and energy price implications of GHG emission pricing within its export region is largely based on the views of various independent electricity export price forecast consultants that contribute to Manitoba Hydro's electricity export price forecast. The outlook associated with the impacts of future GHG emission or climate change legislation/policies is embedded in the electricity price forecasts provided by each of the forecast consultants.

Domestic

Similarly, fossil-fuel resources within Manitoba are likely to face further GHG pricing constraints. The timing and level will depend on circumstances and policies specific to Canada or Manitoba such as further provincial emissions taxes, adoption of a broader carbon tax, or membership in a cap and trade program. The Manitoba outlook of carbon adders for thermal based electric generation considers GHG emission pricing from other regions within Canada and the U.S. as well as the perspectives of the electricity export price forecast consultants. Based on these considerations, a plausible range (high, reference, low) of future domestic GHG emission prices are produced.

1.6. SUMMARY OF EXPORT/IMPORT CONTRACTS

The following tables summarize the high level details associated with Manitoba Hydro's long-term export/import contracts that are "Common to All Development Plans" and "Contingent upon Development". Tables 1.4 through to 1.7 summarize the details for contracts assumed in the 2012 NFAT evaluations and Tables 1.8 through to 1.11 summarize the details for contracts assumed in the 2013 update evaluations.

Table 1.4: Long-Term Export Contracts – Common to All Development Plans NFAT 2012 Evaluations

(Referenced to Manitoba Border)					
Customer	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**
Great River Energy	GRE 150 SD	150	Seasonal Diversity	May 1995 to October 2014	Existing
	GRE 200 SD	200	Seasonal Diversity	November 2014 to April 2025	Term Sheet
Minnesota Municipal Power Agency	MMPA 30	30	System Participation	May 2000 to April 2012	Existing
Minnesota Power	MP 50	50	System Participation	May, 2009 to April 2015	Existing
Northern States Power	NSP 150 SD	150	Seasonal Diversity	May 1995 to April 2015	Existing
	NSP 200 SD	200	Seasonal Diversity	November 1996 to April 2015	Existing
	NSP 350 SD	350	Seasonal Diversity	May 2015 to April 2025	Signed
	NSP 500	500	System Participation	May 2005 to April 2015	Existing
	NSP 375	375/325	System Participation	May 2015 to April 2025	Signed
Ontario Power Generation	Lake St. Joseph Agreement	0	Energy Only	Indefinite	Existing
Southern Minnesota Municipal Power Agency	SMMPA 30	30	System Participation (April through November)	April 2008 to March 2013	Existing
Wisconsin Public Service	WPS 100	0	Energy Only	June 2009 to May 2012	Signed

Table 1.5: Long-Term Export Contracts – Contingent Upon Development
NFAT 2012 Evaluations

(Referenced to Manitoba Border)						
Customer	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**	**Contingent Upon**
Minnesota Power	MP 250	250	System Participation	June 2020 to May 2035	Signed	Keeyask G.S. and New US Interconnection
Northern States Power	NSP 125	125	System Participation	May 2021 to April 2025	Signed	New Hydro
Wisconsin Public Service	WPS 100 Product A	100	System Participation	June 2021 to May 2025	Signed	Keeyask G.S.
	WPS 100 Product B	0	Surplus Energy	June 2025 to May 2029	Signed	Keeyask G.S.
	WPS	Up to 300 MW	System Participation and Surplus Energy	June 2014 to May 2040	Under Discussion	New Hydro and New US Interconnection

Table 1.6: Long-Term Import Contracts – Common to All Development Plans NFAT 2012 Evaluations

(Referenced to Manitoba Border)					
Supplier	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**
Northern States Power	NSP 150 SD	150	Seasonal Diversity	May 1995 to April 2015	Existing
	NSP 200 SD	200	Seasonal Diversity	November 1996 to April 2015	Existing
	NSP 350 SD	350	Seasonal Diversity	May 2015 to April 2025	Signed
	NSP 500 ESA	0	500 MW Energy Services Agreement	May 2009 to April 2019	Existing
Great River Energy	GRE 150 SD	150	Seasonal Diversity	May 1995 to October 2014	Existing
	GRE 200 SD	200	Seasonal Diversity	November 2014 to April 2025	Term Sheet

**Table 1.7: Long-Term Import Contracts – Contingent Upon Development
NFAT 2012 Evaluations**

(Referenced to Manitoba Border)						
Supplier	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**	**Contingency**
Minnesota Power	MP Energy Exchange	0	Energy Only	June 2020 to May 2035	Signed	Keeyask G.S. and New US Interconnection
Wisconsin Public Service	WPS	0	Energy Only	June 2026 to May 2036	Under Discussion	New Hydro and New US Interconnection

Table 1.8: Long-Term Export Contracts – Common to All Development Plans NFAT 2013 Update Evaluations

(Referenced to Manitoba Border)					
Customer	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**
Great River Energy	GRE 150 SD	150	Seasonal Diversity	May 1995 to October 2014	Existing
	GRE 200 SD	200	Seasonal Diversity	November 2014 to April 2030	Pending Approvals
Minnesota Power	MP 50	50	System Participation	May, 2009 to April 2015	Existing
	MP 50	50	System Participation	May 2015 to May 2020	Term Sheet
Northern States Power	NSP 150 SD	150	Seasonal Diversity	May 1995 to April 2015	Existing
	NSP 200 SD	200	Seasonal Diversity	November 1996 to April 2015	Existing
	NSP 350 SD	350	Seasonal Diversity	May 2015 to April 2025	Signed
	NSP 500	500	System Participation	May 2005 to April 2015	Existing
	NSP 375	375/325	System Participation	May 2015 to April 2025	Signed
Ontario Power Generation	Lake St. Joseph Agreement	0	Energy Only	Indefinite	Existing

Table 1.9: Long-Term Export Contracts – Contingent Upon Development
NFAT 2013 Update Evaluations

(Referenced to Manitoba Border)						
Customer	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**	**Contingent Upon**
Minnesota Power	MP 250	250	System Participation	June 2020 to May 2035	Signed	Keeyask G.S. and New US Interconnection
Northern States Power	NSP 125	125	System Participation	May 2021 to April 2025	Signed	New Hydro
Wisconsin Public Service	WPS 100 Product A	100	System Participation	June 2021 to May 2025	Signed	Keeyask G.S.
	WPS 100 Product B	0	Surplus Energy	June 2025 to May 2029	Signed	Keeyask G.S.
	WPS	Up to 300 MW	System Participation and Surplus Energy	June 2014 to May 2040	Under Discussion	New Hydro and New US Interconnection

Table 1.10: Long-Term Import Contracts – Common to All Development Plans NFAT 2013 Update Evaluations

(Referenced to Manitoba Border)					
Supplier	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**
Northern States Power	NSP 150 SD	150	Seasonal Diversity	May 1995 to April 2015	Existing
	NSP 200 SD	200	Seasonal Diversity	November 1996 to April 2015	Existing
	NSP 350 SD	350	Seasonal Diversity	May 2015 to April 2025	Signed
	NSP 500 ESA	0	500 MW Energy Services Agreement	May 2009 to April 2019	Existing
Great River Energy	GRE 150 SD	150	Seasonal Diversity	May 1995 to October 2014	Existing
	GRE 200 SD	200	Seasonal Diversity	November 2014 to April 2030	Pending Approvals

Table 1.11: Long-Term Import Contracts – Contingent Upon Development NFAT 2013 Update Evaluations

(Referenced to Manitoba Border)						
Supplier	**Contract Name**	**Capacity (MW)**	**Type**	**Term**	**Status**	**Contingency**
Minnesota Power	MP Energy Exchange	0	Energy Only	June 2020 to May 2035	Signed	Keeyask G.S. and New US Interconnection
Wisconsin Public Service	WPS	0	Energy Only	June 2026 to May 2036	Under Discussion	New Hydro and New US Interconnection

1.7. WIND INTEGRATION COSTS

In 2009 the North American Electric Reliability Corporation issued a Special Report on accommodating intermittent or variable resources such as wind generation[1]. Intermittent resources differ from conventional and fossil-fired resources in a fundamental way: the fuel source (wind) cannot presently be controlled or stored. Unlike coal or natural gas, which can be extracted, transported and stored for use when needed, or water which can be stored behind a dam, intermittent fuels must be used when and where they are available.

As noted by NERC in the 2009 Special Report:

> "Fuel availability for variable resources often does not positively correlate with electricity demand, either in terms of time of use/availability or geographic location. …. Additionally, peak availability of wind power, the most abundant variable resource in terms of megawatt value today, can often occur during periods of relatively low customer demand for electricity.
>
> Further, the output of variable resources is characterized by steep "ramps" as opposed to the controlled, gradual "ramp" up or down generally experienced with electricity demand and the output of traditional generation. Managing these ramps can be challenging for system operators, particularly if "down" ramps occur as demand increases and vice versa. Insufficient ramping and dispatchable capability on the remainder of the bulk power system can exacerbate these challenges."

Accommodating the intermittency or variability of the wind resources creates some small but discernible costs, called wind integration costs, on the host power system. The study of wind integration into a power system and the resulting wind integration costs requires detailed system specific technical studies. As also noted by NERC in the 2009 Special Report:

[1] NERC Special Report: Accommodating High Levels of Variable Generation, North American Reliability Corporation, April 2009, available at www.nerc.com

> "Integration studies need to be conducted to assess the appropriate level of system ramping capabilities (intra-hour and load following), reserves, minimum demand levels, rapid start capability, scheduling intervals, additional transmission and system inertial response. The individual characteristics of each system (i.e. generation resource mix, ramping capability, amount of dispatchable resources, etc.) will affect these impacts. High-quality, high-resolution (typically sub-hourly) variable generation and load data is required to ensure the validity of the study results."

Manitoba Hydro contracted with external industry experts for two key studies as part of its work to better understand the implications of wind integration on its power system. The first study, by EPRI Solutions, looked at the sub hourly operational impacts of wind on Manitoba Hydro's system[2]. Outputs of this study included:

- Hourly wind generation time series for use in hourly resolution simulations to be used in further operations simulations.
- Sensitivity analysis of impacts of varying wind speed time series and generation synthesis algorithms on wind plant energy production and real power fluctuations.
- Processing of NREL 1-second wind plant real power output data as a proxy for conducting the high-frequency regulation impact analysis.
- Synthesis of Manitoba Hydro 1-minute resolution wind generation and system load time series data for the total regulating reserve impact analysis.
- Assessment of the impact of various wind generation capacity scenarios on the high-frequency regulating reserve requirements.
- Assessment of the impact of various wind generation capacity scenarios on the total regulating reserve requirement.
- Analysis of the impact on 10-minute changes in system net load.
- Assessment of the potential Transmission Reliability Margin impact to accommodate the fluctuations in net system load that might result in additional tie-line flows.

[2] EPRI Solutions, Manitoba Hydro Wind Integration Sub-Hourly Operational Impacts Assessment, March 1, 2005.

The second study, by Synexus Global, looked at the incremental cost of providing reserves and reshaping operations associated with the integration of a wind resource into the Manitoba Hydro generation mix[3]. The addition of 500 MW or 1000 MW of wind resources was analyzed over a one year period, for three flow cases ranging from, low (1989-90) to median (1993-94) and high (1996-97). The operations simulation includes an external electricity market model utilizing Manitoba Hydro's long-term export price forecast. The cost of wind integration was determined by comparing two operations simulations:

- An "equivalent energy base", (EEB) run, which involved operating the system using the average monthly on- and off- peak wind energy. This run essentially contained the same monthly average energy supply as the wind case (but without the variability and uncertainty) and formed the base case upon which the incremental operations and revenue impacts of wind variability/uncertainty and its reserve requirement could be evaluated.
- A wind run, which included updating the average energy (the equivalent energy case) with actual hourly wind records for each 24-hr period and re-optimization to determine the generation schedule for the week in response to changes in wind supply. Reserve for the wind case was increased accordingly to account for wind variability and uncertainty, based on the output of the EPRI Solutions work.

[3] Synexus Global, A Study to Evaluate the Short-Term Operational Impacts of Wind Integration into the Manitoba Hydro System, December 2005.

The incremental costs for the 500 MW wind capacity in relation to the EEB case are summarized in Table 5.3 and Table 5.4 of the Synexus Global report for the base case as well as the sensitivity to reserve case.

Synexus Global Table 5.3 500 MW - Incremental Costs, Millions of U.S. Dollars

Hydrology	Wind	Sensitivity[1]
Low	4.8	3.1
Median	5.6	3.6
High	6.7	1.8

1- Due only to variability as there is no additional reserves defined.

Synexus Global Table 5.4 1000 MW - Incremental Costs, Millions of U.S. Dollars

Hydrology	Wind	Sensitivity[1]
Low	9.1	4.5
Median	11.3	6.9
High	19.7	4.8

1- Due only to variability as there is no additional reserves defined.

The above wind integration costs were flow weighted and then the total divided by the average annual wind generation to produce the unit wind integration costs as follows:

- 500 MW of wind generation: $4.22/ MWh (2005 dollars)
- 1000 MW of wind generation: $4.99/ MWh (2005 dollars)

The unit wind integration costs are expressed on a marginal basis for each 100 MW increment of wind, and scaled to the current long-term export price forecast using the ratio of the current long-term price forecast divided by the 2005 price forecast.

1.8. DESCRIPTION OF MARGINAL COSTS

Introduction

Manitoba Hydro interprets marginal value to mean the cost or value to the system of deferring an increment of load growth. Since the supply of power to residential load requires generation supply, bulk transmission capability and distribution capability, a marginal value is determined for each of these three components. The marginal cost for generation consists of both an energy and capacity component while the transmission and distribution marginal costs have only a capacity component.

Transmission and Distribution Component of Marginal Costs

From the bulk transmission and distribution perspective, a customer that increases load requirement will incur a cost to the Manitoba Hydro system because even the smallest incremental increase in load, when considered in combination with other incremental increases, will eventually result in a requirement to upgrade transmission and distribution facilities. Manitoba Hydro uses the "one year deferral" methodology to determine the cost that an additional increment of load can be expected to incur from the transmission and distribution perspective It is noted that T&D marginal cost is derived primarily from the cost of infrastructure since there is virtually no incremental operation and maintenance cost associated with an increment of load.

Generation Component of Marginal Cost

The generation component of marginal cost differs from the T&D component in that it is influenced significantly by both the cost of operating the system and the cost of the infrastructure supplying the generation. The variable cost of system operation is called production cost and this includes the fuel cost of operating thermal resources, water rental costs of hydroelectric resources and the cost of purchased energy. For purposes of analyzing

marginal cost, the revenue associated with opportunity export sales is combined with production costs to obtain net production cost.

A new load from a domestic customer may incur two types of costs from the generation perspective that result in two components of marginal cost: a net production cost and a cost of infrastructure for generation resources.

1. The first component is the net production cost that results from altering the operation of a fixed system of resources under a defined load requirement. An increase in domestic load may result in an increase in the fuel cost for thermal generation, an increase in costs of purchased energy from imports and may result in a decrease in revenue from export sales. The production cost component is an ongoing cost on an hour by hour basis that is incurred over all the years that have an incremental increase in domestic load.
2. The second component of generation marginal cost is associated with the requirement to maintain firm resources to meet firm load requirements. A load increase may require that Manitoba Hydro advance the in-service date of new generation in order to meet firm commitments. Because Manitoba Hydro normally acquires generation in large blocks due to economies of scale, the need to advance generation resources may not occur for many years into the future. However, each small increment of load growth has the potential to incur a cost in that it contributes to the eventual requirement to advance the in-service date of new generation. This component of marginal cost is analogous to the deferral component associated with T&D marginal cost.

Prior to the year 2000, Manitoba Hydro utilized the “deferral” method for determining the cost avoided by an increment of new load in addition to consideration of production cost. However, it was necessary to change the methodology for determining marginal cost by not including a deferral component after about the year 2000 since the significant increase in the value of export power resulted in an economic opportunity to advance the in-service date of future generation plant. This change in methodology continues to be appropriate today since the

forecast of export prices currently is sufficiently high to make the advancement of hydroelectric development economic.

Current Marginal Cost Methodology

Currently, generation marginal value for the Manitoba Hydro system is determined by assuming that the load can be reduced by a small increment over the period of the planning horizon. Since the preferred development plan consists of hydroelectric resources installed in conjunction with new export contracts, a reduced load has the impact of increasing the quantity of firm energy and capacity that can be marketed as an incremental long-term export sale which generates additional incremental revenue for Manitoba Hydro. However, this incremental sale has some associated costs since it utilizes interconnection capability and thus affects other potential opportunity sales. This sale also affects the operation of the system and the quantity of import and thermal resources that may be required over the range of possible water flow conditions. These system operating impacts are called production costs and are determined by undertaking a simulation of system operation for 35 years into the future using Manitoba Hydro's long term generation system simulation called SPLASH.

Manitoba Hydro's SPLASH model utilizes an optimization technique to maximize net flow related revenue to the system by simulating the operation of reservoirs and hydroelectric generation plants utilizing a monthly time step. The expected price signals from the export market are provided to the model for on-peak and off-peak time periods for each month of the year. The capability of the interconnections to each market region is provided in order to limit the rate at which export energy can be transmitted. The SPLASH model determines the net production cost on a monthly basis for a series of years into the future. The net production cost is derived from the variable cost characteristics of the various generation sources and revenue is derived from export sales. A simulation of system operation is undertaken for each of the 99 flow conditions between the years 1912 and 2010 which are assumed to be representative of the range of flow conditions that may occur in the future.

In order to determine the marginal value of an increment of power, the production costs of two simulation runs of the SPLASH model must be compared. The first simulation run is a base case that corresponds to a specific development plan with new resources added over time as energy and capacity requirements increase as determined by net Manitoba load. In this model run firm (dependable) export sales are treated the same as domestic requirements in that they are both firm obligations that must be met. The output of a simulation consists of energy volumes, revenues and costs that vary with flow conditions such as thermal fuel costs, water rental costs and import energy costs. In order to determine marginal value, a second simulation is undertaken in which the load is reduced from the base case by a constant increment in each month for a total of 500 GWh over the year as an example.

It is assumed that the energy and capacity savings from this load reduction can be sold as a long-term firm sale on the export market. The characteristics of this sale are input into the second simulation run and the in-service dates of all resources remain identical to those of the base run. The output consists of production costs for each month over all the same flow conditions for the same components as the base run. The net difference in production costs between the two simulations for each year of the study period is divided by the energy associated with the incremental load change to derive the marginal generation value in dollars per megawatt hour. Transmission and distribution losses are also calculated and added to the generation component to account for the full quantity of generation that is required to serve the end use load.

For use within Manitoba Hydro, marginal costs are developed for two seasons (summer and winter) as well as a single annual marginal cost for each year over the 35-year planning horizon. In addition, these marginal costs contain an energy and a capacity component. Therefore, the marginal costs developed by Manitoba Hydro can be utilized for applications that have different impacts in summer and winter and that have different combinations of energy and capacity.

1.9. CASH TRANSFERS TO THE PROVINCE

The economic evaluations of development plans include capital taxes and water rentals as costs which are paid to the Province of Manitoba. As described in Section 1.4 of this appendix, included in the calculation of Manitoba Hydro's discount rate used for economic evaluations is the 1% provincial guarantee fee. Financial evaluations include capital taxes, water rentals and the provincial guarantee fee as costs which are paid to the Province of Manitoba.

While these transfers are considered as costs from the perspective of Manitoba Hydro, they benefit the provincial government and indirectly Manitobans.

Capital tax assumptions are described in Section 3.1.6 and water rental fee assumptions are described in Section 3.2.2 of this appendix.

Financial evaluations included the provincial guarantee fee as a 1% fee applied to the year-end corporate debt balance of the prior fiscal year. The fee is included in the financial analysis as a component of finance expense. An estimate of the provincial guarantee fee based on the incremental capital costs of each development plan has been calculated as part of the economic evaluation in order to illustrate the total provincial transfer associated with each development plan. The provincial guarantee fee is estimated based on the assumption that 80% of the total incremental investment for each plan will be financed through new long-term debt.

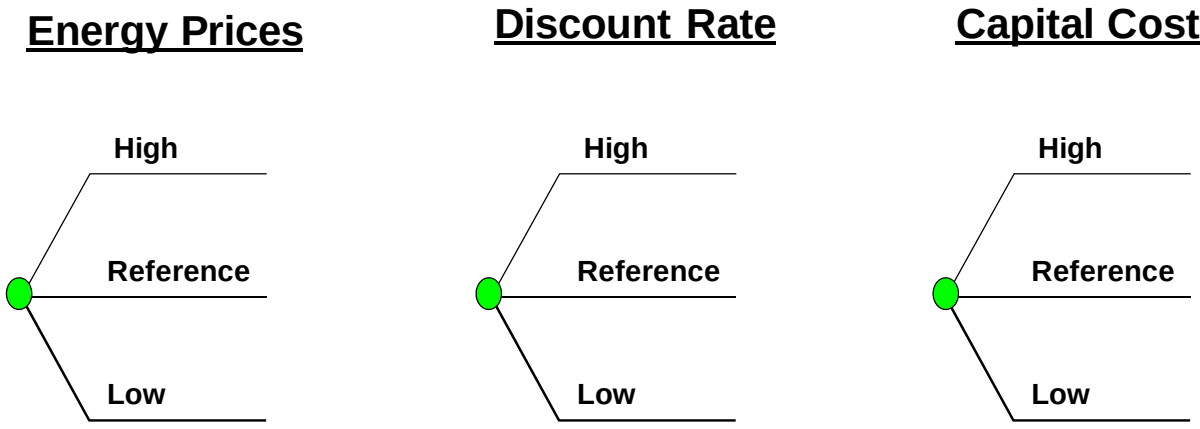
2. Probabilistic Analysis with Scenarios

The economic evaluations associated with ***Chapter 10 Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities*** are based on 2012/13 planning assumptions with the exception of adjustments, primarily downwards, to the electricity export price forecast as described in Section 1.6.4 of this appendix.

The reference scenario economic analysis considered inputs and assumptions that are associated with the "most likely" outcomes for the factors affecting Manitoba Hydro's future. The probabilistic economic analysis used reference, high and low values for the high impact factors that are grouped into three sets: Energy Prices, Economic Indicators and Capital Costs. For the economic probabilistic analysis the relevant Economic Indicator is the real weighted average cost of capital (discount rate).

Chapter 10 describes how the high impact factors were selected and what they include. The probabilistic economic analysis considered values and likelihoods for combinations of key factors. Figure 2.1 shows how, when combined, the three sets of highest impact factors with the high, reference and low assumptions result in 27 discrete scenarios (3X3X3).

Figure 2.1: Combination of Highest Impact Factors Resulting in 27 Scenarios



2.1. High, Reference and Low Assumptions for Highest Impact Factors

2.1.1. Energy Prices

Energy Price factors consist of natural gas, electricity and carbon prices. Electricity export prices are a key factor in evaluating Manitoba Hydro's development plans. The effect of natural gas prices on electricity export prices is embedded in Energy Prices as is the effect of carbon in the electricity markets. Carbon prices are reflected in Energy Prices from two perspectives. One is the impact of carbon policy on electricity export prices in the MISO market and the other is the impact of a potential carbon adder on Manitoba based fossil fuel-fired generation. As Manitoba Hydro recognizes electricity export, natural gas, and carbon prices are not perfectly correlated, an adjustment was made to the probabilities to accommodate the possibility of uncorrelated or negatively correlated results. This adjustment is outlined in Section 2.3.1 of this appendix. Section 1.5 of this appendix describes the methodology associated with the forecasts of high, reference and low electricity export, natural gas and carbon prices.

2.1.2. Discount Rate

The discount rate is representative of the cost of capital and is used to convert capital and revenue cash flows to a net present value. For a discussion on NPV, see Section 1.4 of this appendix. The reference case discount rate used in the 2012 NFAT evaluations is the fall 2012 Weighted Average Cost of Capital (WACC), which was derived using Manitoba Hydro's projected cost of debt plus an equity adder. The cost of debt was based on a consensus forecast methodology. Based on historical data, current Bank of Canada policy, and expert judgment, high and low discount rate cases were developed around the reference case using long-term expectations of interest and inflation that are higher and lower than expected under the consensus approach. Table 2.2 below summarizes the low, reference and high range of real discount rate used in the probabilistic evaluations.

Table 2.2: Range of Real Discount Rates used in Economic Probabilistic Analysis

Factor	Low	Reference	High
Discount Rate	3.35%	5.05%	6.50%

2.1.3. Capital Costs

Capital Cost factors include generation costs for all resource types, transmission costs and applicable real escalation.

Three sets of capital costs are produced based on internal analysis, or contingencies recommended by consultants on the basis of capital type. As discussed further in Section 2.3.3, it is assumed different types of capital costs are correlated. Therefore, in a 'high capital cost' world, natural gas-fired generation, wind generation, hydro-electric generation, and transmission capital costs are all at their high values, and in a 'low capital cost' world, they are all set to their low values.

The low and high base cost estimates for Keeyask G.S. and Conawapa G.S. differ from the reference case based on the amount included to address uncertainty (i.e. contingency and management reserve). As such, the point estimate is the same in each of the scenarios. The low estimate is based on a contingency amount at a P10 confidence level. This means there should be less than a 10% chance actual costs are less than the low amount. The high estimate is based on the inclusion of both the P50 contingency amount plus the labour reserve. The labour reserve represents the potential additional costs associated with labour productivity risk and associated cumulative impacts. The labour reserve was derived by applying outcomes of the Wuskwatim process reviews to the labour components of the Keeyask and Conawapa estimates. Based on the analysis, it is anticipated that this high amount has a low probability of being exceeded (less than 10%). The selection of low and high amounts is intended to provide a large range of potential costs in the analyses (versus selecting low and high amounts closer to the mean).

A contingency is applied to the point estimates for new wind and natural gas-fired generating stations and their associated transmission to account for uncertainty and potential risks that could be encountered during project implementation. Cost distributions for systemic risks were calculated by a 3rd party risk and contingency consultant so that, when applied to the point estimate, they would represent cost estimates at varying confidence levels. For the purposes of determining low and high cost estimates for these projects, P10 and P90 level project estimates were selected from these cost distributions. The contingency is consistent with and developed using AACE Recommended Practices.

Major new transmission projects, including new U.S. interconnections and north/south transmission associated with the development of both Keeyask and Conawapa, were developed with a cost estimate range of -10% and +50% of the P50 project costs. This range was applied to determine low and high project costs, respectively.

Capital costs estimates are classed by development stage, as defined by the Cost Estimate Classification Table outlined in AACE Recommended Practice 18r-97 as shown below in Table 2.3.

Table 2.3: AACE Cost Estimate Classification Table

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

The Keeyask G.S. capital cost estimate can be considered to be between a Class 3 and Class 2 estimate. The estimate is considered to be between these two classes because, despite a number of tender prices already having been received, tender price for the General Civil contract is still required. Regarding Conawapa G.S., the capital cost estimate can be considered to be a Class 3 estimate.

Other capital cost estimates (Gas, Wind and Transmission), on the other hand, are at very early stages of development. Generally, these capital cost estimates could be considered to be between Class 5 or Class 4 estimates. To ensure consistency between the hydro, wind and thermal highs and lows relative to their reference capital cost estimate, Manitoba Hydro contracted with the same consultant to define the class estimates for different resource types.

A range of low, reference and high real escalation associated with hydro-electric generation resource options and natural gas-fired generation options is also applied to the base low, reference and high capital costs for generation. The range of real escalation is summarized below in Table 2.4.

Table 2.4: Range of Real Escalation Applied to Hydro-Electric and Natural Gas-Fired Generation Options

Generation Type	Low	Reference	High
Hydro-Electric Generation	0.3%/yr	0.6%/yr	0.8%/yr
Natural Gas-Fired Generation	0.1%/yr	0.5%/yr	0.7%/yr

In Table 2.5, the low and high capital cost estimates used in the probabilistic evaluations have been expressed as a percentage difference from the reference estimates. As real escalation is assumed throughout the planning horizon for natural gas-fired and hydro-electric resources, the year of installation matters. That is, plants built further in the future are assumed to cost more in $2014 than those built sooner.

Table 2.5: Percentage Difference of Low and High Capital Costs Relative to Reference Capital Costs

Resource	Low	Reference	High
Keeyask (2019)	-8.6%	-	+13.2%
Conawapa (2026)	-9.8%	-	+11.8%
SCGT (2022)	-30.2%	-	+38.1%
CCGT (2022)	-31.7%	-	+40.1%
Wind (2022)	-26.3%	-	+33.8%

2.2. Red-Green Quilts and Scatter Plots

Section 2.2 refers to Figures 2.7.1 through to 2.7.4 which are located in Section 2.7 of this appendix.

A Quilt table is a way to visualize the relative values of a large set of development plans across a large set of scenarios. Using such a table, one can quickly see which development plans have relatively good outcomes in particular scenarios or across a range of scenarios. Figure 2.7.1 shows a Quilt table of the 15 development plans. Each column represents one of 15 development plan alternatives while each row represents one of 27 scenarios. The number in each cell represents the incremental net present value of that development plan in that scenario relative to the All Gas Ref-Ref-Ref case. The All Gas Ref-Ref-Ref case, indicated by the "0" NPV, is used as a single point base for comparing all of the cases. Each cell is color-coded with increasing red for low NPVs and increasing green for high NPVs. For example, the development plan K19/C31/250MW is a dark red in the low energy price, low discount rate, and high capital cost scenario with a NPV of -$3,506. The same development plan is dark green in the high energy price, high discount rate, and low capital cost scenario with a NPV of $3,867. While most development plans have ranges of dark red to dark green, some are much redder (bad) or greener (good) than others. If a plan has a great deal of both dark red and dark green its outcome is more uncertain, while more uniform colouring indicates less uncertainty.

Figure 2.7.2 provides a Quilt table where the All Gas development plan is used as a fixed base for comparing each development plan in the context of each of the 27 scenarios and is indicated by the "0" NPV for each scenario under the All Gas development plan. In this type of analysis, NPVs for a development plan provide a measure of the relative performance between that development plan and the All Gas development plan within each of the 27 scenarios. When considering the incremental net present values in the Quilt from this perspective (the All Gas development plan is used as a fixed base), the colours must be interpreted slightly differently. For example, a plan that is entirely green may still have significant upside potential and downside risks. However, it will always be better than All Gas, regardless of the scenario.

Figure 2.7.3 provides a Quilt table that includes cash transfers to the Province which are calculated for each development plan as additional economic benefits. The cash transfers are water rentals, capital taxes and the provincial guarantee fee. Capital taxes and the provincial guarantee fee are assumed to be fixed rates on capital expenditures and therefore vary directly with capital costs. The water rentals are assumed to be constant with respect to the 27 scenarios.

Figure 2.7.4 shows a Scatter Plot of the 15 development plans which are displayed on the X-axis. Net present values are displayed on the Y-axis. For each development plan, the NPV in each of the 27 scenarios is represented with a symbol. The Scatter Plot provides the same incremental NPVs as provided in the Quilt in Figure 2.7.1 but graphically displays the range of incremental NPVs by development plan. It demonstrates that the rank of a particular scenario will not be the same in all development plans.

2.3. Derivation of Probability Weightings

As each of the combinations of the highest impact factors (Energy Prices, Discount Rate, Capital Costs) do not have the same likelihood of occurring, probabilities were developed for each of the sets of the key factors. This section describes how the probabilistic inputs were developed in each of these areas. While the details vary among areas, this process typically involves three steps:

1) Relationships among Variables - develop a formal understanding or model of the relationships among the individual variables in each area, typically in the form of an influence diagram.[4]
2) Probabilistic Assessment - obtain the best possible probabilistic assessment of the variables in the influence diagram. Generally, the philosophy underlying this assessment can be termed "Bayesian."[5] In this view, probabilities represent a "state of information" rather than a "state of nature." This state of information draws upon the best possible historical data, expert judgment or both.
3) Input Development - develop the specific probabilistic model inputs – probabilities and values – that best match the probabilistic assessment from Step 2 given constraints on the type of inputs used in the economic and financial models. In general, matching is based on the moments of the probabilistic assessment and model inputs.

The variables in this evaluation include both what are referred to as "market" and "private" risks. Market risks are those that can be easily hedged or priced in public financial markets. Good examples are oil prices and interest rates. Private risks are those that cannot be easily

[4] For more on influence diagrams, see R.A. Howard and J.E. Matheson, *Influence Diagrams,* Decision Analysis, Vol. 2, No. 3, September 2005, pp. 127-143.
[5] For a recently-published introductory discussion of Bayesian analysis, see James V. Stone, Bayes' Rule: A Tutorial Introduction to Bayesian Analysis, June 2013.

hedged or priced in public financial markets. Good examples are technology changes and environmental regulations[6].

It is generally accepted in economics, finance and management that it is appropriate to assign probabilities to private risks in order to understand and evaluate investments. For market risks, the situation is more complex. Under specific conditions - if the evaluation is based solely on diversified investor wealth maximization and the financial markets are complete – finance theory indicates that it is not appropriate to assign probabilities to these market risks. The reason is that the risks are already priced in the public financial market and can be valued at that price.[7] However, since Manitoba Hydro takes a much broader view in its resource development evaluation and must consider numerous stakeholder perspectives, public financial markets do not fully cover all the relevant risks over the entire investment time frame. Consequently, probabilities were assigned to all variables – "market" and "private."[8]

The time-frame of this evaluation extends over years, even decades. In general, the probabilistic inputs in this evaluation represent scenarios of values over this time-frame (vectors), not instantaneous or even annual values (scalars). Consequently, when terms such as "high and "low" are used, they refer to long-term sustained values over years not values in individual years.

[6] For more on market and private risks, see James E. Smith and Robert F. Nau, *Valuing Risky Projects: Option Pricing Theory and Decision Analysis*, Management Science, Vol. 41, No. 5, May, 1995, pp. 795-816.
[7] For more detail on this point of view, see Sheridan Titman and John D. Martin, The Art and Science of Corporate Investment Decisions, 2011, Chapter 11.
[8] For more detail on this point of view, see Kenneth J. Arrow et. al., *How Should Benefits and Costs be Discounted in an Intergenerational Context,* Resources for the Future, December 2012.

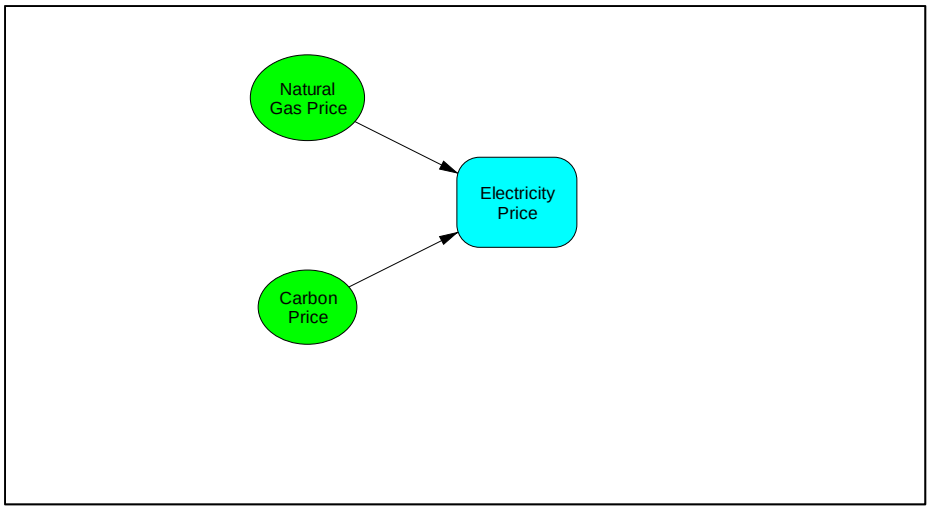
2.3.1. Energy Prices

Relationships Among Variables

There are three variables included in the category Energy Prices: Natural gas price, Carbon price and Electricity price.

The model used to describe the relationship among these three factors is illustrated in Figure 2.2. Natural gas price and carbon price are assumed to be independently uncertain. This assumption is a reasonable approximation since these two elements are driven largely by different factors – natural gas price primarily by economics and carbon price primarily by politics. Experts typically view them as only weakly linked. Electricity price is assumed to be deterministically dependent on the natural gas and carbon price. This assumption is a reasonable approximation since this linkage is supported both by logic and empirical data, as generation from natural gas is typically "on the margin." Experts generally view them as tightly linked.[9]

Figure 2.2: Energy Prices - Underlying Model

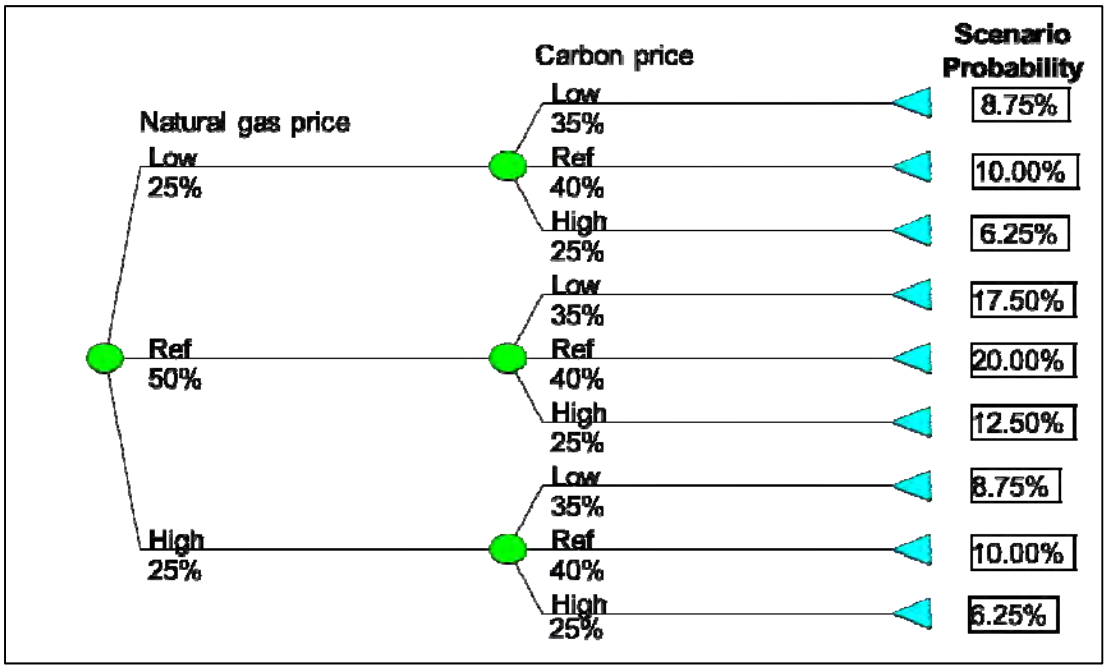


[9] See, for example, Rachel Wilson et. al., *2012 Carbon Dioxide Price Forecast*, Synapse Energy Economics, October 4, 2012.

Probability Assessment

Based on the model above, high, reference and low forecasts (with both values and probabilities) are developed separately using data, models and expert judgment for both natural gas prices and carbon prices. Electricity prices are calculated deterministically from the gas and carbon values in each scenario. These are combined into a nine-branch distribution as shown in Figure 2.3.

Figure 2.3: Natural Gas and Carbon Price Probability Assessment



Input Development

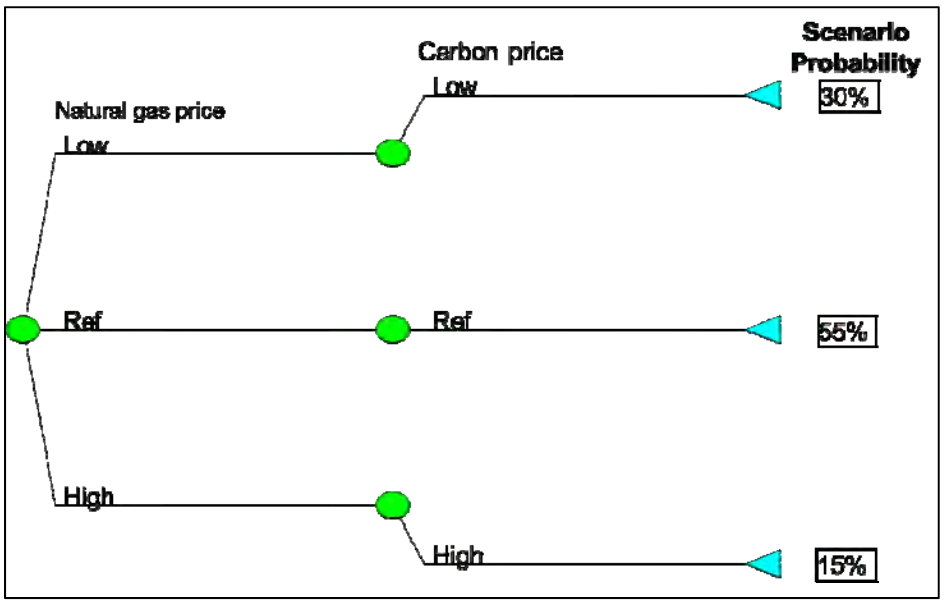
Once the nine-branch distribution above has been developed, the final task is to benchmark Manitoba Hydro's pre-existing gas, carbon and electricity price scenarios to this distribution. This matching is based on electricity prices. Section 1.6 of this appendix describes how Manitoba Hydro develops forecasts for electricity prices, natural gas prices and carbon prices.

Using the probability assessments in Figure 2.3, the mean and variance of the levelized electricity price are 22.3 and 45.6 respectively. The result of the benchmarking using Manitoba Hydro's scenarios is shown in Figure 2.4. Based on the mean and variance of electricity price, probabilities were assigned to three scenarios:

- Low gas, carbon, electricity
- Reference gas, carbon and electricity
- High gas, carbon and electricity

The distribution matches well with a mean and variance of 22.1 and 47.7 respectively.

Figure 2.4: Manitoba Hydro Natural Gas Price and Carbon Price (and Electricity Price) Probabilistic Inputs



2.3.2. Economic Indicators (Discount Rate)

Relationships Among Variables

There are 10 variables included in the category Economic Indicators:

- MH Real WACC
- US-CDN Exchange Rate
- MH CDN Nominal Short-term T-Bill rate
- MH CDN Nominal Short-term BA rate
- MH US Nominal Short-term interest rate
- MH CDN Nominal Long-term interest rate
- MH US Nominal Long-term interest rate
- US GDP Implicit Price Deflator
- CDN CPI
- MB CPI

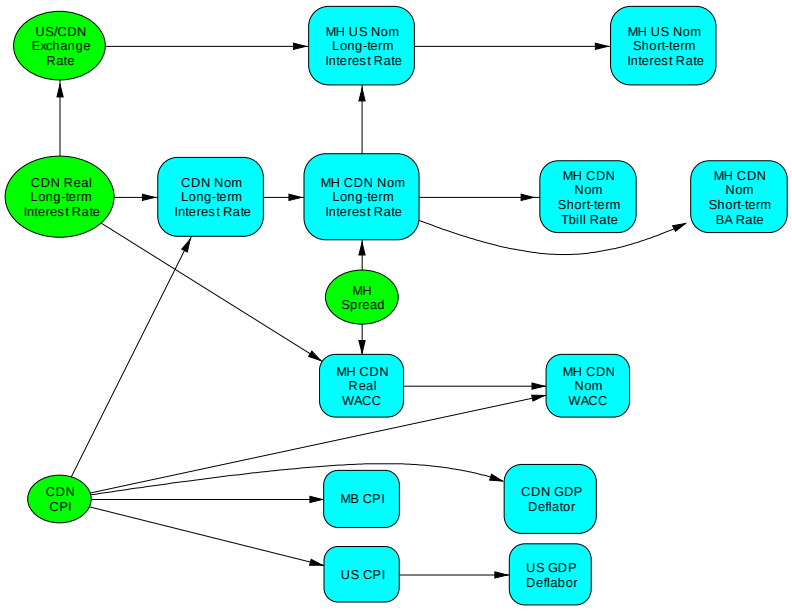
To properly assign probabilities to the Manitoba Hydro financial scenarios, it is necessary to evaluate the relationships between these and related variables. A model of these relationships among these is illustrated in Figure 2.5. This model is supported by a mix of data, logic and expert opinion. The key simplification in this model is that the different interest rate variables form an inter-correlated block while the different inflation/GDP variables form a separate inter-correlated block. The historic correlations within these two blocks are high enough that it is reasonable to assume that the values are deterministically linked.

While nominal interest rates and inflation rates are clearly linked by the definition of nominal interest rates, there is no evidence that real interest rates and inflation rates are correlated to the point that these blocks of parameters can be folded into a single value. Other variables in the analysis such as the US/CDN Exchange Rate and the MH Bond Spread (the difference

between MH's cost of borrowing and the risk free Government of Canada Rate) are considered separate from these blocks as there is no evidence that they are strongly correlated with either of the two partitions.

The rest of this section documents the evidence that a reasonable model of the economic indicator variables consists of four key drivers with the rest of the parameters assumed to be deterministically linked to one or more of these drivers. The underlying are the real Canadian long-term interest rate, Canadian inflation, the US/Canadian exchange rate, and the premium that Manitoba Hydro must pay to access the financial markets.

Figure 2.5: Underlying Economic Indicator Relationships



The first contention of this model is that it is reasonable to assume deterministic linkages between the interest rate parameters. Figure 2.6 shows average annual Canadian and US

nominal interest rates since 1983. The two parameters are highly correlated with a correlation coefficient of 0.98. Furthermore, since the Canadian and the US economies are so tightly linked, it is reasonable to assume that this strong correlation will continue into the future.

Figure 2.6: Canadian and US Long-Term Nominal Interest Rates[10][11]

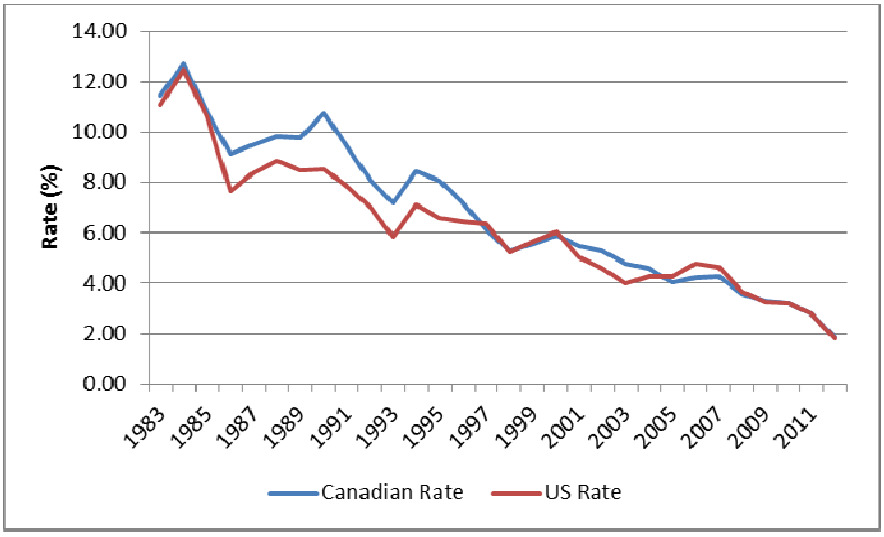


Table 2.6 shows the cross correlations of all the interest rate parameters used by Manitoba Hydro in their economic indicator analysis. All of the correlations are positive with the highest correlations as expected between similar types of interest rates. The lowest correlation is 0.49 but since the rest of the parameters are even more highly correlated, it is a reasonable simplification to assume a single interest rate value for the partition of interest rate parameters.

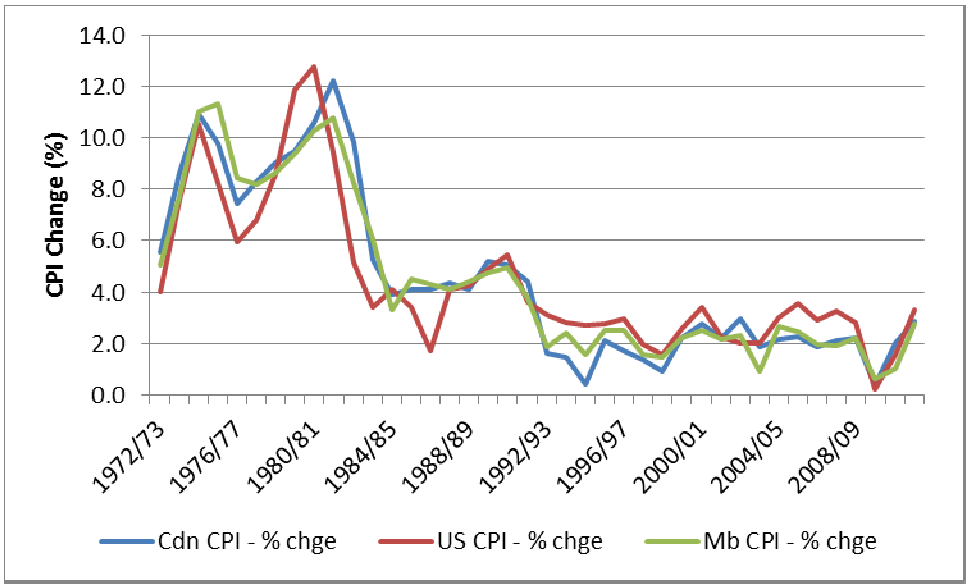
[10] Canadian Interest Rates from Bank of Canada, http://www.bankofcanada.ca/rates/interest-rates/selected-historical-interest-rates/
[11] US Interest Rates from Federal Reserve, http://research.stlouisfed.org/fred2/series/DGS10?cid=115

Table 2.6: Cross Correlations of Interest Rate Parameters[12]

	MH Cdn long-term nominal interest rate	*MH US long-term nominal interest rate*	*MH Cdn Short-Term nominal 3 mth T-Bill interest rate*	*MH Cdn Short-Term nominal 3 mth BA interest rate*	*MH US Short-Term nominal 6 mth LIBOR interest rate*
MH Cdn long-term nominal interest rate					
MH US long-term nominal interest rate	0.83				
MH Cdn Short-Term nominal 3 mth T-Bill interest rate	0.81	0.79			
MH Cdn Short-Term nominal 3 mth BA interest rate	0.76	0.70	0.98		
MH US Short-Term nominal 6 mth LIBOR interest rate	0.49	0.62	0.81	0.84	

The second contention of this model is that it is reasonable to assume deterministic linkages between the inflation parameters of the economic indicators. Figure 2.7 shows the evolution of Canadian, US, and Manitoba inflation since 1972. As expected for such tightly linked economies, the values move together with a correlation coefficient of 0.9 for Canada/US and 0.98 for Canada/Manitoba. This demonstrates that it is reasonable to assume a single inflation value per scenario for the partition of inflation parameters.

Figure 2.7: Canadian, US, and Manitoba Inflation[13]

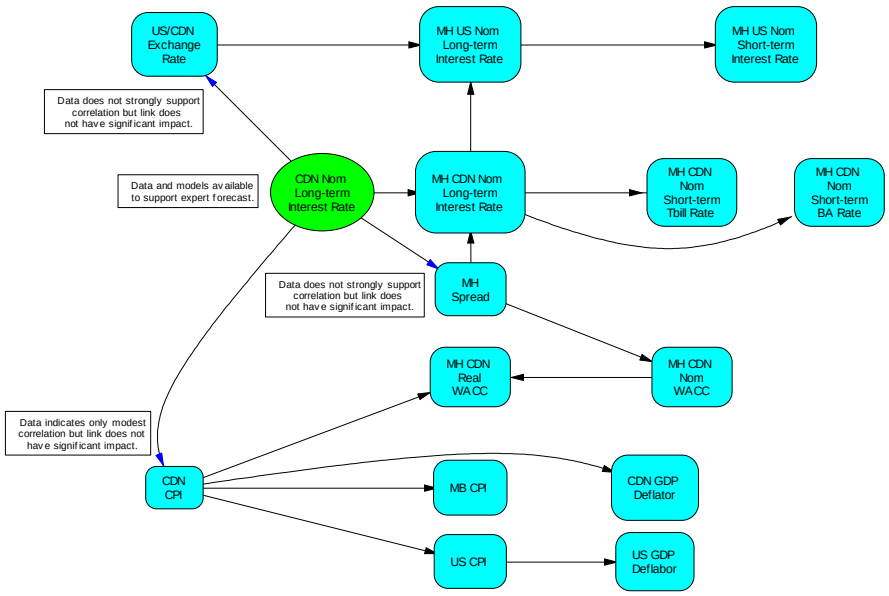


[12] Data from Manitoba Hydro historic data provided for the project
[13] Data from Manitoba Hydro historic data provided for the project

Probability Assessment

The approximation of this model used for probability assessment is shown in Figure 2.8. This model matches more closely the readily-available data and judgment, particularly the availability of historical data and probabilistic forecasts. The sole underlying driver in this model is Canadian nominal long-term interest rates. A probability assessment of this driver was developed using a mixture of historical data on interest rates, expert opinion on the relationship between historical and future rates, and expert opinion on future inflation values. The other variables are linked deterministically to this driver.

Figure 2.8: Modeled Economic Indicator Relationships



In the case of the link between the US/CDN Exchange Rate and the CDN Nominal Long-Term Rate and the link between the MH Spread and the CDN Nominal Long-Term Rate, the data does not support strong correlation but there is little to no expert opinion on what the relationships should be. In both of these cases, a deterministic link versus a probabilistic link will not have a significant impact on the results of the overall analysis, meaning that it is reasonable to choose to assume a deterministic link.

There are reasonable expert probabilistic forecasts of both Canadian Long-Term Real Interest Rate and of US Inflation. Under the assumption that Canadian and US inflation are deterministically linked, the Canadian Long-Term Real Interest Rate and the inflation assumptions can be combined to create a probabilistic forecast of Long-Term Nominal Canadian Interest Rates. Under the simplified model shown in Figure 2.13, this probabilistic forecast can then be used to benchmark Manitoba Hydro's financial scenarios. The rest of this section explains how the probabilistic forecast of Long-Term Nominal Canadian Interest Rates was developed.

The Canadian Institute of Actuaries (CIA) provides an in-depth and authoritative method for developing probabilistic long-term interest rate forecasts, and an actual forecast of those rates[14]. This method is designed to be consistent with economic and financial principles, and to match key characteristics of historical interest rates such as reversion to a long-term mean and persistence of periods of high or low rates. The CIA model is "mechanism free"; that is, the forecast is benchmarked to history.

Despite the strengths of the CIA forecast, it was not used directly. Instead, the underlying concepts and understanding of the CIA work were applied to analyze historical interest rates. There are two major reasons for this indirect approach.

- The CIA provides only a limited number of spot or annual forecasts, and it is difficult to use these forecasts to forecast long-term sustained rates.
- The CIA forecasts are based on a historical view of inflation, although there is evidence that central banks now exercise more control over inflation than they have historically. It is difficult to isolate the impact of inflation in the CIA

[14] *Calibration of Stochastic Interest Rate Models*, Canadian Institute of Actuaries, 2009.

forecast, and determine the impact of changing underlying assumptions regarding inflation.

The approach used to develop a probability assessment is as follows:

1) Real Interest Rate: Use annual values of nominal interest rates and inflation to develop a forecast of 20-year levelized real interest rates
2) Inflation Rate: Develop a forecast of 20-year levelized inflation rates.
3) Convolution: Evaluate the correlation between 20-year levelized real interest rates and 20-year levelized inflation rates, and convolve the two distributions to develop a forecast of 20-year levelized nominal interest rates.

Each step is described in more detail below.

1) Real Interest Rate

The probabilistic forecast of real interest rates is based on historically observed values consistent with the CIA's methodology. Annual Canadian long-term nominal interest rates and inflation from 1940 are obtained from the Bank of Canada website. This is the same time period as is used in the CIA analysis. Annual real interest rates are calculated from nominal interest rates and inflation rates using the following formula.

$$r = \frac{1+i}{1+I} - 1$$

Then 20-year levelized values are calculated for real interest rates using the following formula for 20 year overlapping blocks.

$$\bar{r} = \exp\left(\frac{\sum_{n=1}^{20} \ln(r)}{20}\right) - 1$$

The result is a probability distribution of 20-year levelized real interest rates. Table 2.7 shows the percentiles of this distribution used in the rest of the analysis.

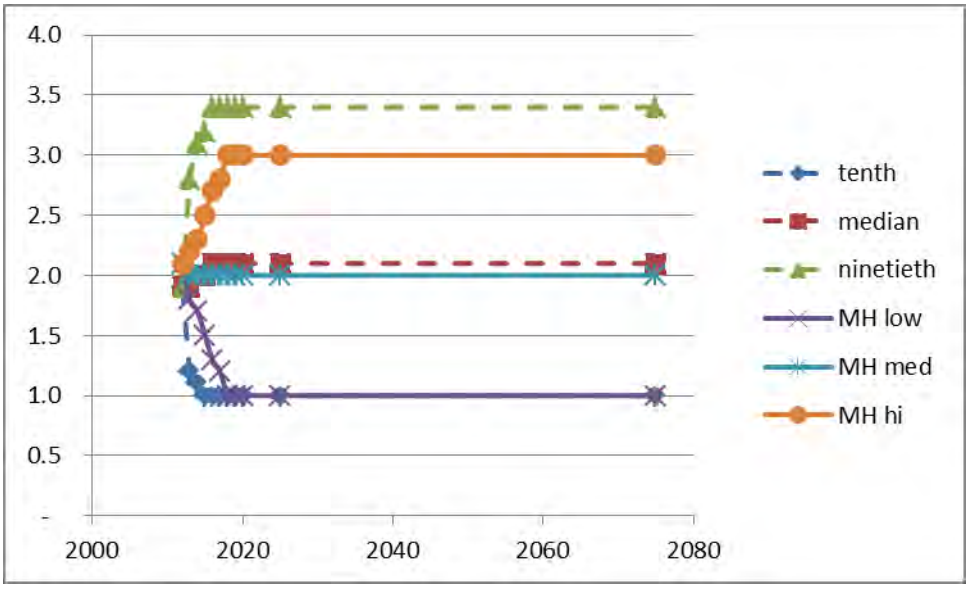
Table 2.7: Real Interest Rate Percentiles

	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
20-year Levelized Real Interest Rate	0.80	2.03	2.82	4.18	5.06

2) Inflation Rate

The U.S. Federal Reserve provides probabilistic inflation forecasts in their Green Book[15]. This is arguably the best source for such forecasts. Given the tight relationship between US and Canadian inflation, it represents an authoritative probabilistic forecast for Canadian inflation as well. Figure 2.9 shows both the Federal Reserve probabilistic forecast percentiles and Manitoba Hydro inflation scenarios. The two sets of scenarios are sufficiently close that it is reasonable to use the Manitoba Hydro inflation scenarios directly in the remainder of the analysis as representing 10th, 50th and 90th percentile values.

Figure 2.9: Federal Reserve and Manitoba Hydro Forecast Inflation Rate



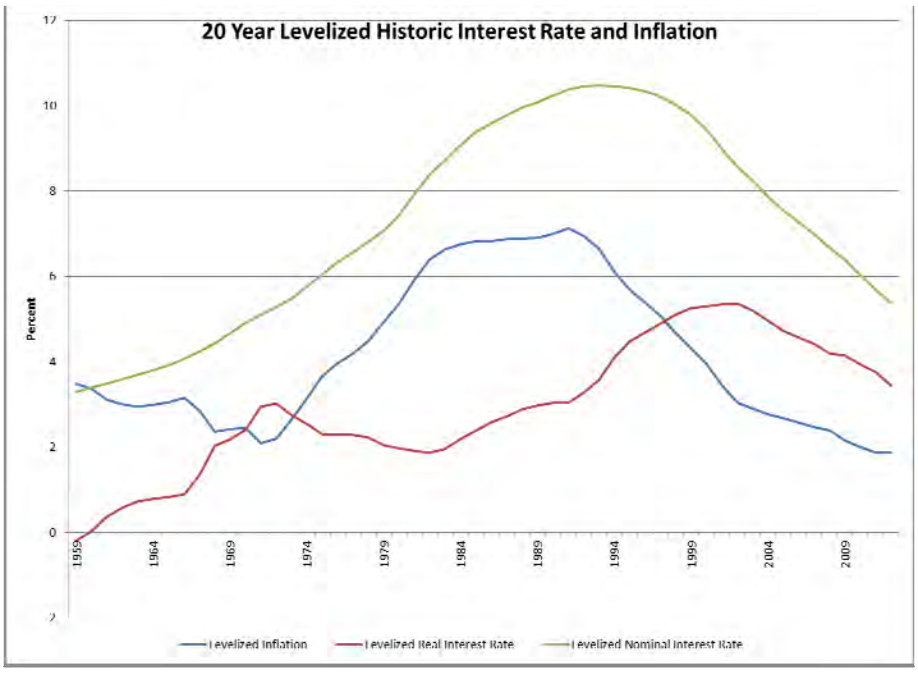
[15] http://www.federalreserve.gov/monetarypolicy/fomc_historical.htm

The Green Book forecast required some processing to be useful to compare the Federal Reserve inflation probabilities to Manitoba Hydro's scenarios. The Green Book is only available 5 years after the relevant meetings occurred, so only documents from late 2007 and before can be used. Actual Inflation is 1.9% now versus 2.0% in 2007 so the base value for the Fed forecast was adjusted down. The Green Book forecast also only gives the results of scenarios out for 30 months meaning that the full forecast had to be extrapolated. Two aspects of this forecast were used to do the extrapolation. First, the range of the Federal Reserve probabilistic forecast was nearly constant month to month for all the Green Books that were available suggesting that it is reasonable to assume this same pattern would hold now. Second, the first derivative of the range of the forecast declined going out in time, suggesting that the range is converging to steady-state. To create Figure 4, the initial value was set to current inflation, the path of the Green Book forecast was matched for 30 months, and the convergence of the first derivative to 0 was extrapolated to create steady-state scenarios.

3) Convolution

The last step in developing a probability assessment of nominal interest rates is to combine or convolve the distributions on real interest rates and inflation rates. To do this, we first investigate the historic link between real interest rates and inflation rates. Figure 2.10 shows the historic relationships between levelized real interest rates and levelized inflation rates. The figure indicates a very modest amount of correlation between real interest rate and inflation with coefficient -0.02.

Figure 2.10. Historical Levelized Interest Rates and Inflation Rates



In order to develop the best forecast of nominal interest rates, the historic conditional probabilistic relationship between levelized real interest rates and levelized inflation rates is calculated. The conditional probabilities are calculated by determining the percentage of time that inflation was "Low", "Base", or "High" given that real interest rates were "Low", "Base", or "High" respectively. The definition of the bins for inflation and interest rates is given in Table 2.8: Bins for Convolution of Interest Rates and CPI.

Table 2.8: Bins for Convolution of Interest Rates and CPI

	25th Percentile	50th Percentile	75th Percentile
Levelized Real Interest Rate	2.03	2.82	4.18
Levelized CPI	2.71	3.45	5.85

An example of how the levelized values of interest rates and inflations are placed into bins is shown in Table 2.9. As can be seen in 2004, the CPI is 2.77 which is greater than its 25th percentile while the interest rate is 4.95 which is greater than its 75th percentile leading to the

CPI being placed in the "Average" bin while the interest rate is placed in the "High" bin. For comparison, in 2010 the CPI is 2.00 which is "Low", while the interest rate is 3.75 which is "Average".

Table 2.9: Example of Assigning Inflation and Interest Rates to Conditional Bins

	20 Yr Levelized CPI Change	20 Yr Levelized Real Interest Rate	Levelized CPI Scenario Bin	Levelized Real Interest Rate Scenario Bin
2003	2.894189	5.195664	Average	High
2004	2.771738	4.95066	Average	High
2005	2.683854	4.716231	Low	High
2006	2.576068	4.570574	Low	High
2007	2.465866	4.40903	Low	High
2008	2.385931	4.189312	Low	High
2009	2.147142	4.138725	Low	Average
2010	2.000075	3.939568	Low	Average
2011	1.86839	3.75425	Low	Average
2012	1.870999	3.435786	Low	Average

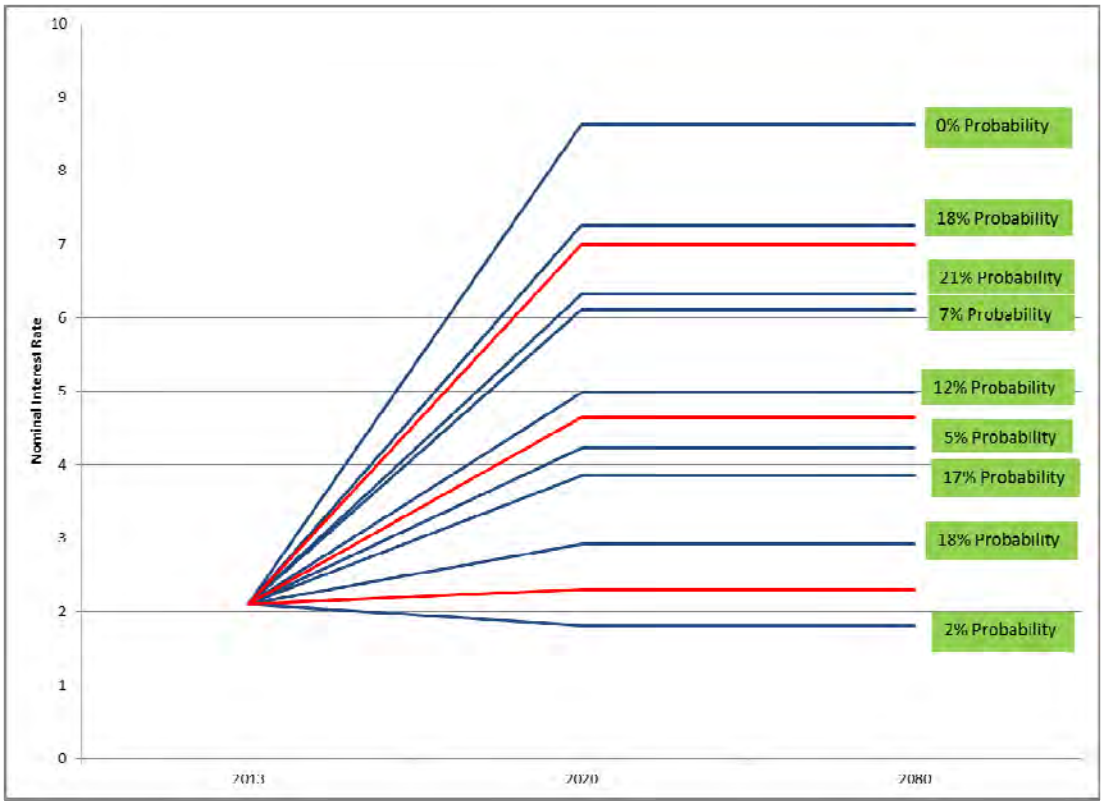
The computed conditional probabilities are shown in Table 2.10. Low values refer to those below the 25th percentile, high values to those above the 75th percentile and base values are the remainder. This table indicates some degree of dependence; for example, the extreme cases "low real interest, low inflation" and "high real interest, high inflation" are very rare.

Table 2.10: Conditional Relationship between Real Interest Rates and Inflation Rates

	Low CPI	Base CPI	High CPI
Low Interest Rate	7%	71%	21%
Base Interest Rate	35%	23%	42%
High Interest Rate	29%	71%	0%

The separate distributions on real interest rate and inflation rate, and the conditional relationships in Table 4 can be used to develop a combined nine-branch distribution of nominal interest rates using the formula given in the previous section. This is shown below in blue in Figure 2.11. For comparison, Manitoba Hydro's three nominal interest rate scenarios are shown in red.

Figure 2.11: Nominal Interest Rate Scenarios

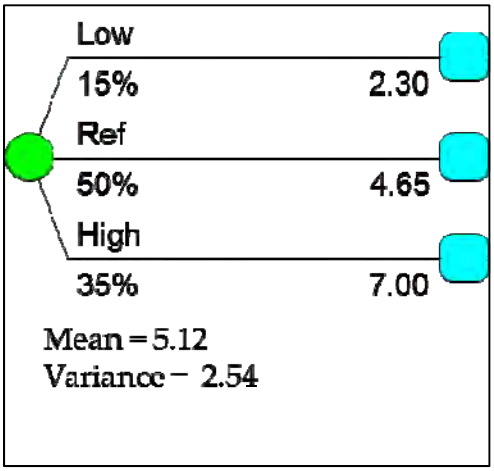


Note that the extreme values in this chart both have low probability. The highest forecasted value that corresponds to high inflation and high real interest rate has 0% probability, while the lowest forecasted value that corresponds to low inflation and low real interest rate has 2% probability. This gives initial evidence that the Manitoba Hydro scenarios can be successfully assigned probabilities benchmarked to these 9 cases.

Input Development

Once the nine-branch nominal interest rate distribution has been developed, the final task is to benchmark the Manitoba Hydro nominal interest rate scenarios to this distribution. The mean and standard deviation of the nine-branch 20-year levelized nominal interest rate forecast are 5.09 and 2.58 respectively. The probabilities that should be assigned to Manitoba Hydro's three scenarios to best match this forecast are shown below. This three-branch distribution matches mean and variance well.

Figure 2.12: Manitoba Hydro Interest Rate (and Economic Indicators) Probabilistic Inputs



2.3.3. Capital Costs

Relationships among Variables

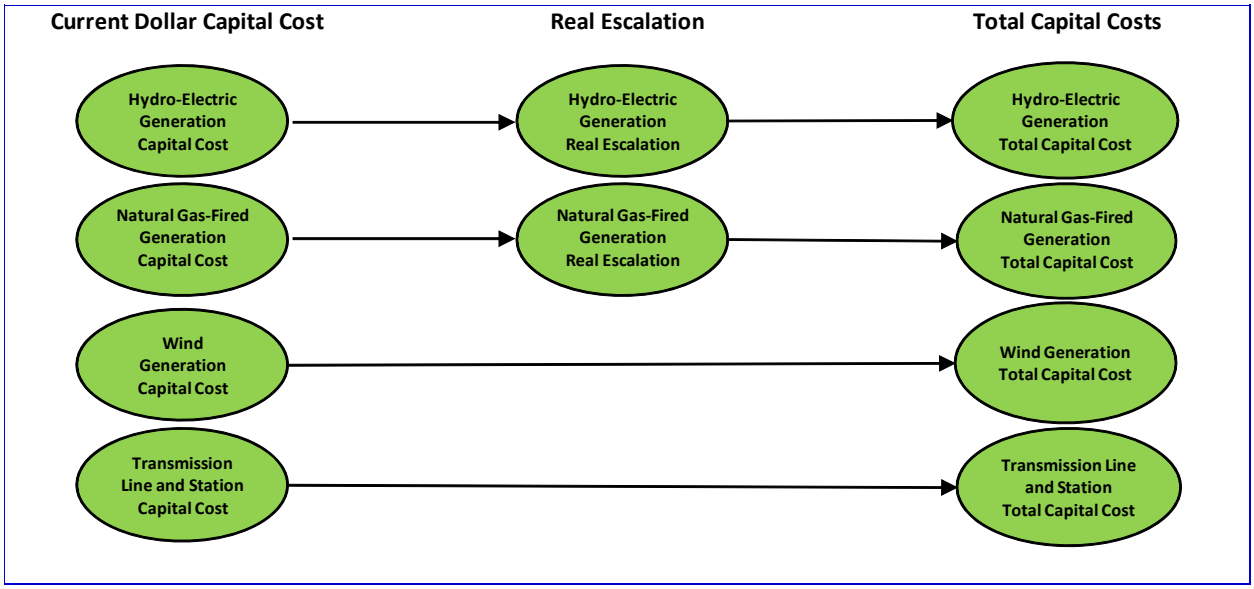
There are six variables included in the category Capital Costs:

- Hydro-Electric Generation Current Dollar Capital Costs
- Natural Gas-Fired Generation Current Dollar Capital Costs
- Wind Generation Current Dollar Capital Costs
- Transmission Line and Station Current Dollar Capital Costs
- Hydro-Electric Generation Capital Cost Escalation
- Natural Gas-Fired Generation Capital Cost Escalation

The relationships among these individual factors can vary substantially based on the particular application and context. In general, it appears that current dollar capital (i.e., construction) costs and capital cost escalation rates are driven by different factors - capital costs by engineering issues and escalation rates by economic issues. Consequently, it is reasonable to assume that capital costs and capital cost escalation are independent. In addition, in our case, it appears that generation and transmission capital (construction) costs are affected by similar factors such as difficult site conditions and rising labour costs. This view of dependence among different generation and transmission assets is generally supported by empirical evidence and expert judgment. Data from the past ten years in EIA's Annual Energy Outlook shows a significant correlation between natural gas-fired generation and hydro-electric generation cost escalation.[16i] In addition, industry experts typically report combined capital cost escalation rates for non-nuclear generation technologies, such as the IHS CERA Power Capital Costs Index (PCCI)[17]. This indicates that these six factors can be combined into two as shown in Figure 2.13: generation/transmission capital costs and natural gas-fired/hydro-electric generation capital cost real escalation rates.

[16] See, for example, DOE/EIA, Annual Energy Outlook: 2013, April 2013.
[17] See, for example, IHS CERA, *Power Plant Construction Costs Falling for All Types of New Plants,* http://press.ihs.com/press-release/energy-power/ihs-cera-power-plant-construction-costs-falling-all-types-new-plants, June 23, 2009.

Figure 2.13: Capital Costs - Underlying Model



Probability Assessment & Input Development

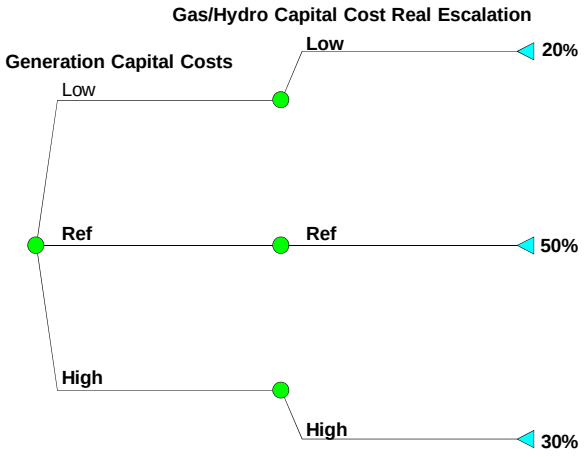
Various techniques, including Monte Carlo analysis, were used in the initial development of the High and Low estimates at the P10 and P90 levels, which would correspond to probabilities of 25-50-25, excluding the impact of escalation. The probabilities were then refined for the following factors:

- Capital cost estimates for Keeyask G.S. and Conawapa G.S. are at an advanced stage; nevertheless, costs are more likely to increase than decrease, mainly due to labour costs.
- Capital cost estimates for the natural gas-fired and wind generation alternatives are at an earlier stage than those for Keeyask G.S. and Conawapa G.S. and likely do not capture all cost risks .
- There is a large amount of empirical data that supports the trend that costs are more likely to increase than decrease for any capital project.

- Similar labour issues associated with developing hydro generation are also associated with non-hydro generation.
- The assumption of dependence between capital costs and escalation rates makes our lower and upper bounds broader than if we treated them independently, countering the tendency for overconfidence in uncertainty estimation.

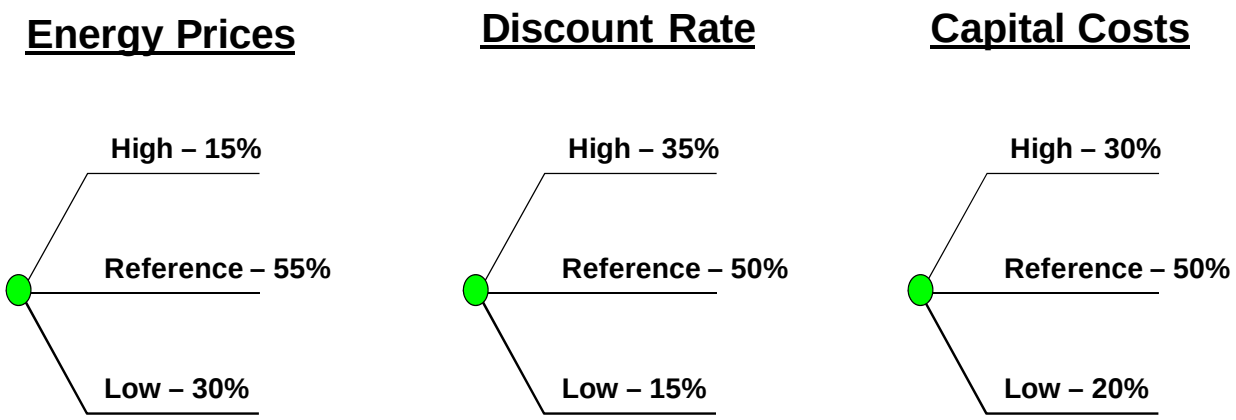
Based on this analysis, probabilities were assigned to three pre-existing capital cost scenarios as shown in Figure 2.14.

Figure 2.14: Manitoba Hydro Capital Cost Probabilistic Inputs



The graphic in Figure 2.15 provides the probabilities that were applied to each of the highest impact factors.

Figure 2.15: Probabilities for Highest Impact Factors



As shown in Table 2.11, these probabilities are multiplied in combination to produce a probability for each of the 27 scenarios under study as shown in the table below. For example, the Low Energy Price, Low Discount Rate and High Capital Cost (Low, Low, High) scenario results in a probability for the scenario as follows:

- 30% x 15% x 30% = 1.35%

Table 2.11: Probabilities for Each of the 27 Scenarios

Energy Prices	Discount Rates	Capital Costs	Probabilities
Low (30%)	Low (15%)	High (30%	1.35%
		Ref (50%)	2.25%
		Low (20%)	0.90%
	Ref (50%)	High (30%	4.50%
		Ref (50%)	7.50%
		Low (20%)	3.00%
	High (35%)	High (30%	3.15%
		Ref (50%)	5.25%
		Low (20%)	2.10%
Ref (55%)	Low (15%)	High (30%	2.48%
		Ref (50%)	4.13%
		Low (20%)	1.65%
	Ref (50%)	High (30%	8.25%
		Ref (50%)	13.75%
		Low (20%)	5.50%
	High (35%)	High (30%	5.78%
		Ref (50%)	9.63%
		Low (20%)	3.85%
High (15%)	Low (15%)	High (30%	0.68%
		Ref (50%)	1.13%
		Low (20%)	0.45%
	Ref (50%)	High (30%	2.25%
		Ref (50%)	3.75%
		Low (20%)	1.50%
	High (35%)	High (30%	1.58%
		Ref (50%)	2.63%
		Low (20%)	1.05%

2.4. Expected Value

The expected value for each development plan is determined by calculating the weighted average of the NPVs. The information in Table 2.11 is the basis for the determination of the expected value for each development plan when combined with the scenario weightings provided in Figure 2.15. Expected value is calculated for each development plan by:

Expected Value of a plan = the sum of (each scenario NPV x the probability of its occurrence).

The expected value (weighted average) incorporates asymmetries in the possibilities that may not be apparent from the single reference scenario and is a very meaningful measure in a probabilistic economic evaluation.

The following example illustrates how to calculate expected value, with three illustrative plans (Plan A, B, C) and three scenarios (low, reference and high). Table 2.12 provides the net present value of the three plans over the three scenarios. Table 2.13 provides the incremental NPV of all the cases relative to Plan A Reference Scenario.

Table 2.12: Net Present Value of Three Sample Plans

NPV $2014M	Plan A	Plan B	Plan C
Low Scenario	-3000	-2500	-1000
Reference Scenario	-2000	-1500	-1500
High Scenario	-1000	-500	-2000

Table 2.13: Incremental NPVs of Sample Plans: 'Absolute Reference' Perspective

NPV $2014M	Plan A	Plan B	Plan C
Low Scenario	-1000	-500	1000
Reference Scenario	0	500	500
High Scenario	1000	1500	0

In the above example, if the low, reference and high scenarios are assigned probabilities of 30%, 50% and 20%, Plan C would have an expected value of:

30% X $1000M + 50% X $500M + 20% X $0M = $550M

Similarly, Plan A would have an expected value of -$100M and Plan B would have an expected value of $400M. Note that in this example, the probabilities are not symmetric. Therefore, the expected value of Plan A is not $0M. In this case, it is -$100M. If desired, this can be shifted to 0, so Plan C would have an expected value *relative to Plan A* of $550M-(-$100M) = $650M.

2.5. Cumulative Probabilities: S-Curve Plots

To gain more insight beyond expected value, cumulative probabilities or "S" Curves are used. The first step is to order the scenario outcomes, which must be done for each plan individually. In this example, the All Gas plan is shown.

Table 2.14: Transforming Scenario Probabilities into Cumulative Probabilities

Probabilities	All Gas
1.35%	-4043
2.25%	-3049
0.90%	-2247
4.50%	-463
7.50%	208
3.00%	750
3.15%	1204
5.25%	1708
2.10%	2114
2.48%	-5014
4.13%	-4020
1.65%	-3217
8.25%	-671
13.75%	0
5.50%	542
5.78%	1308
9.63%	1812
3.85%	2218
0.68%	-6435
1.13%	-5441
0.45%	-4638
2.25%	-1158
3.75%	-487
1.50%	55
1.58%	1210
2.63%	1713
1.05%	2120

Probabilities	All Gas	Cumulative Probabilities
0.68%	-6435	0.3%
1.13%	-5441	1.2%
2.48%	-5014	3.0%
0.45%	-4638	4.5%
1.35%	-4043	5.4%
4.13%	-4020	8.1%
1.65%	-3217	11.0%
2.25%	-3049	13.0%
0.90%	-2247	14.6%
2.25%	-1158	16.1%
8.25%	-671	21.4%
3.75%	-487	27.4%
4.50%	-463	31.5%
13.75%	0	40.6%
1.50%	55	48.3%
7.50%	208	52.8%
5.50%	542	59.3%
3.00%	750	63.5%
3.15%	1204	66.6%
1.58%	1210	68.9%
5.78%	1308	72.6%
5.25%	1708	78.1%
2.63%	1713	82.1%
9.63%	1812	88.2%
2.10%	2114	94.1%
1.05%	2120	95.6%
3.85%	2218	98.1%
		100.0%

As shown in Table 2.14, after the NPVs are ordered from lowest to highest, cumulative probabilities can be calculated. For ease of calculation, the precise scenario outcome is defined as the midpoint of the range it is supposed to represent. For example, the high energy, low discount, high capital scenario (probability 0.68%) is the worst scenario for the All Gas plan. The NPV calculated (-$6435M) is representative of continuous scenarios that are similar to this scenario, and occupy the range from 0% to 0.68%, centred at 0.34%. The next-worst scenario (probability 1.13%) occupies the next part of the range, from 0.68% to 1.81%, centred at 1.24% (note numbers lose precision in rounding). Therefore, the value of $-5441 is set at this centred

value of 1.24%. This process continues until the entire range from 0 to 100% has been represented by a scenario.

These cumulative probabilities are plotted on the vertical axis with the values on the x-axis to create the 'S-Curve' figures used in Chapter 10. In that chapter, it is discussed that each point represents the probability that the value will be less than or equal to that value (for example, there is a 40.6% chance the NPV will be less than $0M in the All Gas case). However, given that 27 discrete scenarios have been used as the centre points of ranges to represent what is in reality a continuous distribution, there is some imprecision. The points were connected linearly to preserve the actual scenario values recognizing that the resulting lines are not smooth, but removing any subjectivity in how the points should be smoothed.

Figures 2.7.7, 2.7.8 and 2.7.9 show the S-curves for the three categories of development plans that have been evaluated -

- Development plans with no new U.S. interconnection designed to serve only Manitoba load and existing export commitments (Figure 2.7.7),
- Development plans with a 250-MW U.S. interconnection (Figure 2.7.8),
- Development plans with a 750-MW interconnection (Figure 2.7.9).

Figures 2.7.7 to 2.7.24 provide all of the S-curves that are provided in ***Chapter 10 Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities.***

2.6. Cumulative Probabilities: Box-Whisker Plots

A Box-Whisker plot is another method to visualize the range of NPVs for the different development plans being considered. The box-whisker plot in Figure 2.7.5 shows the P10 and P90 values as whiskers and the P25 and P75 as boxes for each of the 15 development plans. 'P' stands for percentile, so a P10 is at the 10th percentile, meaning only 10% of possible outcomes are lower than this value.

The value of a Box plot is that it not only shows the possible range of NPVs for each development plan, but the likelihood of those NPVs and the probability-weighted expected value. Box Plots provide a quick high-level picture of how the ranges of different plans compare, and if they have more significant upside or downside risk. For plans that are close in value from the Box plot perspective, a more detailed analysis is warranted. Box plots both with and without the provincial transfers are shown in Figures 2.7.5 and 2.7.6, respectively.

2.7. Probabilistic Analysis Figures

Figure 2.7.1: Red-Green Quilt: Relative to All Gas Ref-Ref-Ref Case

Energy Prices	Discount Rates	Capital Costs	All Gas	K22/Gas	Wind/Gas	K19/Gas24 /250MW	K19/Gas25/750MW (WPS Sale & Inv)	K19/Gas31 /750MW	SCGT/C26	CCGT/26	Wind/C26	K22/C29	K19/C31 /250MW	K19/C31 /750MW	K19/C25 /250MW	K19/C25/750MW (WPS Sale & Inv)	K19/C25/ 750MW	Scenario Probabilities
Low (30%)	Low (15%)	High (30%)	-4043	-3792	-7769	-3190	-2855	-3418	-3309	-3529	-4543	-4064	-3506	-3554	-3459	-2841	-3642	1.35%
		Ref (50%)	-3049	-2532	-5403	-1877	-1616	-2130	-2401	-2482	-3149	-2786	-2166	-2138	-2124	-1410	-2177	2.25%
		Low (20%)	-2247	-1590	-3666	-890	-703	-1175	-1655	-1627	-2041	-1773	-1099	-1022	-1069	-292	-1030	0.90%
	Ref (50%)	High (30%)	-463	-1212	-3056	-911	-730	-1191	-1297	-1531	-2243	-2539	-2161	-2323	-2510	-2155	-2816	4.50%
		Ref (50%)	208	-278	-1478	95	257	-185	-582	-704	-1181	-1496	-1050	-1153	-1368	-929	-1559	7.50%
		Low (20%)	750	408	-323	837	974	548	6	-29	-335	-678	-176	-243	-473	20	-585	3.00%
	High (35%)	High (30%)	1204	25	-796	117	203	-182	-284	-517	-1070	-1659	-1413	-1622	-2029	-1810	-2383	3.15%
		Ref (50%)	1708	785	384	963	1060	679	323	187	-187	-755	-434	-592	-994	-698	-1243	5.25%
		Low (20%)	2114	1336	1245	1580	1674	1297	822	762	516	-51	327	201	-189	157	-364	2.10%
Ref (55%)	Low (15%)	High (30%)	-5014	-2511	-7167	-1796	-2103	-2041	-1760	-1703	-2360	-840	-334	0	206	853	498	2.48%
		Ref (50%)	-4020	-1251	-4802	-482	-865	-753	-852	-656	-967	438	1006	1415	1541	2284	1963	4.13%
		Low (20%)	-3217	-309	-3064	504	49	202	-107	199	141	1451	2073	2531	2597	3402	3110	1.65%
	Ref (50%)	High (30%)	-671	-46	-2354	341	109	85	23	-43	-531	-237	104	190	152	470	170	8.25%
		Ref (50%)	0	887	-775	1346	1097	1091	738	784	531	806	1215	1360	1295	1696	1427	13.75%
		Low (20%)	542	1573	380	2089	1813	1824	1326	1459	1376	1624	2089	2270	2189	2645	2401	5.50%
	High (35%)	High (30%)	1308	1091	-82	1258	1041	998	879	764	370	168	391	366	109	268	2	5.78%
		Ref (50%)	1812	1851	1098	2104	1898	1859	1487	1468	1254	1073	1370	1396	1144	1380	1143	9.63%
		Low (20%)	2218	2402	1959	2721	2512	2478	1986	2044	1956	1777	2132	2189	1949	2235	2022	3.85%
High (15%)	Low (15%)	High (30%)	-6435	-1499	-6719	-692	-1694	-1006	-355	-23	-267	2355	2796	3410	3819	4372	4455	0.68%
		Ref (50%)	-5441	-239	-4353	621	-456	282	552	1024	1126	3633	4135	4826	5154	5803	5921	1.13%
		Low (20%)	-4638	703	-2616	1607	458	1237	1298	1879	2234	4646	5203	5941	6210	6922	7068	0.45%
	Ref (50%)	High (30%)	-1158	941	-1767	1398	713	1127	1241	1336	1104	2014	2308	2571	2746	2940	2993	2.25%
		Ref (50%)	-487	1874	-189	2403	1701	2134	1956	2163	2166	3057	3420	3741	3888	4166	4250	3.75%
		Low (20%)	55	2560	966	3146	2417	2867	2543	2838	3011	3875	4293	4652	4783	5115	5225	1.50%
	High (35%)	High (30%)	1210	2017	533	2246	1691	1993	1956	1951	1738	1935	2127	2228	2170	2203	2236	1.58%
		Ref (50%)	1713	2777	1712	3092	2549	2854	2563	2656	2622	2839	3106	3259	3206	3315	3377	2.63%
		Low (20%)	2120	3328	2573	3709	3163	3473	3063	3231	3325	3543	3867	4051	4010	4170	4256	1.05%

$2014 NPV	All Gas	K22/Gas	Wind/Gas	K19/Gas24 /250MW	K19/Gas25/750MW (WPS Sale & Inv)	K19/Gas31 /750MW	SCGT/C26	CCGT/26	Wind/C26	K22/C29	K19/C31 /250MW	K19/C31 /750MW	K19/C25 /250MW	K19/C25/750MW (WPS Sale & Inv)	K19/C25/ 750MW
Expected Value	-70	564	-1084	971	772	706	455	459	147	348	736	821	712	1085	760
10th Percentile -"Risk"	-3502	-1249	-4599	-898	-828	-1181	-1217	-1424	-2118	-1692	-1362	-1594	-1988	-1429	-2186
25th Percentile	-560	-248	-2200	115	139	-183	-297	-490	-910	-750	-363	-361	-650	-204	-904
75th Percentile	1481	1636	383	2092	1726	1832	1363	1462	1256	1460	2074	2009	1854	2255	2008
90th Percentile - "Reward"	1905	2007	1209	2479	2256	2215	1956	2070	2028	2601	2953	3220	3180	3377	3360
EV Difference From AllGas	0	634	-1014	1041	842	776	525	529	217	418	806	891	782	1155	830

Figure 2.7.2: Red-Green Quilt; Relative to All Gas Development Plan

Energy Prices	Discount Rates	Capital Costs	All Gas	Wind/Gas	K22/Gas	K19/Gas24 /250MW	K19/Gas25/750MW (WPS Sale & Inv)	K19/Gas31 /750MW	SCGT/C26	CCGT/26	Wind/C26	K22/C29	K19/C31/ 250MW	K19/C31/ 750MW	K19/C25/ 250MW	K19/C25/750MW (WPS Sale & Inv)	K19/C25/ 750MW
Low (30%)	Low (15%)	High (30%)	0	-3726	251	853	1188	625	734	514	-500	-22	537	489	584	1202	401
		Ref (50%)	0	-2354	517	1172	1433	919	648	567	-100	263	883	911	925	1639	872
		Low (20%)	0	-1419	657	1357	1544	1072	592	620	206	474	1148	1224	1178	1955	1217
	Ref (50%)	High (30%)	0	-2593	-749	-448	-267	-729	-834	-1068	-1780	-2076	-1698	-1861	-2047	-1692	-2353
		Ref (50%)	0	-1686	-487	-114	49	-393	-790	-913	-1389	-1704	-1258	-1362	-1576	-1137	-1768
		Low (20%)	0	-1073	-342	87	224	-202	-744	-779	-1085	-1428	-926	-993	-1223	-730	-1335
	High (35%)	High (30%)	0	-2000	-1179	-1087	-1001	-1386	-1488	-1721	-2274	-2863	-2617	-2826	-3233	-3014	-3587
		Ref (50%)	0	-1324	-923	-744	-648	-1029	-1385	-1521	-1894	-2462	-2141	-2299	-2701	-2406	-2950
		Low (20%)	0	-869	-778	-534	-440	-817	-1292	-1352	-1598	-2165	-1787	-1914	-2303	-1958	-2478
Ref (55%)	Low (15%)	High (30%)	0	-2154	2502	3218	2910	2973	3253	3310	2653	4174	4680	5013	5220	5866	5511
		Ref (50%)	0	-782	2768	3537	3155	3267	3167	3364	3053	4458	5026	5435	5561	6304	5983
		Low (20%)	0	153	2908	3721	3266	3420	3111	3417	3359	4669	5291	5749	5814	6620	6327
	Ref (50%)	High (30%)	0	-1683	625	1012	780	756	694	628	140	434	775	861	823	1141	841
		Ref (50%)	0	-775	887	1346	1097	1091	738	784	531	806	1215	1360	1295	1696	1427
		Low (20%)	0	-162	1031	1547	1272	1282	784	917	834	1083	1547	1729	1648	2103	1860
	High (35%)	High (30%)	0	-1390	-218	-50	-268	-310	-429	-544	-938	-1140	-917	-942	-1199	-1040	-1306
		Ref (50%)	0	-714	39	292	86	47	-325	-344	-558	-739	-441	-416	-668	-432	-669
		Low (20%)	0	-260	184	503	294	259	-233	-175	-262	-441	-87	-30	-269	16	-196
High (15%)	Low (15%)	High (30%)	0	-284	4936	5742	4740	5428	6079	6411	6167	8790	9230	9844	10254	10807	10890
		Ref (50%)	0	1087	5202	6062	4985	5722	5993	6465	6567	9074	9576	10266	10595	11244	11361
		Low (20%)	0	2023	5342	6246	5096	5875	5937	6518	6873	9285	9841	10580	10849	11560	11706
	Ref (50%)	High (30%)	0	-609	2099	2556	1871	2285	2398	2494	2261	3172	3466	3729	3903	4098	4151
		Ref (50%)	0	298	2361	2890	2187	2620	2442	2649	2653	3543	3906	4228	4375	4653	4736
		Low (20%)	0	912	2505	3091	2362	2812	2489	2783	2956	3820	4238	4597	4728	5060	5170
	High (35%)	High (30%)	0	-677	807	1036	482	783	747	742	529	725	917	1019	961	994	1027
		Ref (50%)	0	-1	1064	1379	835	1141	850	942	909	1126	1392	1546	1492	1602	1664
		Low (20%)	0	454	1208	1589	1043	1353	943	1111	1205	1424	1747	1931	1891	2050	2136

Figure 2.7.3: Red-Green Quilt; Provincial Perspective including Capital Taxes, Provincial Guarantee Fee and Water Rentals

Energy Prices	Discount Rates	Capital Costs	All Gas	K22/Gas	Wind/Gas	K19/Gas24 /250MW	K19/Gas25/750MW (WPS Sale & Inv)	K19/Gas31 /750MW	SCGT/C26	CCGT/26	Wind/C26	K22/C29	K19/C31 /250MW	K19/C31/ 750MW	K19/C25/ 250MW	K19/C25/750MW (WPS Sale & Inv)	K19/C25 /750MW
Low (30%)	Low (15%)	High (30%)	-3225	-1795	-5808	-1028	-689	-1186	-1022	-1130	-1781	-637	9	101	343	1097	362
		Ref (50%)	-2461	-867	-3972	-61	215	-247	-374	-375	-773	256	948	1091	1274	2096	1385
		Low (20%)	-1845	-169	-2618	669	885	453	159	242	28	965	1698	1872	2012	2879	2186
	Ref (50%)	High (30%)	8	51	-1940	511	717	284	159	1	-509	-363	100	26	23	471	-146
		Ref (50%)	549	785	-661	1301	1490	1071	713	645	319	438	956	925	899	1412	819
		Low (20%)	985	1326	277	1886	2052	1646	1169	1171	977	1067	1629	1625	1587	2142	1568
	High (35%)	High (30%)	1518	940	-58	1185	1303	932	774	598	177	-83	248	103	-114	177	-363
		Ref (50%)	1936	1562	925	1877	2002	1633	1266	1172	895	648	1041	936	722	1075	559
		Low (20%)	2274	2013	1643	2382	2504	2138	1672	1641	1467	1217	1657	1577	1373	1766	1269
Ref (55%)	Low (15%)	High (30%)	-4196	-514	-5207	366	62	191	527	696	402	2587	3181	3655	4009	4791	4502
		Ref (50%)	-3432	414	-3371	1333	966	1130	1175	1451	1410	3480	4120	4645	4939	5790	5524
		Low (20%)	-2816	1112	-2016	2063	1636	1830	1707	2068	2211	4189	4870	5426	5677	6573	6326
	Ref (50%)	High (30%)	-200	1216	-1237	1763	1556	1560	1479	1489	1202	1939	2365	2539	2685	3096	2840
		Ref (50%)	340	1950	41	2553	2329	2347	2033	2133	2030	2740	3221	3438	3562	4037	3805
		Low (20%)	777	2491	979	3138	2891	2921	2489	2659	2688	3369	3894	4138	4249	4767	4554
	High (35%)	High (30%)	1622	2006	656	2326	2141	2112	1937	1880	1617	1745	2053	2091	2024	2255	2023
		Ref (50%)	2040	2628	1639	3018	2840	2814	2430	2453	2336	2475	2845	2924	2860	3153	2945
		Low (20%)	2378	3079	2357	3523	3342	3318	2835	2922	2907	3045	3461	3565	3511	3844	3655
High (15%)	Low (15%)	High (30%)	-5617	498	-4758	1470	471	1226	1932	2376	2495	5783	6311	7065	7622	8311	8460
		Ref (50%)	-4853	1426	-2923	2437	1375	2165	2580	3131	3503	6675	7250	8055	8553	9310	9482
		Low (20%)	-4237	2124	-1568	3167	2045	2864	3112	3748	4304	7384	8000	8836	9290	10092	10284
	Ref (50%)	High (30%)	-687	2204	-651	2819	2160	2603	2696	2868	2837	4189	4569	4920	5278	5566	5663
		Ref (50%)	-146	2937	628	3609	2933	3390	3251	3512	3665	4990	5425	5820	6155	6507	6628
		Low (20%)	290	3478	1566	4194	3495	3964	3706	4038	4323	5619	6099	6519	6842	7237	7377
	High (35%)	High (30%)	1523	2932	1271	3314	2792	3107	3014	3067	2985	3511	3788	3954	4085	4190	4257
		Ref (50%)	1942	3554	2253	4006	3491	3809	3507	3641	3704	4242	4580	4787	4922	5088	5179
		Low (20%)	2279	4005	2972	4511	3993	4313	3912	4109	4275	4811	5197	5427	5572	5779	5889

Figure 2.7.4: Scatter Plot: All 15 Development Plans

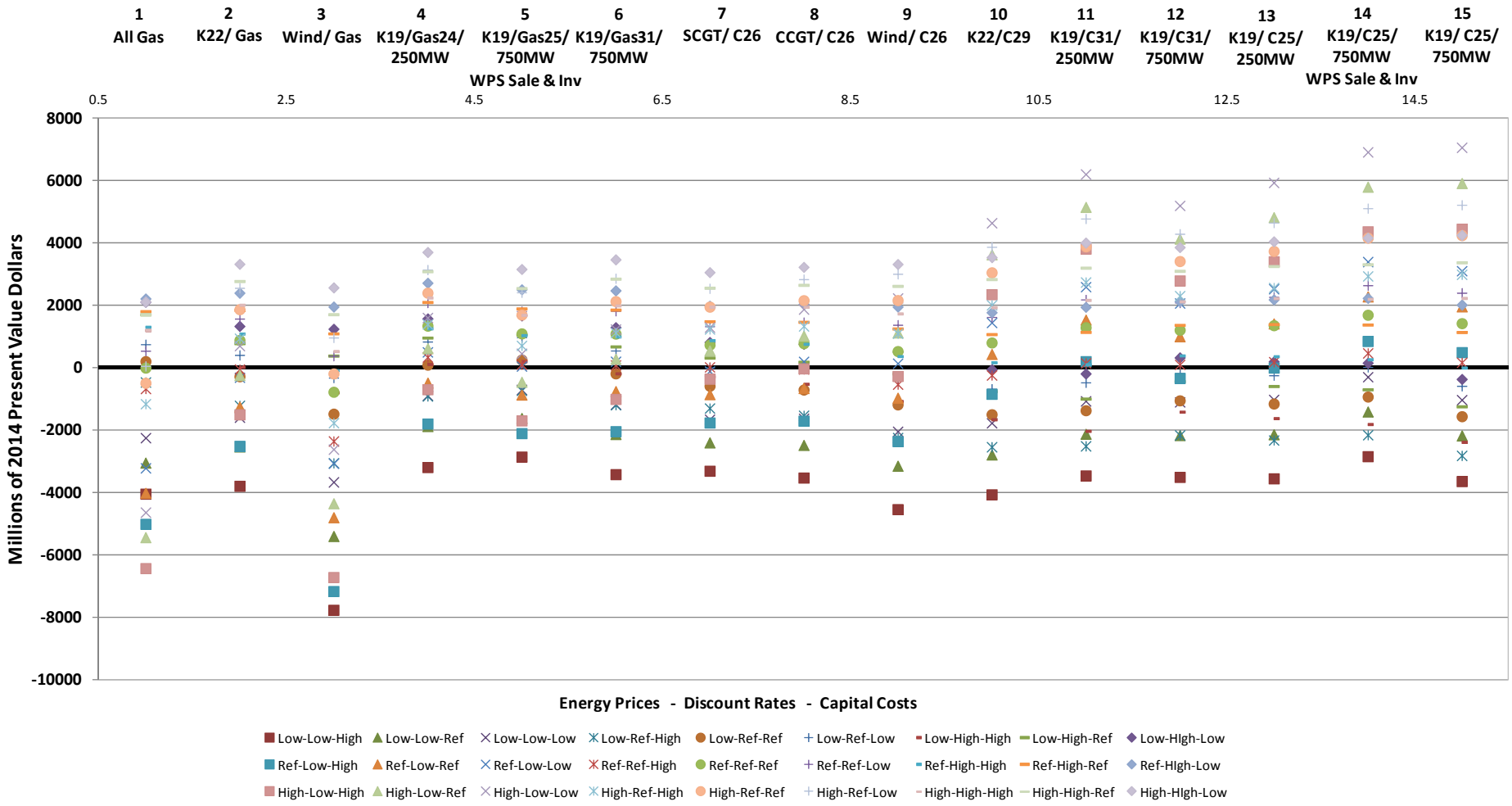


Figure 2.7.5: Box-Whisker Plot: All 15 Development Plans

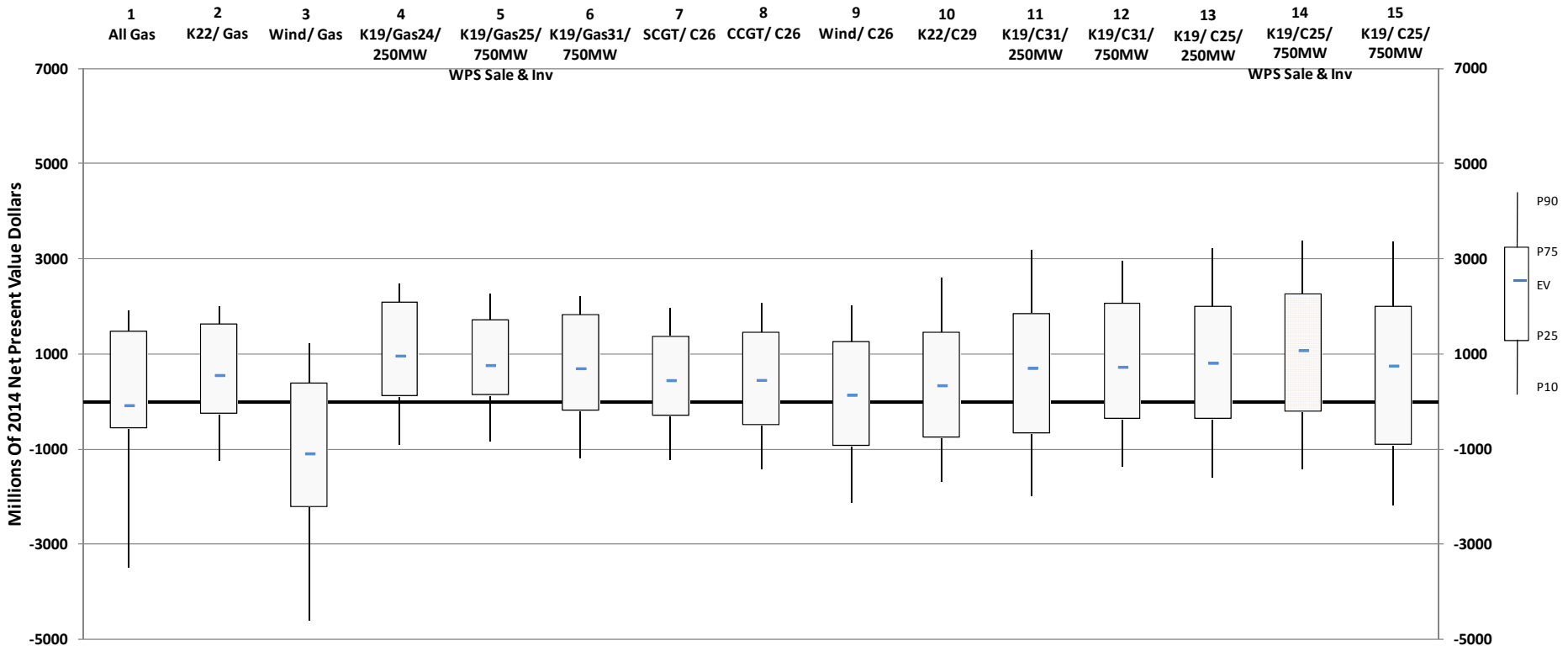


Figure 2.7.6: Box-Whisker Plot: All 15 Development Plans; Provincial Perspective including Capital Tax, Water Rentals and Provincial Guarantee Fee

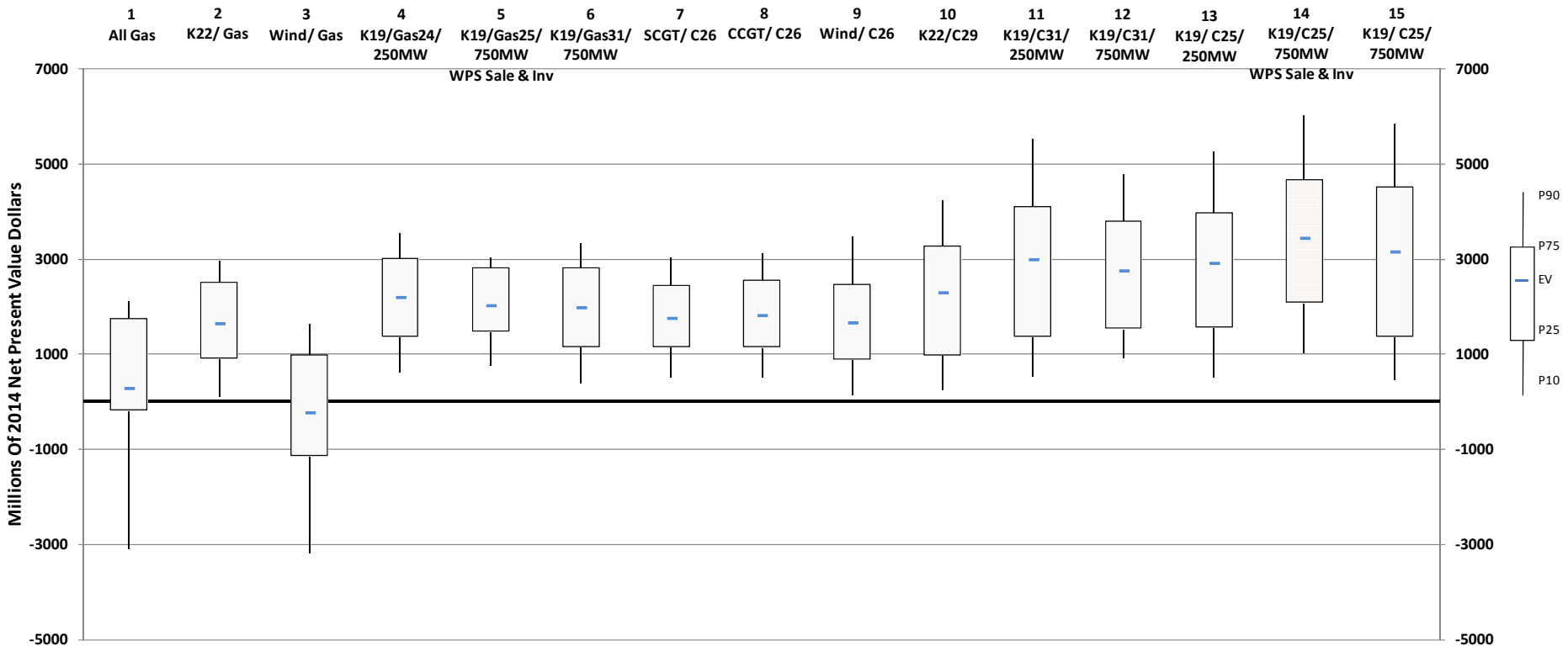


Figure 2.7.7: S-Curves for All 7 Development Plans with No New US Interconnection

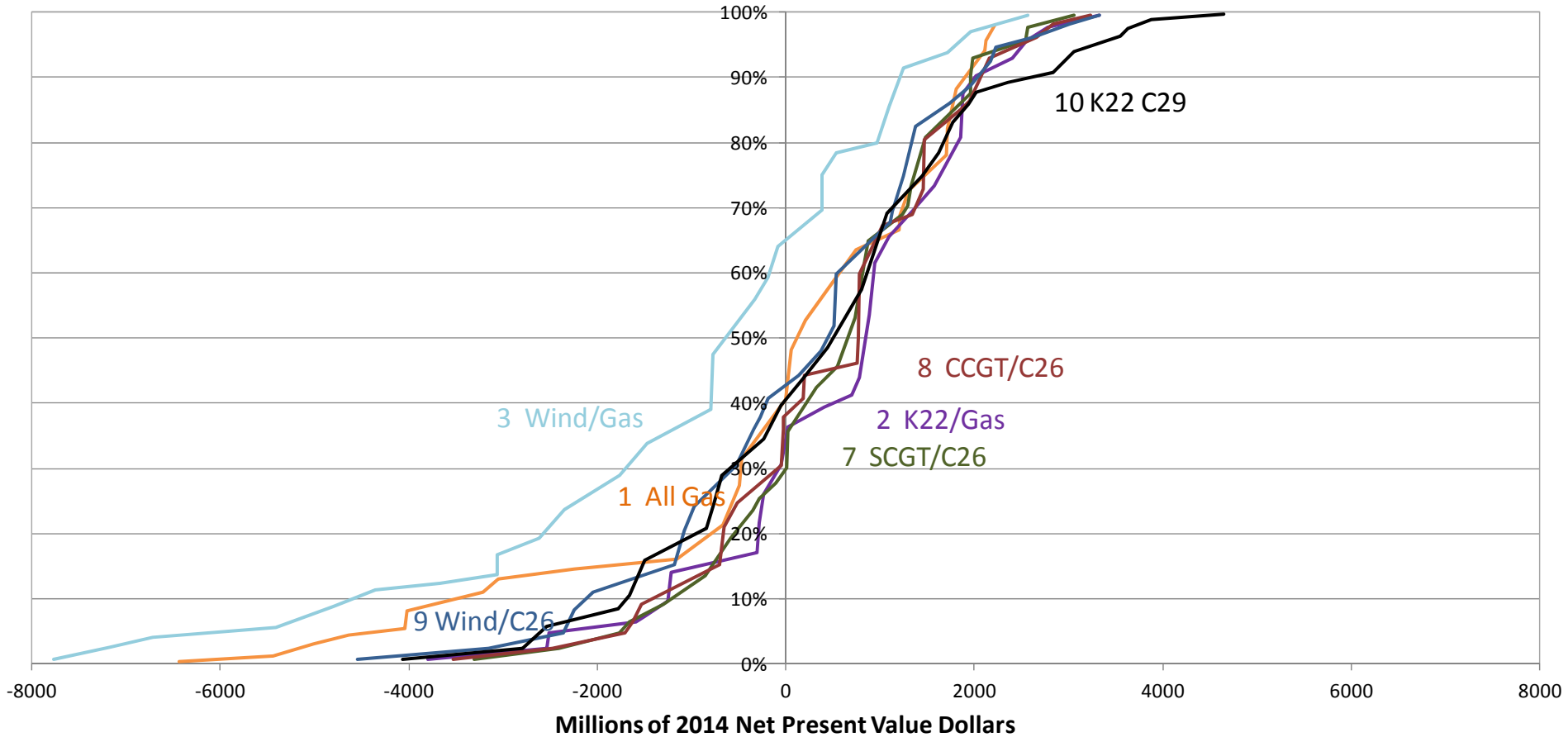


Figure 2.7.8: S-Curves for All 3 Development Plans with a New 250 MW US Interconnection

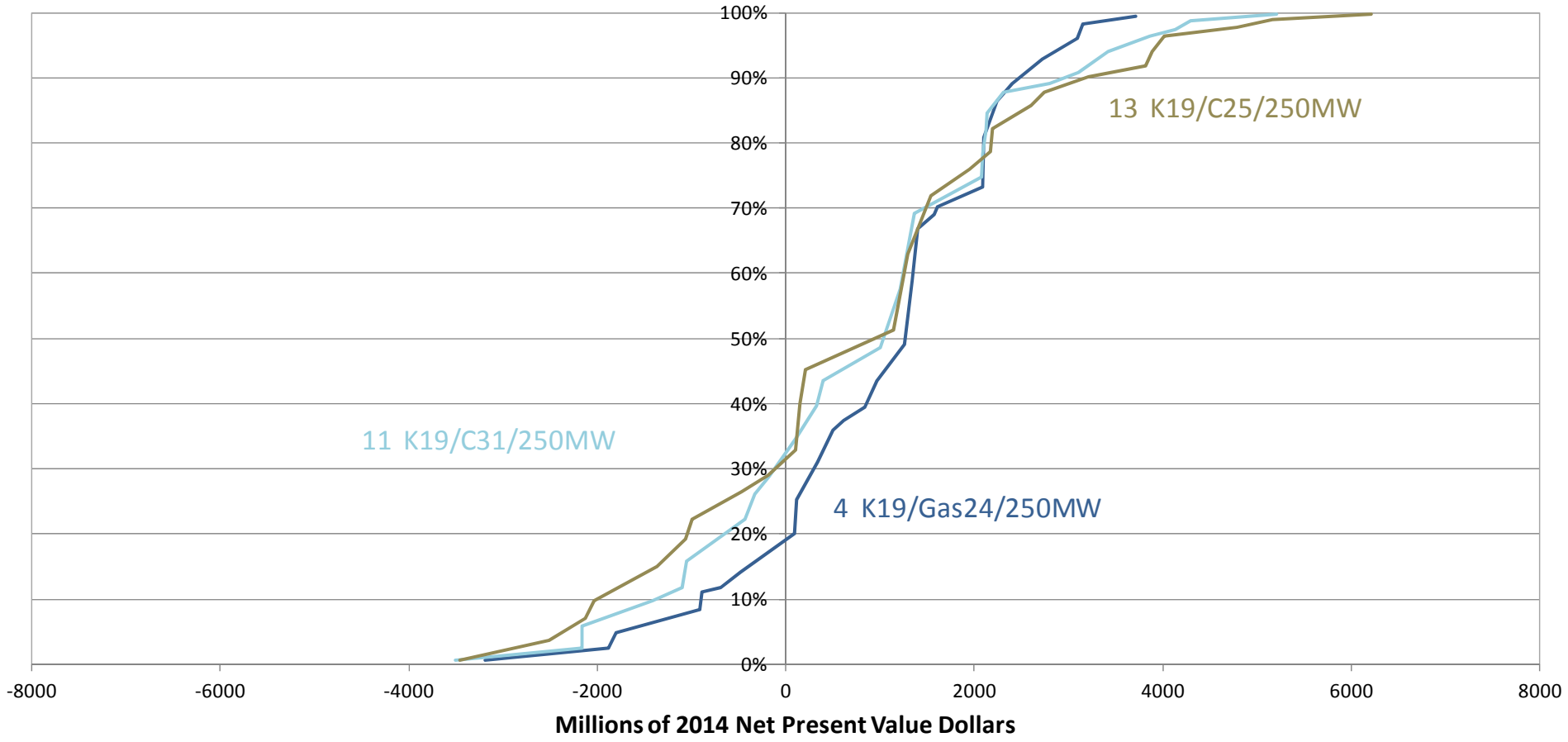


Figure 2.7.9: S-Curves for All 5 Development Plans with a New 750 MW US Interconnection

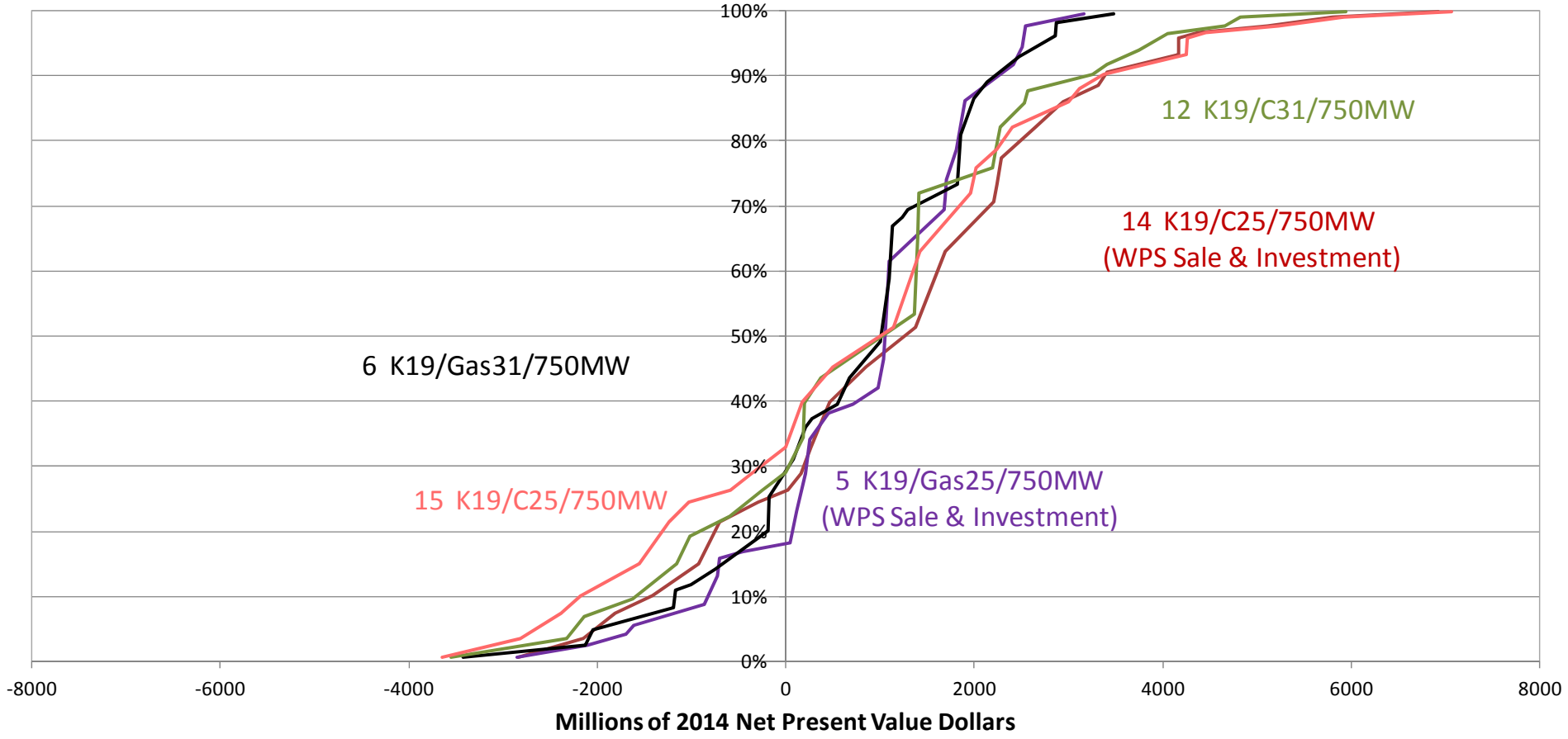


Figure 2.7.10: Chapter 10, Figure 10.11: Selected Plans with No New Interconnection

Development Plan	1	3	7	2
	All Gas	Wind/Gas	SCGT/C26	K22/Gas
Millions of 2014 NPV dollars				
Ref-Ref-Ref NPV	0	-775	738	887
P10 - "Risk"	-3502	-4599	-1217	-1249
P90 - "Reward"	1905	1209	1956	2007
Expected Value	-70	-1084	455	564

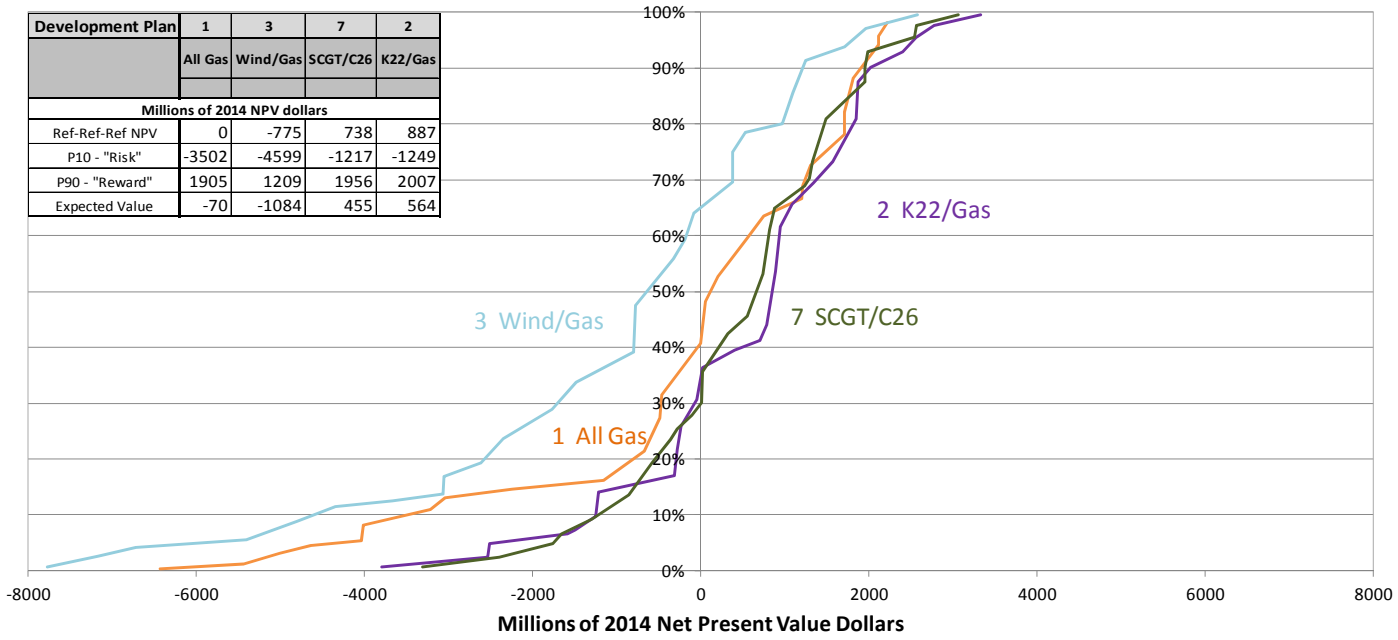


Figure 2.7.11: Chapter 10, Figure 10.12: K22/Gas and SCGT/C26

Development Plan	7	2
	SCGT/C26	K22/Gas
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	738	887
P10 - "Risk"	-1217	-1249
P90 - "Reward"	1956	2007
Expected Value	455	564

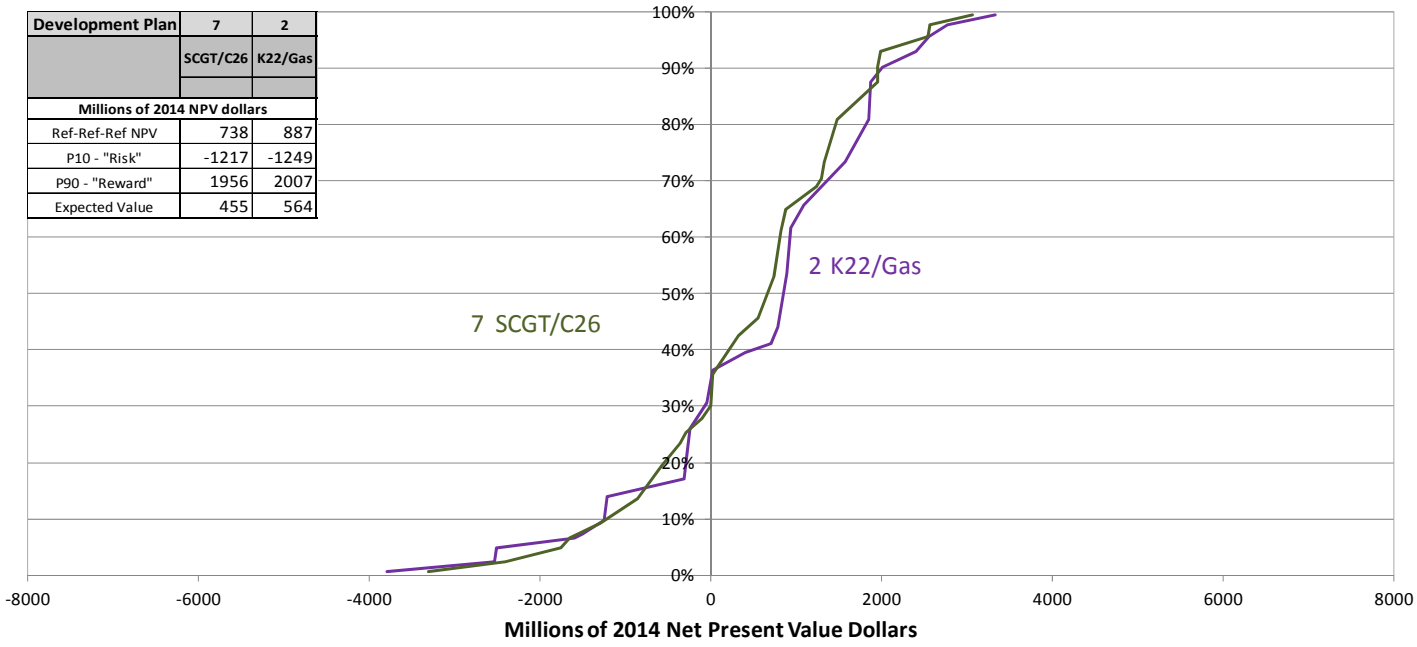


Figure 2.7.12: Chapter 10, Figure 10.13: Plans with 250-MW Interconnection

Development Plan	4	13	11
	K19/Gas24 /250MW	K19/C25 /250MW	K19/C31 /250MW
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1346	1295	1215
P10 - "Risk"	-898	-1988	-1362
P90 - "Reward"	2479	3180	2953
Expected Value	971	712	736

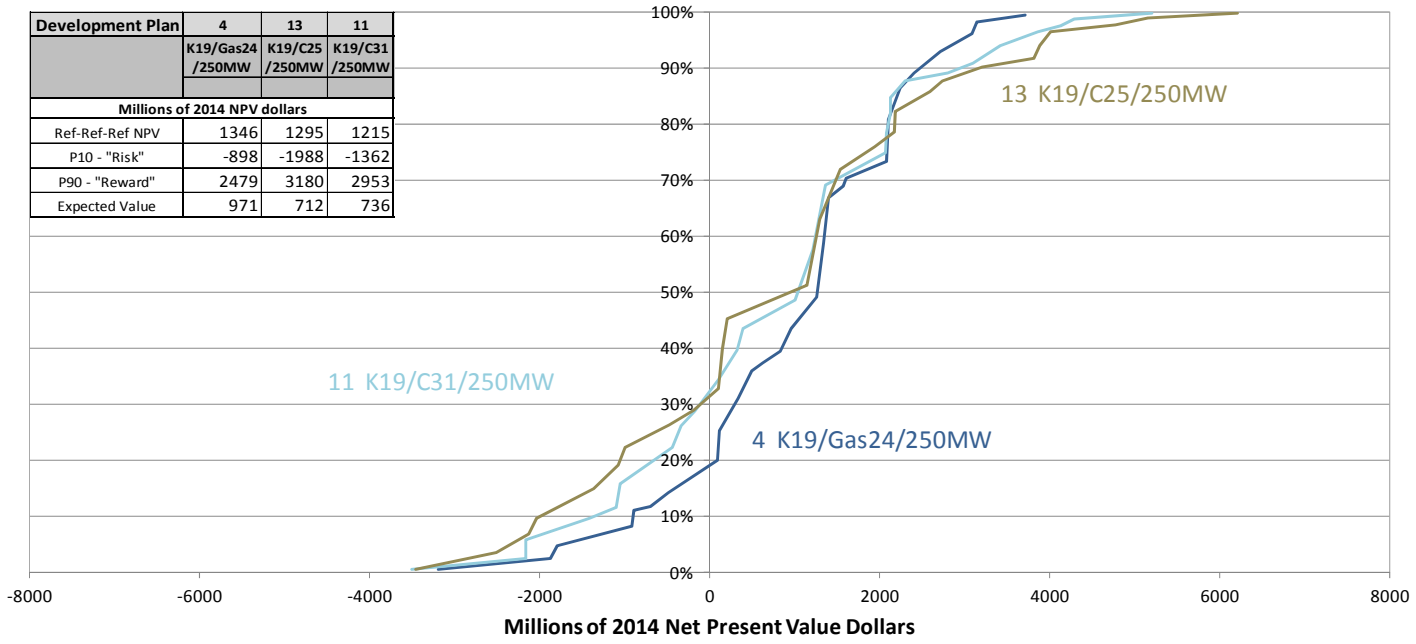


Figure 2.7.13: Chapter 10, Figure 10.14: Plans with 750-MW Interconnection and Proposed WPS Sale

Development Plan	5	14
	K19/Gas25 /750MW	K19/C25 /750MW
	WPS Sale & Inv	WPS Sale & Inv
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1097	1696
P10 - "Risk"	-828	-1429
P90 - "Reward"	2256	3377
Expected Value	772	1085

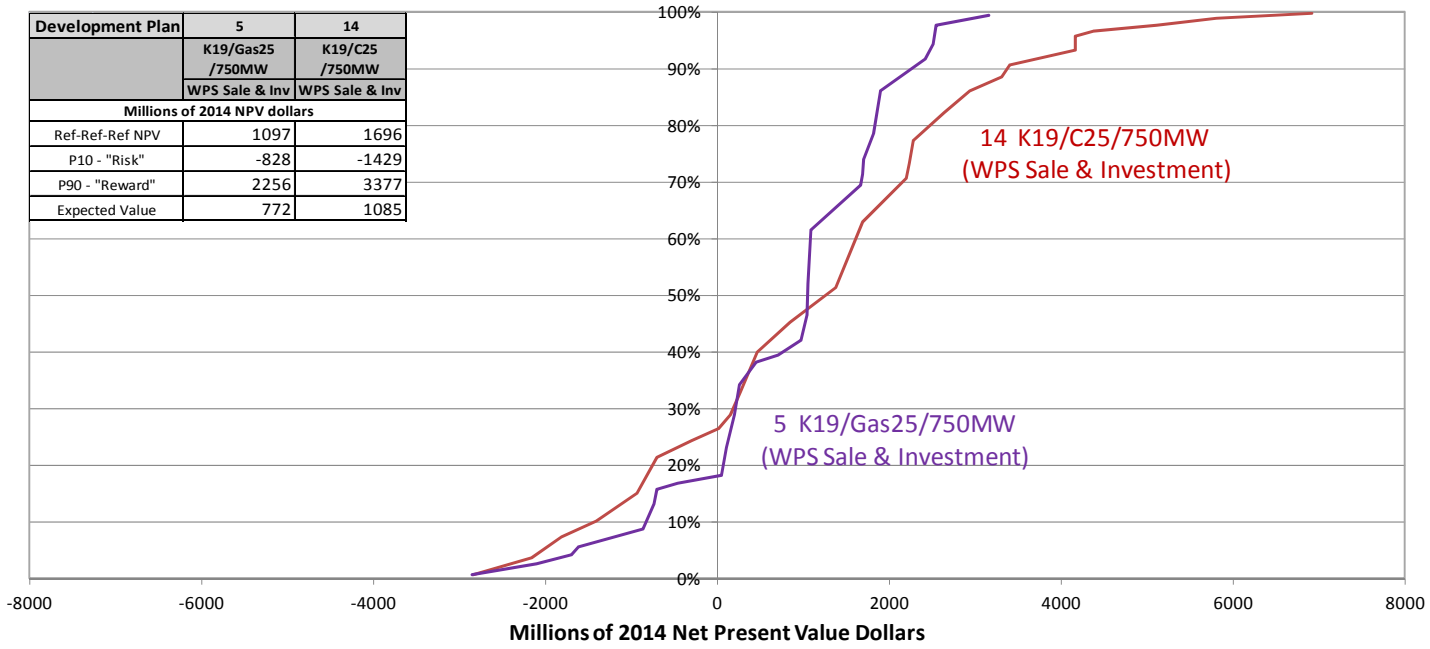


Figure 2.7.14: Chapter 10, Figure 10.15: Plans with 750-MW Interconnection and Without Proposed WPS Sale

Development Plan	6	15	12
	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1091	1427	1360
P10 - "Risk"	-1181	-2186	-1594
P90 - "Reward"	2215	3360	3220
Expected Value	706	760	821

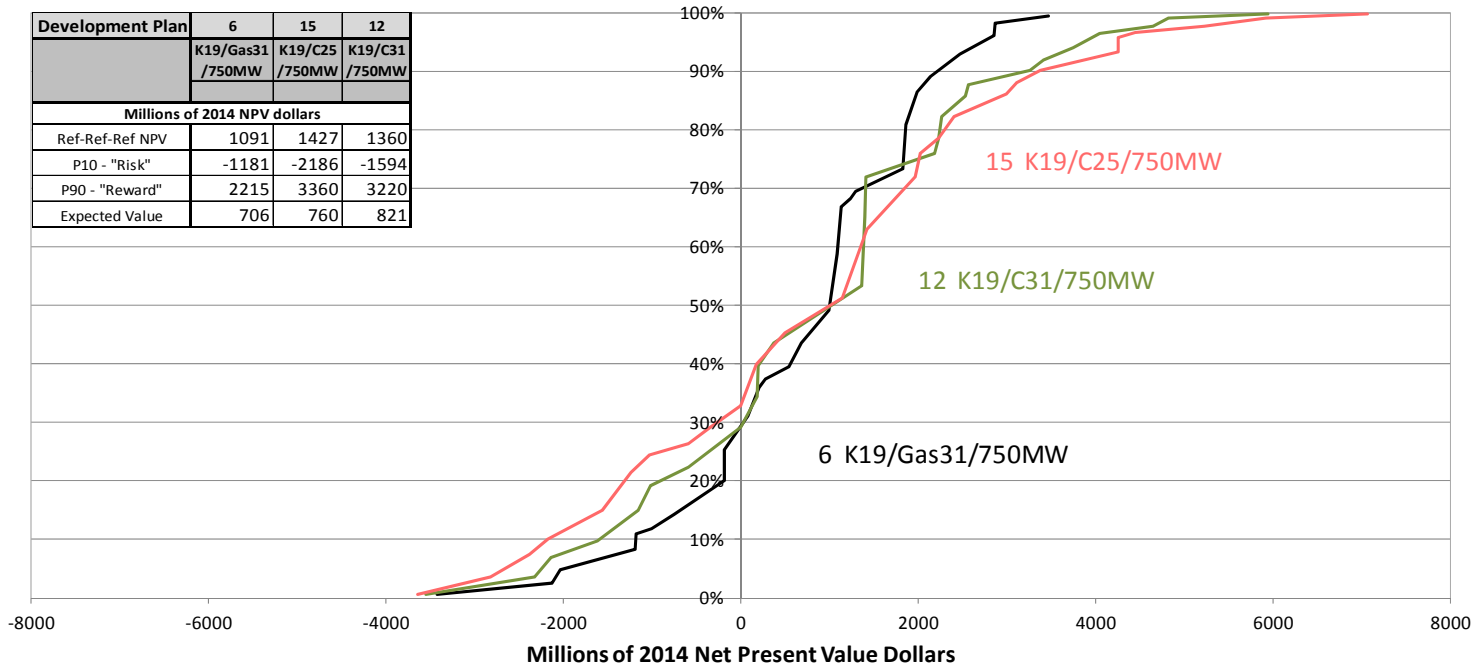


Figure 2.7.15: Chapter 10, Figure 10.16: Plans with 750-MW Interconnection and Conawapa G.S.

Development Plan	15	12	14
	K19/C25 /750MW	K19/C31 /750MW	K19/C25 /750MW WPS Sale & Inv
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1427	1360	1696
P10 - "Risk"	-2186	-1594	-1429
P90 - "Reward"	3360	3220	3377
Expected Value	760	821	1085

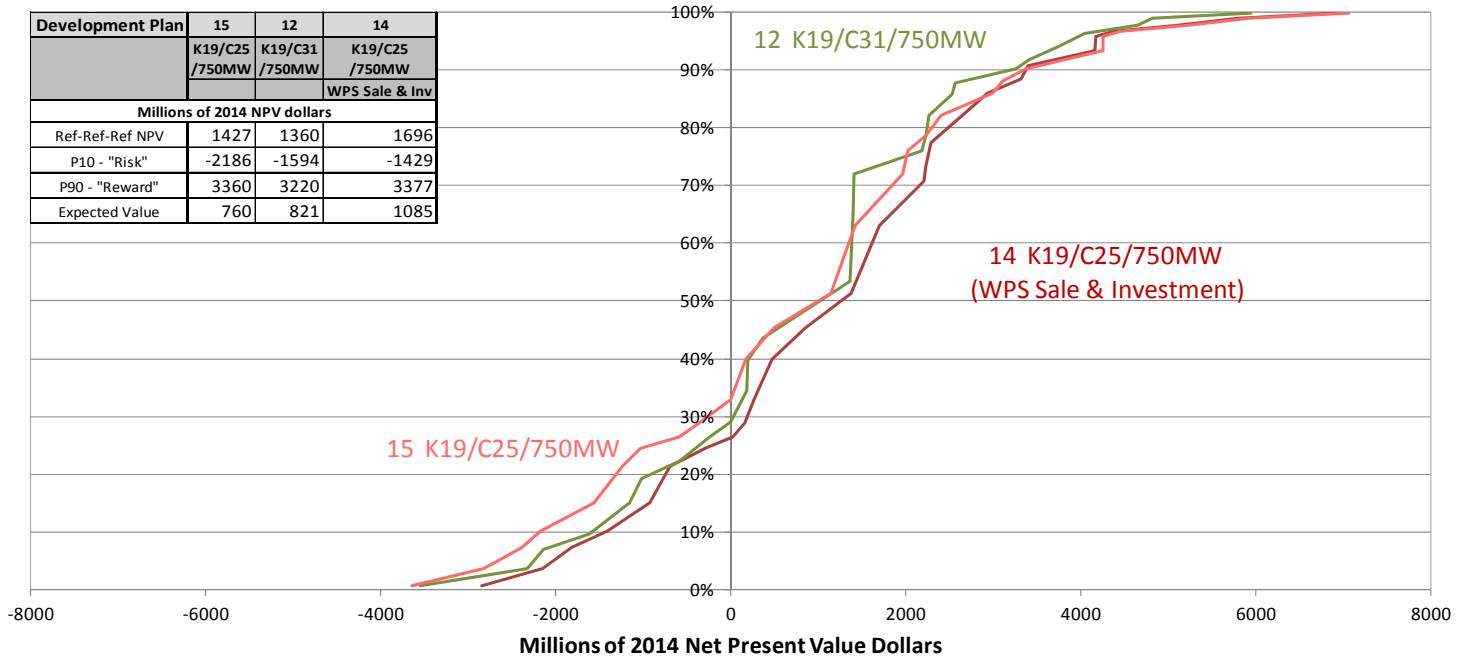


Figure 2.7.16: Chapter 10 Figure 10.17: Plans with a 750 MW Interconnection

Development Plan	6	15	12	5	14
	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
				WPS Sale & Inv	WPS Sale & Inv
Millions of 2014 NPV dollars					
Ref-Ref-Ref NPV	1091	1427	1360	1097	1696
P10 - "Risk"	-1181	-2186	-1594	-828	-1429
P90 - "Reward"	2215	3360	3220	2256	3377
Expected Value	706	760	821	772	1085

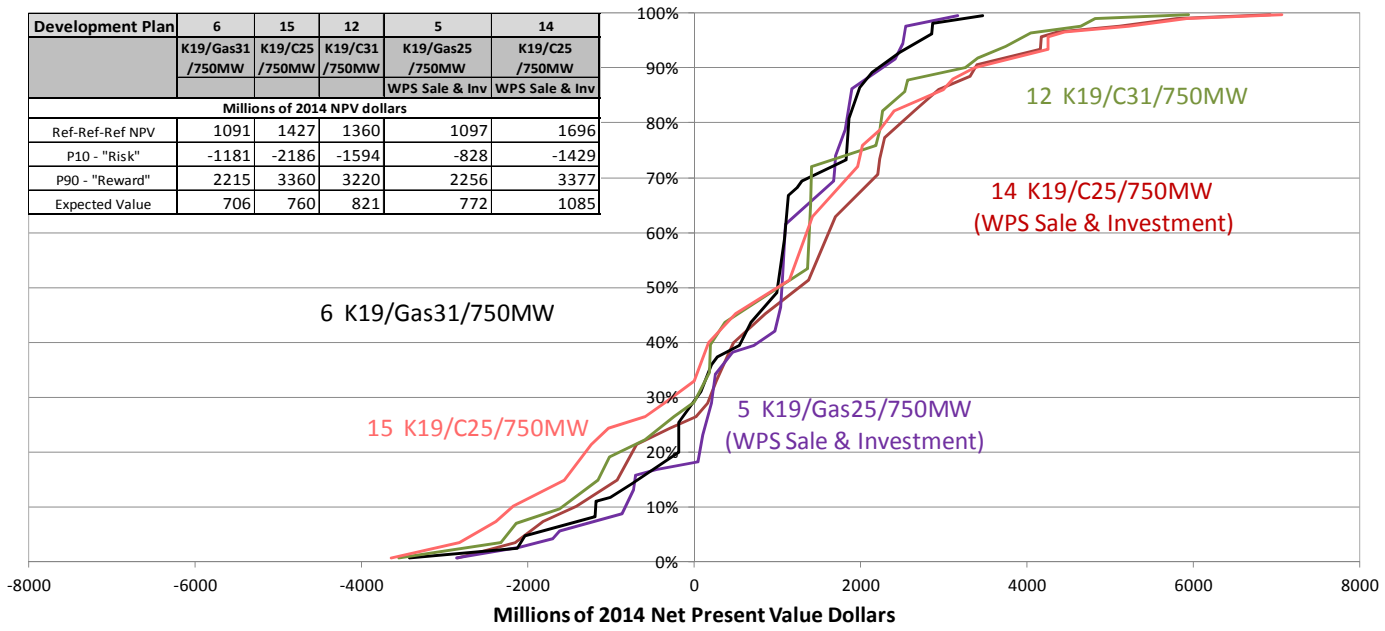


Figure 2.7.17: Chapter 10 Figure 10.18: K22/Gas and K19/Gas24/250MW Plans

Development Plan	2	4
	K22/Gas	K19/Gas24 /250MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	887	1346
P10 - "Risk"	-1249	-898
P90 - "Reward"	2007	2479
Expected Value	564	971

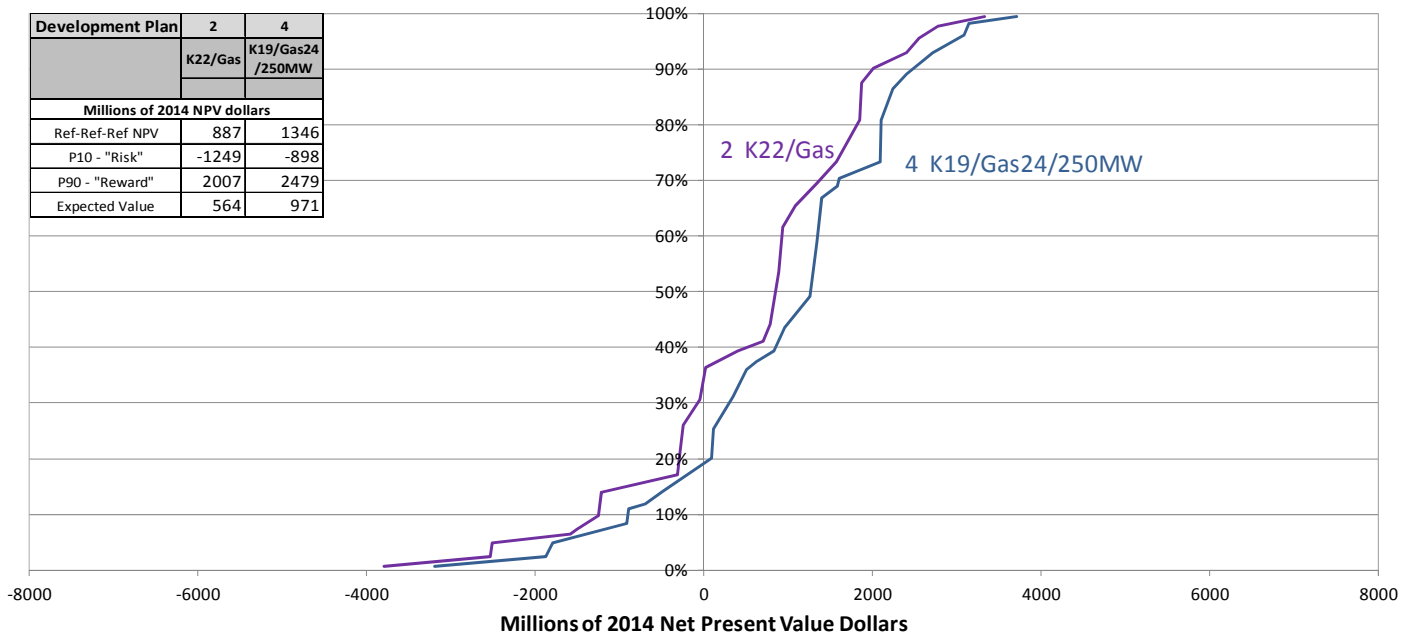


Figure 2.7.19: Chapter 10 Figure 10.19 left: Plans with Natural Gas Generation, 250 MW vs. 750 MW Interconnection

Development Plan	4	6
	K19/Gas24 /250MW	K19/Gas31 /750MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1346	1091
P10 - "Risk"	-898	-1181
P90 - "Reward"	2479	2215
Expected Value	971	706

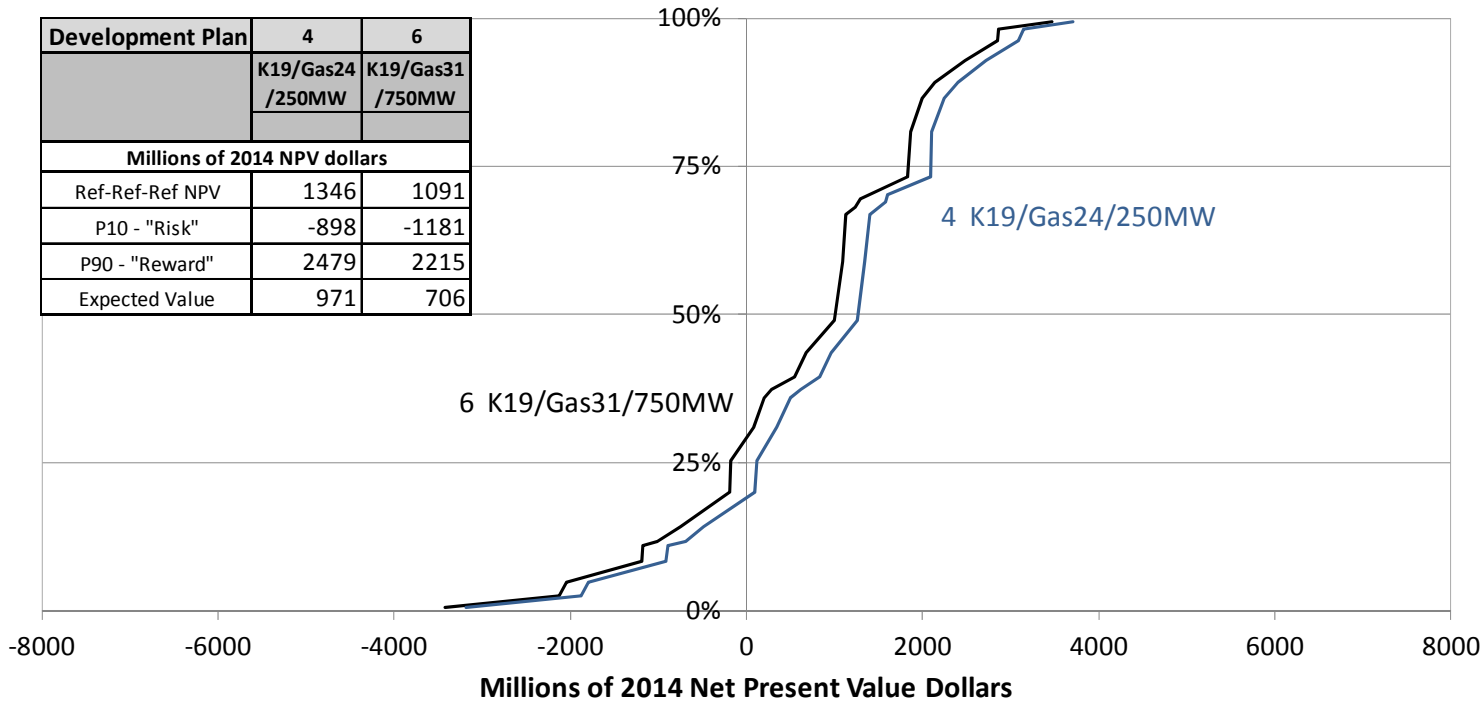


Figure 2.7.19: Chapter 10 Figure 10.19 right: Plans with Natural Gas Generation, 250 MW vs. 750 MW Interconnection

Development Plan	4	5
	K19/Gas24 /250MW	K19/Gas25 /750MW
		WPS Sale & Inv
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1346	1097
P10 - "Risk"	-898	-828
P90 - "Reward"	2479	2256
Expected Value	971	772

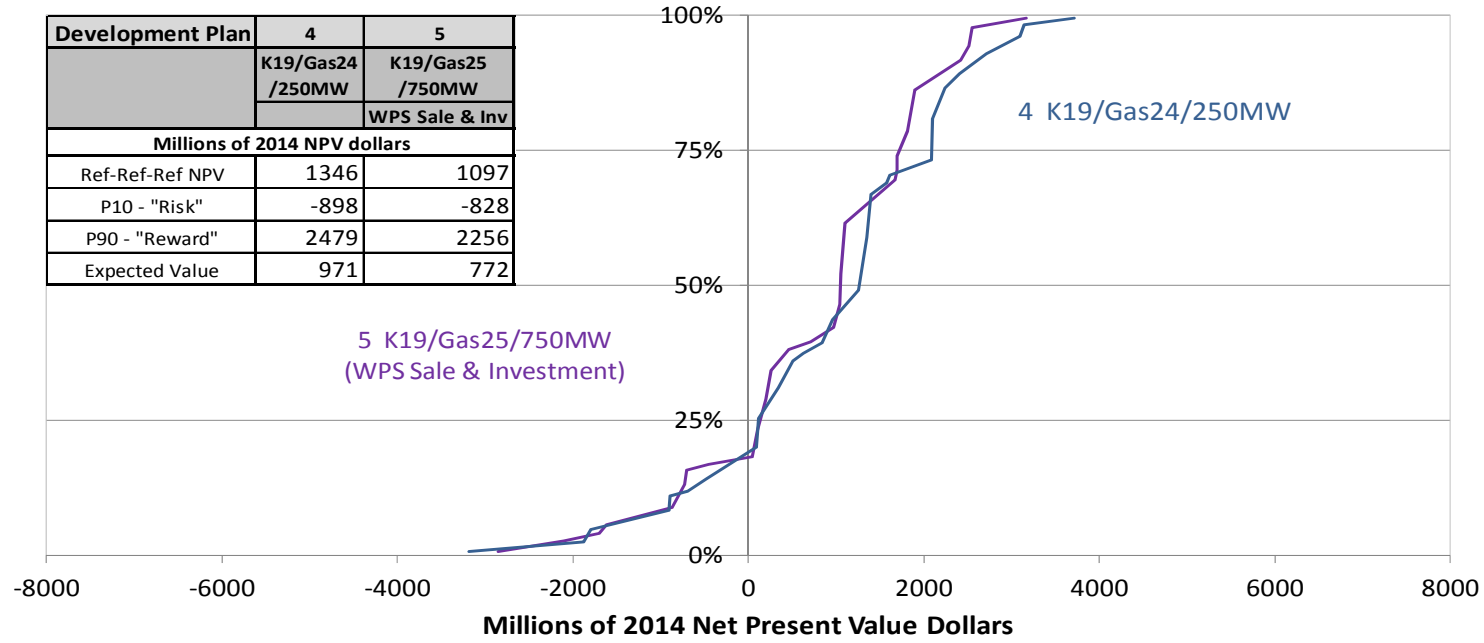


Figure 2.7.20: Chapter 10 Figure 10.20 A: Plans with Conawapa G.S., 250 MW Interconnection

Development Plan	13	11
	K19/C25 /250MW	K19/C31 /250MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1295	1215
P10 - "Risk"	-1988	-1362
P90 - "Reward"	3180	2953
Expected Value	712	736

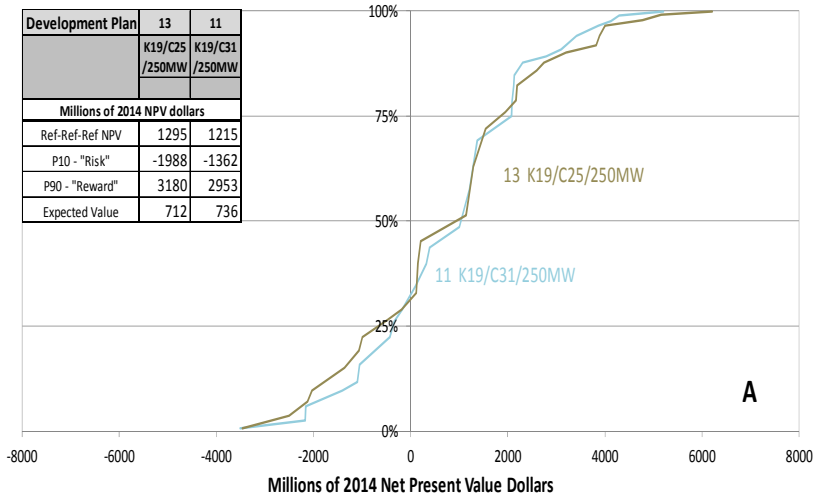


Figure 2.7.21: Chapter 10 Figure 10.20 B: Plans with Conawapa G.S., 750 MW Interconnection

Development Plan	15	12	14
	K19/C25 /750MW	K19/C31 /750MW	K19/C25 /750MW
			WPS Sale & Inv
Millions of 2014 NPV dollars			
Ref-Ref-Ref NPV	1427	1360	1696
P10 - "Risk"	-2186	-1594	-1429
P90 - "Reward"	3360	3220	3377
Expected Value	760	821	1085

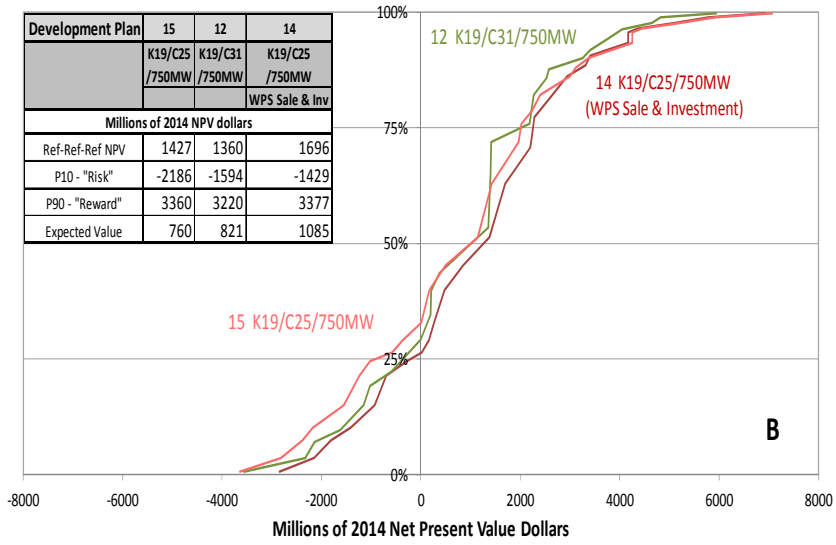


Figure 2.7.22: Chapter 10 Figure 10.20 C: Plans with Conawapa G.S., 250 MW vs. 750 MW Interconnection

Development Plan	11	12
	K19/C31 /250MW	K19/C31 /750MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1215	1360
P10 - "Risk"	-1362	-1594
P90 - "Reward"	2953	3220
Expected Value	736	821

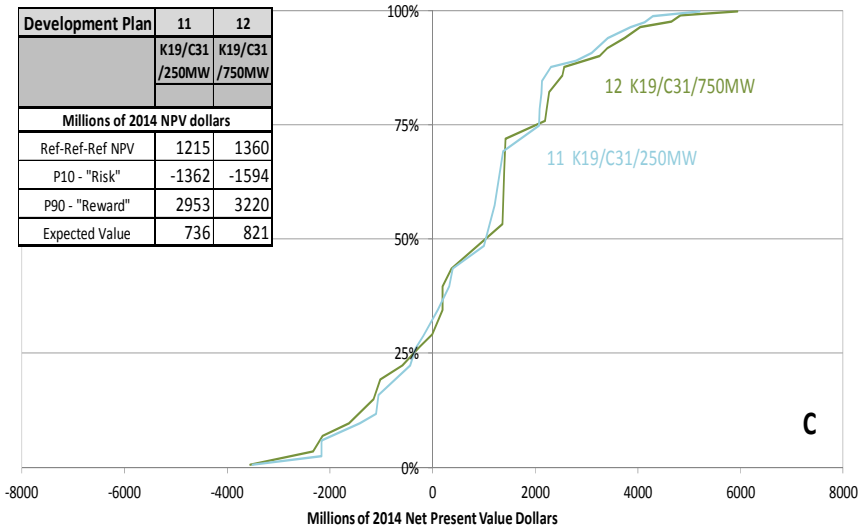


Figure 2.7.23: Chapter 10, Figure 10.21 left: K19/Gas24/250MW vs. K19/C31/750MW

Development Plan	4	12
	K19/Gas24 /250MW	K19/C31 /750MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1346	1360
P10 - "Risk"	-898	-1594
P90 - "Reward"	2479	3220
Expected Value	971	821

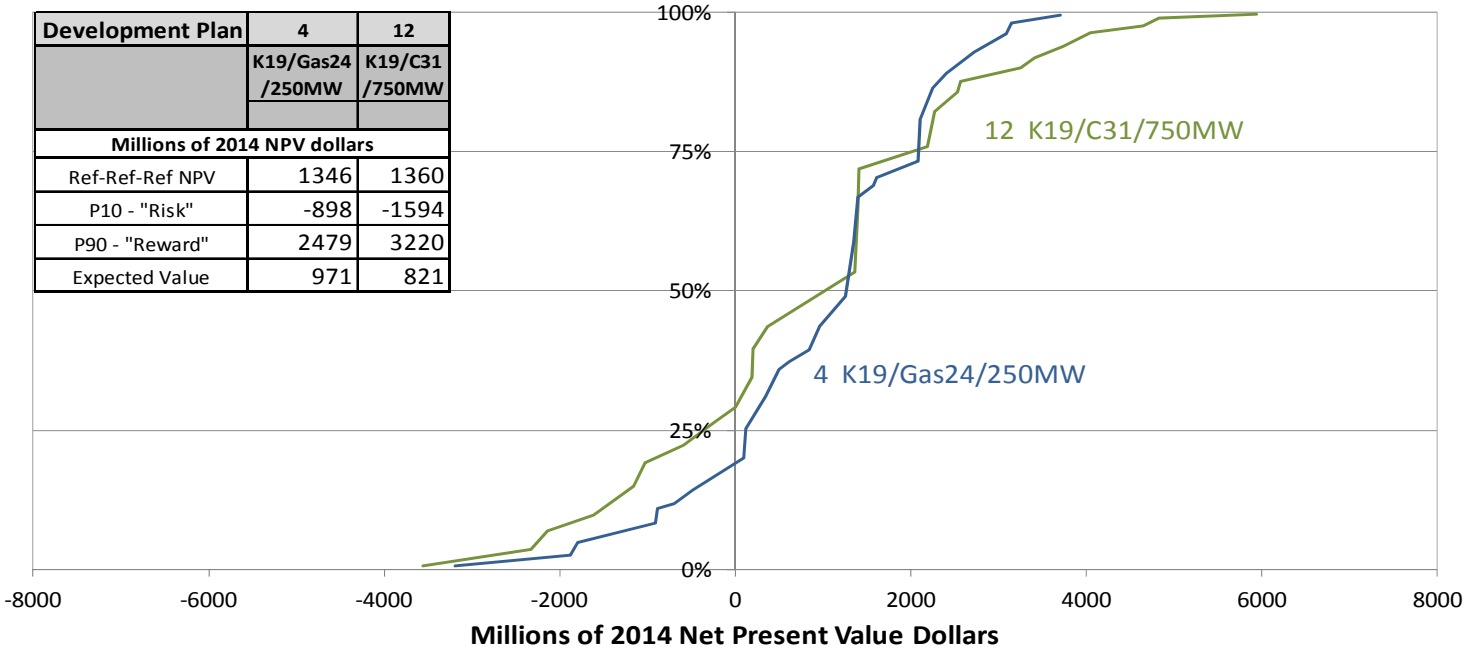
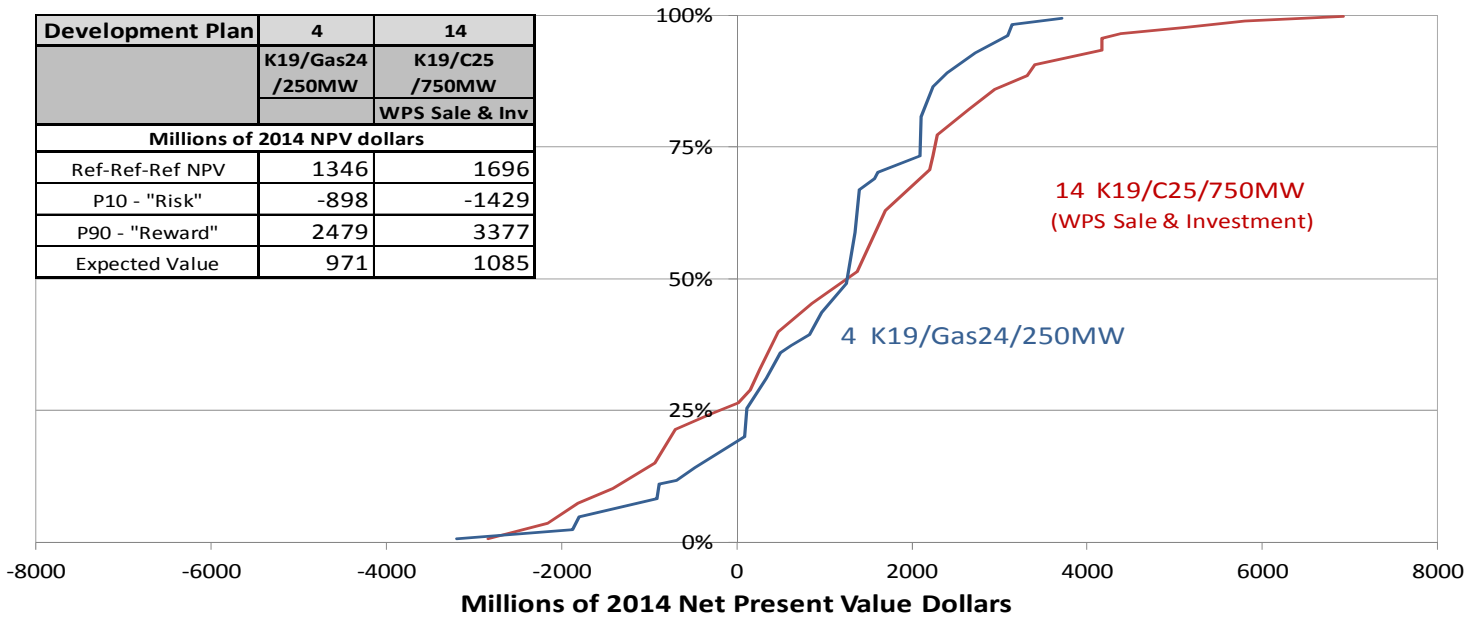


Figure 2.7.24: Chapter 10, Figure 10.21 right: K19/Gas24/250MW vs. K19/C25/750MW w/WPS Sale and Investment

Development Plan	4	14
	K19/Gas24 /250MW	K19/C25 /750MW
		WPS Sale & Inv
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1346	1696
P10 - "Risk"	-898	-1429
P90 - "Reward"	2479	3377
Expected Value	971	1085



3. Economic Summary Tables

The Economic Summary Tables (Tables 001 through to 405 included at the end of this Appendix 9.3) provide the cash flows for components which make up the net present value of each of the 15 NFAT 2012 developments plans for each of the 27 scenarios (405 cases). For a description of the development plans refer to ***Chapter 8 – Determination and Description of Development Plans.***

A high level summary of the incremental present values (incremental to the All Gas development plan) of the cost and revenue totals derived from the Economic Summary Tables is also provided for each development plan for each of the 27 scenarios (Tables 406 through to 432 included at the end of this Appendix 9.3).

Economic Summary Tables are also provided for the development plans associated with the 2013 updated economic evaluations (Tables 433 through to 444 included at the end of this Appendix 9.3).

Following is a general description of each of the cash flow components used for the economic evaluations of development plans and provided in the Economic Summary tables.

3.1. Capital and Related Costs

Capital cost estimates and related costs for the resource options that make up the development plans are identified by resource type in this category. Incremental capital costs associated with each development plan are included in the cash flow components of this category. Capital costs common to all development plans are excluded. Capital costs are presented on the basis of remaining estimated capital costs going forward from June 2014. All costs incurred or estimated prior to June 2014 are considered as sunk.

3.1.1. Hydro G.S. - Hydro–electric Generation

Capital estimates for Conawapa G.S. and Keeyask G.S. are shown separately and include the capital estimate for the generating station principal and supporting infrastructure based on the in-service date of the development plan. The capital estimating process for these resources is described in ***Appendix 2.2 – Developing the Keeyask and Conawapa Capital Cost Estimates***. For economic analysis purposes, hydro-electric generating stations are assumed to have a life of 67 years which reflects a compromise between the different service lives of the mechanical and electrical equipment and the service lives of the concrete and earthen structures.

3.1.2. Thermal G.S. - Natural Gas-fired Generation

Capital cost estimates for natural gas-fired generation include the generating station as well as land acquisition and gas pipeline costs. The generating station estimate is the product of a consulting study commissioned in 2012. The consultant was hired to produce a study that recommends natural gas-fired generation options for use in evaluations based on Manitoba Hydro's unique system needs and long-term load and market forecasts. The scope of the study includes details of recommended generation including performance, lead time and price. The consultant used industry standard gas turbine plant estimating software. A number of input variable adjustments were required to tailor the estimate to a specific project in Manitoba. Climatic parameters, soil conditions, water quality and other factors were selected from a number of available options to match the expected site conditions. Adjustments were made to account for regional differences in labour rates and material pricing. For economic analysis purposes, natural gas-fired generation options are assumed to have a life of 30 years.

3.1.3. Wind G.S. - Wind Generation

For economic evaluation purposes, it is assumed that all additional wind developments would be owned and operated by Manitoba Hydro. Manitoba Hydro wind turbine capital cost estimates are based on annual industry reviews of average wind project costs. The land required is assumed to be secured through leases and those costs are included in the Fixed

Operating and Maintenance category. Wind turbines are assumed to have a life of 20 years which is the current industry practice for evaluation purposes. Most failure statistics available for megawatt size units have less than 15 years of operation.

3.1.4. Transmission

Transmission is separated into two categories: Generation Outlet Transmission (GOT) and US Transmission Line (US T/L). GOT includes the facilities required to transmit the power from a generating station. Where appropriate, GOT also includes the North-South Transmission Upgrade Project as described in Chapter 2. When available, detailed capital cost estimates for generation outlet transmission are used. For transmission projects which have not been studied in detail, more generic unit cost estimates for generation outlet transmission have been developed by Manitoba Hydro (e.g. on a cost per km basis). GOT includes the required transmission lines which are assumed to have a life of 50 years and transmission stations which are assumed to have a life of 35 years.

US T/L refers to the capital expenditure related to a new U.S. transmission interconnection and includes Manitoba Hydro's contribution to both the Canadian and U.S. portion of the transmission line. Depending on the development plan, either a 250 MW or 750 MW transmission interconnection is included. In either case, Manitoba Hydro is responsible for all costs of the Manitoba portion of the transmission facilities. In the case of the 750 MW interconnection, Manitoba Hydro will also be responsible for a portion of the capital costs of the U.S. interconnection, however as the business model and cost allocation for this project have not been finalized, assumptions have been made for purposes of the NFAT evaluations. US T/L includes the transmission interconnection lines and stations to the U.S. which are assumed to have a life of 50 years and 35 years, respectively.

3.1.5. Total Capital

Total Capital is the annual sum of the yearly cash flows for the generating stations and transmission facilities.

3.1.6. Capital Taxes

Capital taxes are a provincial tax assessed under "The Corporation Capital Tax Act" of Manitoba. In general terms, this tax is applied at a rate of 0.5% to the capital invested by Manitoba Hydro in the province, where "capital" can be generally defined as the total debt and retained earnings of the corporation. The capital tax included in the economic evaluation is the amount of incremental tax incurred based on the additional capital investment of each development plan.

3.1.7. Fixed O&M – Fixed Operating and Maintenance Costs

Fixed O&M are those costs that occur on an annual basis that are not dependent on the quantity of energy generated. These costs include labour, operating and overhead costs associated with operating, maintaining and administering the incremental generation, transmission and interconnection facilities contemplated by each development plan. Estimated costs of regular capital maintenance items required over the life of the facilities are also included. Fixed O&M for incremental wind generation also includes the estimated cost of land lease payments.

3.2. Net Average Flow Related Revenue (Production Costs and Revenues)

The components that make up net average flow related revenue are calculated using Manitoba Hydro's system simulation computer model known as SPLASH. The SPLASH model is described in more detail in ***Appendix 9.2 – Description of the SPLASH Model***.

3.2.1. Gross Revenue

Gross revenue incorporates the revenue from both firm export power sales and the sale of short-term opportunity export energy. Gross revenue does not include domestic revenue as it is common to all development plans. Expected export revenues are generated from the SPLASH model and are a function of the makeup of each development plan within the context of the whole Manitoba Hydro generation and transmission system and the interconnected markets.

Firm export power sales consist of existing long-term contract commitments and proposed contract commitments for firm sales in the future which are at a fixed contract price. In addition, any excess dependable hydro-electric energy not sold or anticipated to be sold is assumed to be marketed as a firm sale in the future. This uncommitted firm hydro-electric energy is valued at a premium price relative to short-term opportunity sales.

The value of market priced firm and opportunity exports is derived from the corporate electricity export price forecast. See Section 1.5 of this appendix for a description of the electricity export price forecast methodology.

All export revenues are forecast in U.S. dollars and then converted to Canadian dollars using Manitoba Hydro's forecast for the U.S. dollar to Canadian dollar foreign exchange rate.

3.2.2. Water Rentals

Water rentals are annual charges levied by the Provincial Government for the use of water for the production of electricity under the provision of the Manitoba Water Power Act and Regulation. Water rental charges for each hydro-electric generating station, on a calendar year basis, are the greater of:

a) a fixed rate multiplied by the installed capacity;
b) a fixed rate multiplied by the electric output for the year.

Water rental rates are set to be equivalent to 3.3426 mills per KWh. For planning purposes, it is assumed that this rate remains constant for the 35 year planning period.

3.2.3. **Thermal Burn** – Variable Production Costs of Thermal Generation

Manitoba Hydro thermal generation includes the existing natural gas-fired and coal-fired steam generation as well as future natural gas-fired generation contemplated by each development plan. For planning purposes it is assumed that Manitoba Hydro's last coal-fired steam turbine unit will be retired as of January 1, 2020.

The variable production costs of thermal generation are dependent upon the quantity of generation. As part of a predominately hydro-electric system, from a planning perspective, the need to dispatch thermal generation is dependent on water flows. The quantity of generation is determined by the SPLASH model and includes fuel costs, variable operation and maintenance (O&M) costs and carbon adders.

3.2.3.1. Fuel Costs

The methodology for determining both the coal and natural gas price forecasts is described below.

Coal

Price estimates for Powder River Basin (PRB) coal to 2019/20 are based on future projections of current contract provisions that exist with Manitoba Hydro's coal supplier and rail transporter. The above contracts expire in 2014. The coal price forecast includes both the cost of coal and transportation costs.

Natural Gas

The fuel cost for natural gas-fired generation is derived from the natural gas price forecast for the Province of Manitoba. See Section 1.5.2 of this appendix for a description of the natural gas price forecast methodology.

3.2.3.2. Variable O&M

Variable O&M for thermal generation represents the cost of the major maintenance and overhaul events that occur on either the basis of unit starts, operating hours or some combination of both as well as consumables such as chemicals and lubricants used during plant operation.

3.2.3.3. Carbon Adders

The provincial Emission Tax on Coal Act imposes a $17.37 tax per tonne on sub-bituminous coal purchased after January 1, 2012. This corresponds to an approximate tax rate of $9.40 per MWh generated for the remaining coal unit.

The expected costs associated with future carbon legislation/policies which would impact natural gas-fired generation are included and based on the quantity of natural gas-fired generation in each development plan. See Section 1.5 of this appendix for a description of the carbon price forecast methodology

3.2.4. Power Purchases

Power purchases include both imports from the MISO market and existing wind purchases.

Import quantities are generated from the SPLASH model and are a function of each development plan within the context of the whole Manitoba Hydro generation and transmission system and the interconnected markets. Imports are used to supply Manitoba Hydro's obligations and quantities vary depending on water flow conditions. In addition, when system conditions allow, Manitoba Hydro imports energy during lower import price periods, to facilitate sales opportunities during higher export price periods to maximize export revenue opportunities.

Wind purchase costs are based on the terms and conditions of the individual power purchase agreements in effect.

3.2.4.1. Wind Integration costs

Total wind integration costs are a deduction from the Gross Revenue and/or an addition to the Power Purchases. The allocation for each year is based on the volume of exports or imports divided by the market transaction volume (total import plus export volume) multiplied by the wind integration unit rate. A more detailed discussion of wind integration costs can be found in Section 1.5 of this appendix.

3.2.5. Net Revenue

Net Flow Related Revenue is calculated on an annual basis as gross flow related revenue less flow related expenses including water rentals, thermal burn costs and power purchases.

K19/C25/750MW (WPS Sale &Inv)

TABLE 001
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	3.78	277.90	1.39	0.00	311.23	102.98	19.82	98.34	90.08
2015	87.48	485.83	0.00	0.00	18.92	6.75	598.98	4.38	0.00	341.10	101.10	23.49	102.11	114.39
2016	182.24	643.32	0.00	0.00	25.89	17.15	868.60	8.73	0.00	351.61	99.26	24.63	104.47	123.24
2017	212.03	779.65	0.00	0.00	37.88	24.95	1054.51	14.00	0.00	367.37	97.30	26.31	107.43	136.33
2018	254.86	549.74	0.00	0.00	39.82	103.34	947.77	18.74	0.00	351.91	95.21	26.94	108.58	121.18
2019	260.97	393.19	0.00	0.00	50.71	85.16	790.03	22.69	13.01	378.89	95.14	25.52	108.28	149.94
2020	719.36	160.55	0.00	0.00	3.54	157.85	1041.30	27.90	44.86	617.12	102.28	20.22	123.67	370.96
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	34.16	42.99	697.22	102.84	22.23	133.26	438.89
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	39.46	41.65	694.56	101.65	22.24	135.74	434.92
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	43.35	39.80	664.06	99.33	22.12	139.94	402.68
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	46.24	38.24	641.23	97.13	24.58	145.52	374.00
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	48.35	50.89	661.04	101.75	21.82	113.58	423.89
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	49.49	49.35	862.16	109.86	21.76	114.33	616.22
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	49.68	47.92	899.07	109.90	21.29	125.05	642.84
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	46.91	889.29	108.23	22.00	128.24	630.82
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	48.20	868.89	106.31	22.04	131.31	609.24
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	43.02	859.25	104.97	21.57	133.01	599.70
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	41.70	846.94	103.31	22.04	136.64	584.95
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	40.22	828.23	101.62	22.09	139.90	564.62
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	39.21	804.17	99.84	22.11	143.08	539.15
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	38.27	781.53	98.11	22.27	147.20	513.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	39.54	741.75	96.43	22.07	143.82	479.43
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	36.10	672.95	94.82	22.47	128.55	427.11
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	49.68	35.57	640.80	93.20	22.58	129.84	395.19
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	35.06	615.74	91.55	22.53	134.49	367.17
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	50.07	37.47	592.43	89.94	22.48	146.19	333.82
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	50.66	34.09	589.00	88.66	21.37	156.31	322.66
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	50.74	36.95	570.11	86.66	38.13	158.02	287.31
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	51.13	36.51	555.62	85.12	42.52	164.06	263.91
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	51.72	36.07	545.01	83.76	44.88	172.02	244.36
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	52.21	41.37	541.23	82.55	51.48	180.82	226.39
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	53.12	43.86	516.67	80.70	66.61	181.87	187.49
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	53.20	44.56	505.17	79.26	80.82	187.57	157.51
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	43.31	491.59	77.99	84.47	196.24	132.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	42.07	504.47	79.32	77.30	188.56	159.30
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	53.20	44.61	504.47	79.32	77.30	188.56	159.30
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	53.20	43.11	504.47	79.32	77.30	188.56	159.30
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	53.20	42.78	504.47	79.32	77.30	188.56	159.30
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	53.20	42.46	504.47	79.32	77.30	188.56	159.30
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	53.20	42.15	504.47	79.32	77.30	188.56	159.30
2054	0.00	0.00	0.00	0.00	17.63	18.49	36.12	53.20	41.84	504.47	79.32	77.30	188.56	159.30
2055	0.00	0.00	0.00	0.00	0.87	19.18	20.05	53.20	42.71	504.47	79.32	77.30	188.56	159.30
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	53.20	55.02	504.47	79.32	77.30	188.56	159.30
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	53.20	39.25	504.47	79.32	77.30	188.56	159.30
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	53.20	54.48	504.47	79.32	77.30	188.56	159.30
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	53.20	41.62	504.47	79.32	77.30	188.56	159.30
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	53.20	51.26	504.47	79.32	77.30	188.56	159.30
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	66.75	504.47	79.32	77.30	188.56	159.30
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	53.20	66.75	504.47	79.32	77.30	188.56	159.30
2065	0.00	0.00	0.00	0.00	8.65	4.18	12.82	53.20	38.66	504.47	79.32	77.30	188.56	159.30
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	53.20	66.75	504.47	79.32	77.30	188.56	159.30
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	53.20	66.75	504.47	79.32	77.30	188.56	159.30
2069	0.00	0.00	78.30	0.00	33.08	56.37	167.75	53.20	38.66	504.47	79.32	77.30	188.56	159.30
2070	0.00	0.00	106.94	0.00	2.67	58.46	168.07	53.20	53.00	504.47	79.32	77.30	188.56	159.30
2071	0.00	0.00	16.22	0.00	32.44	0.00	48.66	53.20	37.50	504.47	79.32	77.30	188.56	159.30
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	53.20	53.00	504.47	79.32	77.30	188.56	159.30
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	53.20	36.63	504.47	79.32	77.30	188.56	159.30
2074	0.00	0.00	96.75	0.00	50.02	0.00	146.76	53.20	51.26	504.47	79.32	77.30	188.56	159.30
2075	0.00	0.00	109.64	0.00	75.23	0.00	184.87	53.20	38.66	504.47	79.32	77.30	188.56	159.30
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	53.20	53.00	504.47	79.32	77.30	188.56	159.30
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	37.50	504.47	79.32	77.30	188.56	159.30
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	53.20	53.00	504.47	79.32	77.30	188.56	159.30
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	40.40	504.47	79.32	77.30	188.56	159.30
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	53.20	53.00	504.47	79.32	77.30	188.56	159.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	53.20	38.66	504.47	79.32	77.30	188.56	159.30
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	53.20	35.76	504.47	79.32	77.30	188.56	159.30
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	53.20	38.66	504.47	79.32	77.30	188.56	159.30
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	53.20	38.66	504.47	79.32	77.30	188.56	159.30
Salvage Value	2.31	0.00	6.54	0.00	10.30	4.78	23.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	193.35	0.00	449.81	337.17	7837.52	779.59	651.85	11808.35	1938.98	705.38	2816.45	6347.54

Net Present Value -2921

K19/C25/750MW

TABLE 002
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	5.28	279.40	1.40	0.00	312.22	102.98	19.82	97.95	91.47
2015	87.48	485.83	0.00	0.00	18.92	8.56	600.79	4.40	0.00	343.08	101.10	23.52	102.06	116.40
2016	182.24	643.32	0.00	0.00	25.89	17.93	869.38	8.75	0.00	352.81	99.25	24.59	104.39	124.57
2017	212.03	779.65	0.00	0.00	37.88	24.95	1054.51	14.02	0.00	367.62	97.30	26.28	107.35	136.68
2018	254.86	549.74	0.00	0.00	39.82	146.07	990.49	18.97	0.00	350.91	95.20	26.86	108.55	120.29
2019	260.97	393.19	0.00	0.00	50.71	100.61	805.48	23.00	13.01	377.59	95.13	25.49	108.28	148.68
2020	719.36	160.55	0.00	0.00	3.54	278.17	1161.63	28.81	47.98	620.46	102.28	20.19	123.28	374.71
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	35.08	46.21	700.66	102.85	22.38	133.18	442.25
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	40.37	44.90	698.00	101.65	22.24	135.49	438.62
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	44.26	42.92	668.14	99.33	22.12	139.76	406.93
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	47.15	41.22	645.50	97.10	24.63	145.36	378.41
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	49.27	53.76	665.29	101.74	21.85	113.29	428.41
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	50.40	52.09	846.18	109.85	21.85	110.96	603.53
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	50.60	50.55	861.04	109.91	21.13	116.32	613.69
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	49.42	849.74	108.24	21.96	118.84	600.71
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	50.61	831.77	106.31	22.04	122.13	581.30
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	45.33	824.74	104.96	21.59	123.93	574.27
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	43.90	815.39	103.30	22.14	127.59	562.36
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	42.32	799.96	101.61	22.14	131.28	544.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	41.21	779.42	99.85	22.05	134.97	522.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	40.19	760.42	98.12	22.17	139.75	500.37
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	41.37	691.55	96.49	22.28	123.89	448.89
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	37.85	661.63	94.82	22.50	125.41	418.90
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	50.60	37.25	638.65	93.18	22.51	129.14	393.82
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	36.67	614.52	91.55	22.49	133.67	366.81
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	50.99	39.01	592.02	89.94	22.52	145.33	334.23
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	51.57	35.57	588.44	88.66	21.37	155.44	322.97
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	51.65	38.37	569.71	86.66	38.13	157.40	287.52
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	52.05	37.86	555.39	85.12	42.52	163.53	264.21
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	52.64	37.36	544.55	83.76	44.88	171.37	244.53
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	53.12	42.61	540.93	82.55	51.48	180.29	226.62
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	54.03	45.04	516.46	80.70	66.61	181.47	187.69
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	54.12	45.69	504.83	79.26	80.82	187.03	157.71
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	44.39	491.28	77.99	84.47	195.74	133.09
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	43.10	504.19	79.32	77.30	188.08	159.49
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	54.12	45.59	504.19	79.32	77.30	188.08	159.49
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	54.12	44.04	504.19	79.32	77.30	188.08	159.49
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	54.12	43.67	504.19	79.32	77.30	188.08	159.49
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	54.12	43.30	504.19	79.32	77.30	188.08	159.49
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	54.12	42.95	504.19	79.32	77.30	188.08	159.49
2054	0.00	0.00	0.00	0.00	17.63	18.49	36.12	54.12	42.61	504.19	79.32	77.30	188.08	159.49
2055	0.00	0.00	0.00	0.00	0.87	19.18	20.05	54.12	43.43	504.19	79.32	77.30	188.08	159.49
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	54.12	55.71	504.19	79.32	77.30	188.08	159.49
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	54.12	39.90	504.19	79.32	77.30	188.08	159.49
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	54.12	55.10	504.19	79.32	77.30	188.08	159.49
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	54.12	42.21	504.19	79.32	77.30	188.08	159.49
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	54.12	51.26	504.19	79.32	77.30	188.08	159.49
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	66.75	504.19	79.32	77.30	188.08	159.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	54.12	66.75	504.19	79.32	77.30	188.08	159.49
2065	0.00	0.00	0.00	0.00	8.65	4.18	12.82	54.12	38.66	504.19	79.32	77.30	188.08	159.49
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	54.12	66.75	504.19	79.32	77.30	188.08	159.49
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	54.12	66.75	504.19	79.32	77.30	188.08	159.49
2069	0.00	0.00	78.30	0.00	33.08	56.37	167.75	54.12	38.66	504.19	79.32	77.30	188.08	159.49
2070	0.00	0.00	106.94	0.00	2.67	58.46	168.07	54.12	53.00	504.19	79.32	77.30	188.08	159.49
2071	0.00	0.00	16.22	0.00	32.44	0.00	48.66	54.12	37.50	504.19	79.32	77.30	188.08	159.49
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	54.12	53.00	504.19	79.32	77.30	188.08	159.49
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	54.12	36.63	504.19	79.32	77.30	188.08	159.49
2074	0.00	0.00	96.75	0.00	50.02	0.00	146.76	54.12	51.26	504.19	79.32	77.30	188.08	159.49
2075	0.00	0.00	109.64	0.00	75.23	0.00	184.87	54.12	38.66	504.19	79.32	77.30	188.08	159.49
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	54.12	53.00	504.19	79.32	77.30	188.08	159.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	37.50	504.19	79.32	77.30	188.08	159.49
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	54.12	53.00	504.19	79.32	77.30	188.08	159.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	40.40	504.19	79.32	77.30	188.08	159.49
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	54.12	53.00	504.19	79.32	77.30	188.08	159.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	54.12	38.66	504.19	79.32	77.30	188.08	159.49
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	54.12	35.76	504.19	79.32	77.30	188.08	159.49
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	54.12	38.66	504.19	79.32	77.30	188.08	159.49
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	54.12	38.66	504.19	79.32	77.30	188.08	159.49
Salvage Value	2.31	0.00	6.54	0.00	10.30	4.78	23.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	193.35	0.00	449.81	477.79	7978.14	793.78	680.39	11676.08	1938.95	705.41	2770.18	6261.53

Net Present Value -3191

K19/Gas25/750MW (WPS Sale & INV)

TABLE 003
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	3.78	246.19	1.23	0.00	311.23	102.98	19.82	98.34	90.08
2015	0.00	485.83	0.00	0.00	18.92	6.75	511.50	3.79	0.00	341.12	101.11	23.48	102.11	114.42
2016	0.00	643.32	0.00	0.00	25.89	17.15	686.36	7.22	0.00	351.63	99.26	24.62	104.46	123.28
2017	0.00	779.65	0.00	0.00	37.88	24.95	842.49	11.43	0.00	367.67	97.30	26.29	107.39	136.69
2018	0.00	549.74	0.00	0.00	39.82	103.34	692.91	14.90	0.00	352.38	95.20	26.89	108.53	121.77
2019	0.00	393.19	0.00	0.00	47.18	85.16	525.53	17.52	13.01	379.77	95.14	25.50	108.26	150.86
2020	0.00	160.55	0.00	0.00	0.01	157.85	318.41	19.12	44.86	618.54	102.28	20.19	123.54	372.53
2021	0.00	55.71	0.36	0.00	0.00	0.00	56.07	19.40	42.99	699.74	102.84	22.22	133.02	441.66
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.40	41.65	697.31	101.65	22.20	135.46	437.99
2023	0.00	0.00	94.10	0.00	0.00	0.00	94.10	19.76	39.80	664.33	98.83	23.67	140.13	401.71
2024	0.00	0.00	193.21	0.00	9.28	0.00	202.49	20.66	38.24	645.35	96.80	25.97	145.65	376.92
2025	0.00	0.00	116.29	0.00	73.08	0.00	189.37	21.60	40.58	570.21	96.51	25.19	132.15	316.35
2026	0.00	0.00	88.44	0.00	0.00	0.00	88.44	22.04	42.81	583.20	95.20	30.18	138.54	319.28
2027	0.00	0.00	100.23	0.00	0.00	0.00	100.23	22.54	41.52	570.60	93.22	29.59	148.44	299.35
2028	0.00	0.00	15.20	0.00	0.00	0.00	15.20	22.62	44.28	553.39	90.89	44.24	152.98	265.28
2029	0.00	0.00	74.49	0.00	0.00	0.00	74.49	22.99	45.74	537.53	89.10	49.21	159.17	240.05
2030	0.00	0.00	101.74	0.00	61.48	0.00	163.22	23.80	40.62	534.88	88.02	54.22	163.59	229.06
2031	0.00	0.00	90.67	0.00	0.00	0.00	90.67	24.26	43.47	542.47	87.65	59.05	166.37	229.40
2032	0.00	0.00	102.76	0.00	0.00	0.00	102.76	24.77	42.36	521.61	85.28	70.92	175.26	190.16
2033	0.00	0.00	15.59	0.00	0.00	0.00	15.59	24.85	45.27	512.19	83.74	84.97	181.65	161.83
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	44.22	508.64	83.00	89.58	186.26	149.79
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	42.77	435.77	80.86	85.92	179.28	89.71
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	42.23	356.55	79.41	87.59	158.43	31.11
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	41.71	329.27	77.99	95.69	159.84	-4.25
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	41.21	325.57	77.26	94.19	169.64	-15.51
2039	0.00	0.00	161.42	0.00	0.00	0.00	161.42	25.66	43.61	299.78	75.31	115.57	177.11	-68.20
2040	0.00	0.00	233.20	0.00	0.00	0.00	233.20	26.82	40.24	285.20	73.97	127.84	182.89	-99.50
2041	0.00	0.00	104.44	0.00	9.28	0.00	113.72	27.39	39.77	297.06	74.25	127.03	182.70	-86.93
2042	0.00	0.00	7.68	0.00	0.00	0.00	7.68	27.43	46.24	342.17	71.97	196.23	184.67	-110.71
2043	0.00	0.00	79.88	0.00	0.00	0.00	79.88	27.83	45.80	319.80	70.24	212.87	192.04	-155.35
2044	0.00	0.00	109.10	0.00	61.48	0.00	170.58	28.68	47.12	296.16	68.62	227.71	199.56	-199.72
2045	0.00	0.00	52.04	0.00	0.00	0.00	52.04	28.94	50.71	285.17	67.30	250.73	205.46	-238.32
2046	0.00	0.00	48.47	0.00	0.00	0.00	48.47	29.18	50.31	272.80	66.11	269.87	211.73	-274.91
2047	0.00	0.00	7.35	0.00	0.00	0.00	7.35	29.22	50.50	266.82	65.30	277.64	222.33	-298.45
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	49.26	274.93	66.24	266.08	213.17	-270.56
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	29.22	51.80	274.93	66.24	266.08	213.17	-270.56
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	29.22	48.56	274.93	66.24	266.08	213.17	-270.56
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	29.22	48.23	274.93	66.24	266.08	213.17	-270.56
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	29.22	47.91	274.93	66.24	266.08	213.17	-270.56
2053	0.00	0.00	72.30	0.00	20.54	18.49	111.33	29.22	47.60	274.93	66.24	266.08	213.17	-270.56
2054	0.00	0.00	171.40	0.00	16.76	18.49	206.65	29.22	47.29	274.93	66.24	266.08	213.17	-270.56
2055	0.00	0.00	114.21	0.00	0.00	19.18	133.39	29.22	47.00	274.93	66.24	266.08	213.17	-270.56
2056	0.00	0.00	88.44	0.00	0.00	0.00	88.44	29.22	62.21	274.93	66.24	266.08	213.17	-270.56
2057	0.00	0.00	100.23	0.00	0.00	0.00	100.23	29.22	46.44	274.93	66.24	266.08	213.17	-270.56
2058	0.00	0.00	15.20	0.00	0.00	0.00	15.20	29.22	61.67	274.93	66.24	266.08	213.17	-270.56
2059	0.00	0.00	74.49	0.00	9.28	0.00	83.77	29.22	48.81	274.93	66.24	266.08	213.17	-270.56
2060	0.00	0.00	101.74	0.00	54.81	0.00	156.55	29.22	58.45	274.93	66.24	266.08	213.17	-270.56
2061	0.00	0.00	90.67	0.00	0.00	0.00	90.67	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2062	0.00	0.00	102.76	0.00	0.00	0.00	102.76	29.22	58.45	274.93	66.24	266.08	213.17	-270.56
2063	0.00	0.00	15.59	0.00	0.00	0.00	15.59	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	29.22	58.45	274.93	66.24	266.08	213.17	-270.56
2065	0.00	0.00	0.00	0.00	54.75	4.18	58.93	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	29.22	58.45	274.93	66.24	266.08	213.17	-270.56
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	29.22	58.45	274.93	66.24	266.08	213.17	-270.56
2069	0.00	0.00	161.42	0.00	30.42	56.37	248.21	29.22	45.85	274.93	66.24	266.08	213.17	-270.56
2070	0.00	0.00	233.20	0.00	0.01	58.46	291.66	29.22	44.69	274.93	66.24	266.08	213.17	-270.56
2071	0.00	0.00	104.44	0.00	0.00	0.00	104.44	29.22	44.69	274.93	66.24	266.08	213.17	-270.56
2072	0.00	0.00	7.68	0.00	0.00	0.00	7.68	29.22	44.69	274.93	66.24	266.08	213.17	-270.56
2073	0.00	0.00	79.88	0.00	0.00	0.00	79.88	29.22	43.82	274.93	66.24	266.08	213.17	-270.56
2074	0.00	0.00	109.10	0.00	0.00	0.00	109.10	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2075	0.00	0.00	52.04	0.00	18.27	0.00	70.31	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2076	0.00	0.00	48.47	0.00	9.28	0.00	57.75	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2077	0.00	0.00	7.35	0.00	0.00	0.00	7.35	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	29.22	45.85	274.93	66.24	266.08	213.17	-270.56
2080	0.00	0.00	0.00	0.00	15.37	0.00	15.37	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2083	0.00	0.00	72.30	0.00	0.00	0.00	72.30	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2084	0.00	0.00	171.40	0.00	10.59	0.68	182.68	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2085	0.00	0.00	114.21	0.00	10.27	1.37	125.86	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2086	0.00	0.00	88.44	0.00	24.85	4.11	117.40	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2087	0.00	0.00	100.23	0.00	28.87	6.16	135.26	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2088	0.00	0.00	15.20	0.00	20.54	18.49	54.24	29.22	42.95	274.93	66.24	266.08	213.17	-270.56
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	29.22	45.85	274.93	66.24	266.08	213.17	-270.56
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	29.22	45.85	274.93	66.24	266.08	213.17	-270.56
Salvage Value	0.00	0.00	20.83	0.00	5.66	4.78	31.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	890.47	0.00	292.17	337.17	4376.86	416.42	675.38	8748.00	1774.09	1896.73	3129.33	1947.85

Net Present Value -3521

K19/C31/750MW | **TABLE 004** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	221.41	0.00	0.00	21.01	5.28	278.77	1.39	0.00	312.22	102.98	19.82	97.95	91.47
2015	39.22	485.83	0.00	0.00	18.92	8.56	552.53	4.16	0.00	343.08	101.10	23.52	102.06	116.40
2016	10.66	643.32	0.00	0.00	25.89	17.93	697.80	7.65	0.00	352.81	99.25	24.59	104.39	124.57
2017	10.72	779.65	0.00	0.00	37.88	24.95	853.21	11.91	0.00	368.02	97.30	26.28	107.35	137.08
2018	12.74	549.74	0.00	0.00	39.82	146.07	748.37	15.65	0.00	351.36	95.18	26.85	108.49	120.83
2019	12.82	393.19	0.00	0.00	47.18	100.61	553.80	18.42	13.01	378.40	95.12	25.54	108.25	149.49
2020	12.89	160.55	0.00	0.00	0.01	278.17	451.63	20.68	47.98	621.96	102.27	20.24	123.16	376.30
2021	16.30	55.71	0.00	0.00	0.00	0.00	72.02	21.04	46.21	702.77	102.83	22.34	132.88	444.73
2022	164.90	0.00	0.00	0.00	0.00	0.00	164.90	21.87	44.90	701.08	101.66	22.22	135.15	442.04
2023	251.53	0.00	0.00	0.00	0.00	0.00	251.53	23.12	42.92	666.93	98.72	23.93	140.21	404.07
2024	273.27	0.00	0.00	0.00	0.00	0.00	273.27	24.49	41.22	647.32	96.62	26.62	146.62	377.47
2025	278.50	0.00	0.00	0.00	3.53	0.00	282.03	25.90	39.45	571.08	96.53	19.18	139.38	315.99
2026	753.38	0.00	0.00	0.00	3.53	0.00	756.91	29.68	37.57	551.71	94.63	19.80	152.90	284.38
2027	1196.26	0.00	0.00	0.00	42.90	0.00	1239.16	35.88	36.17	505.81	92.70	18.64	151.36	243.11
2028	1074.05	0.00	0.00	0.00	22.26	0.00	1096.31	41.36	34.83	484.10	91.13	19.36	164.55	209.06
2029	766.99	0.00	0.00	0.00	37.45	0.00	804.44	45.38	36.18	468.22	89.51	19.93	181.32	177.46
2030	531.19	0.00	0.00	0.00	64.84	0.00	596.03	48.36	30.95	464.17	88.18	20.37	195.22	160.40
2031	348.90	0.00	0.00	0.00	86.88	0.00	435.78	50.54	44.00	545.01	92.22	23.54	122.12	307.13
2032	128.50	0.00	0.00	0.00	102.39	0.00	230.89	51.70	43.00	725.20	99.46	23.12	117.91	484.71
2033	40.55	0.00	0.00	0.00	0.00	0.00	40.55	51.90	41.68	783.08	99.93	22.61	135.32	525.22
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	40.76	760.57	98.13	22.16	139.66	500.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	39.05	690.45	96.49	22.14	123.81	448.00
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	38.38	661.56	94.82	22.63	125.40	418.71
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	51.90	37.61	639.08	93.19	22.57	129.17	394.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	36.66	614.58	91.55	22.48	133.67	366.88
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	52.29	39.07	592.11	89.95	22.51	145.33	334.32
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	52.87	35.74	588.44	88.66	21.37	155.45	322.95
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	52.95	41.92	569.71	86.66	38.13	157.39	287.53
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	53.35	38.52	555.39	85.12	42.52	163.54	264.20
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	53.94	38.02	544.55	83.76	44.88	171.38	244.52
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	54.42	43.27	540.93	82.55	51.48	180.28	226.63
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	55.34	42.80	516.46	80.70	66.61	181.47	187.69
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	55.42	46.35	504.83	79.26	80.82	187.04	157.70
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	44.39	491.28	77.99	84.47	195.74	133.09
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	43.10	504.19	79.32	77.30	188.08	159.49
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	55.42	45.59	504.19	79.32	77.30	188.08	159.49
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	55.42	42.30	504.19	79.32	77.30	188.08	159.49
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	55.42	44.82	504.19	79.32	77.30	188.08	159.49
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	55.42	41.57	504.19	79.32	77.30	188.08	159.49
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	55.42	41.22	504.19	79.32	77.30	188.08	159.49
2054	0.00	0.00	0.00	0.00	16.76	18.49	35.25	55.42	40.87	504.19	79.32	77.30	188.08	159.49
2055	0.00	0.00	0.00	0.00	0.00	19.18	19.18	55.42	40.54	504.19	79.32	77.30	188.08	159.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	57.45	504.19	79.32	77.30	188.08	159.49
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	41.64	504.19	79.32	77.30	188.08	159.49
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	56.83	504.19	79.32	77.30	188.08	159.49
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	43.95	504.19	79.32	77.30	188.08	159.49
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	55.42	53.00	504.19	79.32	77.30	188.08	159.49
2061	0.00	0.00	0.00	0.00	0.87	0.00	0.87	55.42	38.66	504.19	79.32	77.30	188.08	159.49
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2063	0.00	0.00	0.00	0.00	5.23	0.00	5.23	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2064	0.00	0.00	0.00	0.00	19.14	2.09	21.22	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2065	0.00	0.00	0.00	0.00	23.47	4.18	27.65	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2066	0.00	0.00	0.00	0.00	21.97	12.53	34.50	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2067	0.00	0.00	0.00	0.00	34.31	18.79	53.10	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	55.42	66.75	504.19	79.32	77.30	188.08	159.49
2069	0.00	0.00	78.30	0.00	30.42	56.37	165.09	55.42	38.66	504.19	79.32	77.30	188.08	159.49
2070	0.00	0.00	106.94	0.00	0.01	58.46	165.41	55.42	53.00	504.19	79.32	77.30	188.08	159.49
2071	0.00	0.00	16.22	0.00	0.00	0.00	16.22	55.42	40.40	504.19	79.32	77.30	188.08	159.49
2072	0.00	0.00	79.48	0.00	0.00	0.00	79.48	55.42	53.00	504.19	79.32	77.30	188.08	159.49
2073	0.00	0.00	108.56	0.00	0.00	0.00	108.56	55.42	36.63	504.19	79.32	77.30	188.08	159.49
2074	0.00	0.00	96.75	0.00	0.00	0.00	96.75	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2075	0.00	0.00	109.64	0.00	11.94	0.00	121.58	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2076	0.00	0.00	16.63	0.00	2.66	0.00	19.29	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2077	0.00	0.00	0.00	0.00	32.44	0.00	32.44	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2078	0.00	0.00	0.00	0.00	26.30	0.00	26.30	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2079	0.00	0.00	0.00	0.00	28.73	0.00	28.73	55.42	38.66	504.19	79.32	77.30	188.08	159.49
2080	0.00	0.00	0.00	0.00	104.82	0.00	104.82	55.42	51.26	504.19	79.32	77.30	188.08	159.49
2081	0.00	0.00	0.00	0.00	65.95	0.00	65.95	55.42	38.66	504.19	79.32	77.30	188.08	159.49
2082	0.00	0.00	0.00	0.00	77.10	0.00	77.10	55.42	53.00	504.19	79.32	77.30	188.08	159.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	37.50	504.19	79.32	77.30	188.08	159.49
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	55.42	53.00	504.19	79.32	77.30	188.08	159.49
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	55.42	37.50	504.19	79.32	77.30	188.08	159.49
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	55.42	53.00	504.19	79.32	77.30	188.08	159.49
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	55.42	35.76	504.19	79.32	77.30	188.08	159.49
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	55.42	38.66	504.19	79.32	77.30	188.08	159.49
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	55.42	38.66	504.19	79.32	77.30	188.08	159.49
Salvage Value	17.09	0.00	6.54	0.00	11.55	4.78	39.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3127.55	2857.05	193.35	0.00	385.74	477.79	7041.47	698.05	634.27	10609.85	1887.85	702.17	2903.34	5116.50

Net Present Value -3257

K19/Gas31/750MW | **TABLE 005** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	5.28	247.70	1.24	0.00	312.22	102.98	19.82	97.95	91.47
2015	0.00	485.83	0.00	0.00	18.92	8.56	513.31	3.81	0.00	343.08	101.10	23.52	102.06	116.40
2016	0.00	643.32	0.00	0.00	25.89	17.93	687.14	7.24	0.00	352.81	99.25	24.59	104.39	124.57
2017	0.00	779.65	0.00	0.00	37.88	24.95	842.49	11.45	0.00	368.02	97.30	26.28	107.35	137.08
2018	0.00	549.74	0.00	0.00	39.82	146.07	735.63	15.13	0.00	351.36	95.18	26.85	108.49	120.83
2019	0.00	393.19	0.00	0.00	47.18	100.61	540.98	17.84	13.01	378.40	95.12	25.54	108.25	149.49
2020	0.00	160.55	0.00	0.00	0.01	278.17	438.74	20.03	47.98	621.96	102.27	20.24	123.16	376.30
2021	0.00	55.71	0.00	0.00	0.00	0.00	55.71	20.31	46.21	702.77	102.83	22.34	132.88	444.73
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	44.90	701.03	101.66	22.24	135.18	441.94
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	42.92	667.47	98.72	23.93	140.19	404.63
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	41.22	648.20	96.62	26.64	146.54	378.41
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	39.45	573.30	96.52	19.20	139.74	317.84
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	37.57	556.00	94.62	19.93	153.75	287.70
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	20.31	36.17	511.22	92.69	18.70	152.06	247.77
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	20.31	34.83	492.18	91.11	19.36	166.34	215.37
2029	0.00	0.00	170.79	0.00	0.00	0.00	170.79	21.05	36.18	474.77	89.58	19.63	181.17	184.41
2030	0.00	0.00	300.16	0.00	18.56	0.00	318.72	22.54	30.95	477.17	88.98	17.48	190.98	179.73
2031	0.00	0.00	135.19	0.00	73.08	0.00	208.27	23.57	37.66	465.70	86.82	40.26	154.94	183.68
2032	0.00	0.00	91.13	0.00	0.00	0.00	91.13	24.02	40.44	455.29	85.25	51.12	159.61	159.32
2033	0.00	0.00	103.28	0.00	0.00	0.00	103.28	24.54	39.27	441.06	83.80	56.20	165.19	135.86
2034	0.00	0.00	15.67	0.00	0.00	0.00	15.67	24.62	42.11	441.27	83.01	60.94	171.52	125.81
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.62	40.58	366.35	80.89	73.81	152.84	58.81
2036	0.00	0.00	159.02	0.00	0.00	0.00	159.02	25.41	39.95	340.55	79.46	80.63	154.42	26.03
2037	0.00	0.00	229.73	0.00	0.00	0.00	229.73	26.56	39.36	325.72	78.14	88.21	159.19	0.18
2038	0.00	0.00	102.89	0.00	61.48	0.00	164.37	27.38	38.79	333.31	78.02	81.56	168.95	4.78
2039	0.00	0.00	7.57	0.00	0.00	0.00	7.57	27.42	48.06	380.65	75.73	158.73	169.92	-23.73
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.42	44.62	357.75	73.85	171.82	177.53	-65.45
2041	0.00	0.00	79.09	0.00	0.00	0.00	79.09	27.82	44.09	340.46	72.39	184.16	183.61	-99.69
2042	0.00	0.00	271.87	0.00	0.00	0.00	271.87	29.18	43.58	324.55	71.04	198.01	189.54	-134.03
2043	0.00	0.00	253.10	0.00	0.00	0.00	253.10	30.44	47.08	319.58	70.18	210.44	195.08	-156.12
2044	0.00	0.00	106.02	0.00	61.48	0.00	167.50	31.28	48.34	318.09	69.87	201.73	205.56	-159.06
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	31.32	54.81	367.45	67.87	289.98	195.55	-185.95
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	54.37	353.04	66.68	303.83	201.17	-218.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	53.07	331.09	65.42	316.22	206.93	-257.48
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	51.78	350.53	66.66	303.34	201.21	-220.69
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	31.32	54.27	350.53	66.66	303.34	201.21	-220.69
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	31.32	50.99	350.53	66.66	303.34	201.21	-220.69
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	31.32	50.61	350.53	66.66	303.34	201.21	-220.69
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	31.32	50.25	350.53	66.66	303.34	201.21	-220.69
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	31.32	49.89	350.53	66.66	303.34	201.21	-220.69
2054	0.00	0.00	0.00	0.00	16.76	18.49	35.25	31.32	49.55	350.53	66.66	303.34	201.21	-220.69
2055	0.00	0.00	0.00	0.00	0.00	19.18	19.18	31.32	49.22	350.53	66.66	303.34	201.21	-220.69
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	64.39	350.53	66.66	303.34	201.21	-220.69
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	48.58	350.53	66.66	303.34	201.21	-220.69
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	63.78	350.53	66.66	303.34	201.21	-220.69
2059	0.00	0.00	148.99	0.00	0.00	0.00	148.99	31.32	50.89	350.53	66.66	303.34	201.21	-220.69
2060	0.00	0.00	278.35	0.00	0.00	0.00	278.35	31.32	59.94	350.53	66.66	303.34	201.21	-220.69
2061	0.00	0.00	133.12	0.00	0.00	0.00	133.12	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2062	0.00	0.00	91.13	0.00	0.00	0.00	91.13	31.32	59.94	350.53	66.66	303.34	201.21	-220.69
2063	0.00	0.00	103.28	0.00	0.00	0.00	103.28	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2064	0.00	0.00	15.67	0.00	10.42	2.09	28.17	31.32	59.94	350.53	66.66	303.34	201.21	-220.69
2065	0.00	0.00	0.00	0.00	27.20	4.18	31.38	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2066	0.00	0.00	159.02	0.00	55.85	12.53	227.39	31.32	59.94	350.53	66.66	303.34	201.21	-220.69
2067	0.00	0.00	229.73	0.00	9.01	18.79	257.54	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2068	0.00	0.00	102.89	0.00	19.28	56.37	178.54	31.32	59.94	350.53	66.66	303.34	201.21	-220.69
2069	0.00	0.00	7.57	0.00	30.42	56.37	94.36	31.32	47.34	350.53	66.66	303.34	201.21	-220.69
2070	0.00	0.00	0.00	0.00	0.01	58.46	58.46	31.32	46.18	350.53	66.66	303.34	201.21	-220.69
2071	0.00	0.00	79.09	0.00	0.00	0.00	79.09	31.32	46.18	350.53	66.66	303.34	201.21	-220.69
2072	0.00	0.00	271.87	0.00	0.00	0.00	271.87	31.32	46.18	350.53	66.66	303.34	201.21	-220.69
2073	0.00	0.00	253.10	0.00	46.11	0.00	299.21	31.32	45.31	350.53	66.66	303.34	201.21	-220.69
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2075	0.00	0.00	7.80	0.00	0.00	0.00	7.80	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	31.32	47.34	350.53	66.66	303.34	201.21	-220.69
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2081	0.00	0.00	0.00	0.00	18.27	0.00	18.27	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2088	0.00	0.00	0.00	0.00	35.91	18.49	54.41	31.32	44.44	350.53	66.66	303.34	201.21	-220.69
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	31.32	47.34	350.53	66.66	303.34	201.21	-220.69
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	31.32	47.34	350.53	66.66	303.34	201.21	-220.69
Salvage Value	0.00	0.00	12.49	0.00	6.21	4.78	23.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	839.87	0.00	268.91	477.79	4443.62	425.09	668.78	8849.35	1775.34	1972.76	3090.27	2010.97

Net Present Value: -3527

K19/C25/250MW | **TABLE 006** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	3.97	278.09	1.40	0.00	312.22	102.98	19.82	97.95	91.47
2015	87.48	485.83	0.00	0.00	18.92	2.72	594.95	4.38	0.00	343.08	101.10	23.52	102.06	116.40
2016	182.24	643.32	0.00	0.00	25.89	3.96	855.41	8.66	0.00	352.81	99.25	24.59	104.39	124.57
2017	212.03	779.65	0.00	0.00	37.88	5.94	1035.50	13.83	0.00	367.62	97.30	26.28	107.35	136.68
2018	254.86	549.74	0.00	0.00	39.82	17.82	862.24	18.14	0.00	347.14	94.61	28.84	109.36	114.33
2019	260.97	393.19	0.00	0.00	50.71	17.82	722.69	21.76	13.01	370.88	94.25	28.94	109.48	138.21
2020	719.36	160.55	0.00	0.00	3.54	18.48	901.93	26.27	13.22	583.26	102.60	20.76	110.86	349.04
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	32.54	12.98	648.62	103.20	21.25	117.48	406.69
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	37.83	13.20	636.66	101.30	22.22	121.05	392.08
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	41.72	13.02	620.72	99.11	22.25	129.22	370.13
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	44.61	12.98	609.09	96.79	24.70	139.70	347.89
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	46.73	27.06	615.43	101.54	22.01	100.62	391.25
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	47.86	26.87	774.21	109.20	21.59	96.64	546.78
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	48.06	26.75	771.31	108.62	20.42	99.65	542.63
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	27.03	757.22	106.89	21.24	102.02	527.08
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	29.55	737.79	105.11	21.41	103.36	507.91
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.57	728.42	103.83	21.16	103.81	499.61
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.40	714.64	102.21	21.61	105.75	485.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.04	696.87	100.58	21.78	108.09	466.42
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.11	674.48	98.91	21.87	109.95	443.75
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.22	652.84	97.27	22.05	112.44	421.08
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	27.29	614.70	95.66	22.21	110.02	386.81
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	48.06	24.39	586.75	94.08	22.53	111.45	358.69
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	24.39	561.79	92.52	22.48	113.66	333.12
2038	0.00	0.00	99.72	0.00	0.00	0.00	99.72	48.44	24.39	535.38	90.97	22.45	116.61	305.35
2039	0.00	0.00	128.22	0.00	9.28	0.00	137.50	49.02	27.29	527.00	89.78	21.22	128.94	287.06
2040	0.00	0.00	16.14	0.00	0.00	0.00	16.14	49.10	28.37	510.17	87.77	37.23	132.64	252.54
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.72	496.78	86.25	41.81	138.08	230.64
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	49.50	27.72	485.90	84.92	44.49	143.98	212.51
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	50.09	27.72	473.37	83.53	44.21	153.17	192.46
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	50.57	33.44	461.65	81.97	66.87	152.99	159.82
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	51.49	36.33	447.14	80.56	73.63	159.06	133.90
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	51.57	37.43	438.64	79.19	83.60	167.98	107.86
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	36.57	424.38	77.79	84.57	180.84	81.17
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.70	436.72	79.18	80.60	169.29	107.64
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	51.57	38.59	436.72	79.18	80.60	169.29	107.64
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	51.57	37.44	436.72	79.18	80.60	169.29	107.64
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	51.57	37.45	436.72	79.18	80.60	169.29	107.64
2052	0.00	0.00	0.00	0.00	28.87	1.47	30.34	51.57	37.45	436.72	79.18	80.60	169.29	107.64
2053	0.00	0.00	0.00	0.00	20.54	4.40	24.95	51.57	37.46	436.72	79.18	80.60	169.29	107.64
2054	0.00	0.00	0.00	0.00	17.63	4.40	22.03	51.57	37.46	436.72	79.18	80.60	169.29	107.64
2055	0.00	0.00	0.00	0.00	0.87	4.56	5.44	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	51.57	51.21	436.72	79.18	80.60	169.29	107.64
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	51.57	51.21	436.72	79.18	80.60	169.29	107.64
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	51.57	51.21	436.72	79.18	80.60	169.29	107.64
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	66.71	436.72	79.18	80.60	169.29	107.64
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2064	0.00	0.00	0.00	0.00	10.42	3.81	14.22	51.57	66.71	436.72	79.18	80.60	169.29	107.64
2065	0.00	0.00	0.00	0.00	8.65	2.40	11.04	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2066	0.00	0.00	0.00	0.00	1.04	2.98	4.02	51.57	66.71	436.72	79.18	80.60	169.29	107.64
2067	0.00	0.00	0.00	0.00	9.01	4.47	13.49	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2068	0.00	0.00	77.91	0.00	19.28	13.42	110.61	51.57	66.71	436.72	79.18	80.60	169.29	107.64
2069	0.00	0.00	106.41	0.00	33.08	13.42	152.91	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2070	0.00	0.00	16.14	0.00	2.67	13.91	32.72	51.57	52.95	436.72	79.18	80.60	169.29	107.64
2071	0.00	0.00	0.00	0.00	32.44	0.00	32.44	51.57	37.46	436.72	79.18	80.60	169.29	107.64
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	51.57	52.95	436.72	79.18	80.60	169.29	107.64
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	51.57	36.59	436.72	79.18	80.60	169.29	107.64
2074	0.00	0.00	96.75	0.00	59.30	0.00	156.04	51.57	51.21	436.72	79.18	80.60	169.29	107.64
2075	0.00	0.00	109.64	0.00	65.95	0.00	175.59	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	51.57	52.95	436.72	79.18	80.60	169.29	107.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	37.46	436.72	79.18	80.60	169.29	107.64
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	51.57	52.95	436.72	79.18	80.60	169.29	107.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	40.35	436.72	79.18	80.60	169.29	107.64
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	51.57	52.95	436.72	79.18	80.60	169.29	107.64
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2084	0.00	0.00	0.00	0.00	10.59	0.16	10.75	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2087	0.00	0.00	0.00	0.00	28.87	1.47	30.34	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2088	0.00	0.00	0.00	0.00	20.54	4.40	24.95	51.57	35.72	436.72	79.18	80.60	169.29	107.64
2089	0.00	0.00	0.00	0.00	16.76	4.40	21.16	51.57	38.62	436.72	79.18	80.60	169.29	107.64
2090	0.00	0.00	0.00	0.00	0.00	4.56	4.56	51.57	38.62	436.72	79.18	80.60	169.29	107.64
Salvage Value	2.31	0.00	6.36	0.00	10.29	1.28	20.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	197.32	0.00	449.97	66.04	7570.52	754.04	426.24	10603.08	1931.10	729.93	2514.10	5427.96

Net Present Value -3323

K19/Gas24/250MW

TABLE 007
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	3.97	246.39	1.25	0.00	312.22	102.98	19.82	97.95	91.47
2015	0.00	485.83	0.00	0.00	18.92	2.72	507.47	3.78	0.00	343.08	101.10	23.52	102.07	116.39
2016	0.00	643.32	0.00	0.00	25.89	3.96	673.16	7.15	0.00	352.81	99.25	24.59	104.39	124.57
2017	0.00	779.65	0.00	0.00	37.88	5.94	823.47	11.27	0.00	368.02	97.30	26.28	107.35	137.08
2018	0.00	549.74	0.00	0.00	39.82	17.82	607.38	14.30	0.00	347.69	94.61	28.80	109.30	114.99
2019	0.00	393.19	0.00	0.00	47.18	17.82	458.19	16.59	13.01	371.77	94.25	28.94	109.45	139.13
2020	0.00	160.55	0.36	0.00	0.01	18.48	179.40	17.49	13.22	584.79	102.60	20.77	110.79	350.63
2021	0.00	55.71	0.00	0.00	0.00	0.00	55.71	17.77	12.98	651.09	103.18	21.26	117.30	409.35
2022	0.00	0.00	93.75	0.00	0.00	0.00	93.75	18.13	13.20	643.16	101.74	20.99	119.46	400.97
2023	0.00	0.00	120.06	0.00	9.28	0.00	129.34	18.67	13.02	635.90	100.66	17.68	121.88	395.68
2024	0.00	0.00	14.90	0.00	0.00	0.00	14.90	18.74	16.96	629.30	98.82	28.79	124.19	377.51
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.74	16.74	517.61	96.57	21.81	118.03	281.20
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.74	16.33	493.80	94.29	24.75	122.48	252.28
2027	0.00	0.00	73.75	0.00	0.00	0.00	73.75	19.11	16.35	459.90	92.23	26.90	124.74	216.04
2028	0.00	0.00	102.81	0.00	73.08	0.00	175.88	19.98	16.42	442.83	90.43	31.11	129.17	192.12
2029	0.00	0.00	168.84	0.00	0.00	0.00	168.84	20.82	23.11	433.36	88.69	43.02	133.62	168.03
2030	0.00	0.00	221.85	0.00	0.00	0.00	221.85	21.93	19.18	432.31	87.78	46.71	136.25	161.57
2031	0.00	0.00	99.36	0.00	9.28	0.00	108.64	22.47	19.18	446.45	88.36	40.01	135.71	182.36
2032	0.00	0.00	7.31	0.00	0.00	0.00	7.31	22.51	26.09	473.14	85.80	97.30	131.36	158.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.51	26.10	461.12	84.29	105.18	135.43	136.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.51	26.10	449.99	82.81	114.22	140.18	112.78
2035	0.00	0.00	158.23	0.00	0.00	0.00	158.23	23.30	25.45	385.60	80.80	114.36	138.21	52.23
2036	0.00	0.00	228.59	0.00	0.00	0.00	228.59	24.45	25.46	359.88	79.33	122.48	139.00	19.08
2037	0.00	0.00	102.38	0.00	0.00	0.00	102.38	24.96	25.46	369.35	79.76	117.96	136.42	35.21
2038	0.00	0.00	168.14	0.00	0.00	0.00	168.14	25.80	32.37	395.52	77.33	183.67	134.90	-0.38
2039	0.00	0.00	232.04	0.00	0.00	0.00	232.04	26.96	35.27	383.24	75.95	196.21	145.74	-34.67
2040	0.00	0.00	103.92	0.00	61.48	0.00	165.40	27.78	32.37	379.78	75.37	201.96	147.95	-45.49
2041	0.00	0.00	7.64	0.00	0.00	0.00	7.64	27.82	39.30	410.45	73.49	266.79	143.74	-73.56
2042	0.00	0.00	163.85	0.00	0.00	0.00	163.85	28.64	39.30	396.48	71.70	288.56	149.41	-113.20
2043	0.00	0.00	236.71	0.00	0.00	0.00	236.71	29.83	39.30	386.20	70.39	304.80	153.90	-142.89
2044	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.36	41.04	370.45	69.89	302.37	155.24	-157.04
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	30.40	47.96	394.58	67.58	379.02	153.64	-205.66
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	47.96	399.93	67.77	377.09	151.89	-196.82
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	47.10	370.09	65.81	400.48	158.20	-254.40
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	30.40	49.14	388.20	67.05	385.53	154.58	-218.96
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2052	0.00	0.00	71.94	0.00	28.87	1.47	102.27	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2053	0.00	0.00	98.25	0.00	20.54	4.40	123.20	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2054	0.00	0.00	14.90	0.00	16.76	4.40	36.07	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2055	0.00	0.00	0.00	0.00	0.00	4.56	4.56	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2057	0.00	0.00	73.75	0.00	0.00	0.00	73.75	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2058	0.00	0.00	100.73	0.00	9.28	0.00	110.01	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2059	0.00	0.00	168.84	0.00	0.00	0.00	168.84	30.40	49.14	388.20	67.05	385.53	154.58	-218.96
2060	0.00	0.00	221.85	0.00	0.00	0.00	221.85	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2061	0.00	0.00	99.36	0.00	0.00	0.00	99.36	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2062	0.00	0.00	7.31	0.00	0.00	0.00	7.31	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2063	0.00	0.00	0.00	0.00	54.81	2.80	57.61	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2064	0.00	0.00	0.00	0.00	10.42	3.81	14.22	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2065	0.00	0.00	158.23	0.00	8.65	2.40	169.27	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2066	0.00	0.00	228.59	0.00	10.32	2.98	241.89	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2067	0.00	0.00	102.38	0.00	9.01	4.47	115.87	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2068	0.00	0.00	168.14	0.00	19.28	13.42	200.84	30.40	61.73	388.20	67.05	385.53	154.58	-218.96
2069	0.00	0.00	232.04	0.00	30.42	13.42	275.88	30.40	49.14	388.20	67.05	385.53	154.58	-218.96
2070	0.00	0.00	103.92	0.00	0.01	13.91	117.85	30.40	47.98	388.20	67.05	385.53	154.58	-218.96
2071	0.00	0.00	7.64	0.00	0.00	0.00	7.64	30.40	47.98	388.20	67.05	385.53	154.58	-218.96
2072	0.00	0.00	163.85	0.00	0.00	0.00	163.85	30.40	47.98	388.20	67.05	385.53	154.58	-218.96
2073	0.00	0.00	236.71	0.00	0.00	0.00	236.71	30.40	47.11	388.20	67.05	385.53	154.58	-218.96
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2075	0.00	0.00	7.80	0.00	46.11	0.00	53.90	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2078	0.00	0.00	0.00	0.00	18.27	0.00	18.27	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	49.14	388.20	67.05	385.53	154.58	-218.96
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2082	0.00	0.00	71.94	0.00	0.00	0.00	71.94	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2083	0.00	0.00	98.25	0.00	0.00	0.00	98.25	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2084	0.00	0.00	14.90	0.00	10.59	0.16	25.66	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2087	0.00	0.00	73.75	0.00	28.87	1.47	104.09	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2088	0.00	0.00	100.73	0.00	20.54	4.40	125.68	30.40	46.24	388.20	67.05	385.53	154.58	-218.96
2089	0.00	0.00	15.28	0.00	16.76	4.40	36.44	30.40	49.14	388.20	67.05	385.53	154.58	-218.96
2090	0.00	0.00	0.00	0.00	15.37	4.56	19.93	30.40	49.14	388.20	67.05	385.53	154.58	-218.96
Salvage Value	0.00	0.00	22.22	0.00	5.37	1.28	28.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	1097.53	0.00	259.43	66.04	4280.05	404.31	445.49	8827.68	1779.44	2581.74	2607.54	1858.95

Net Present Value -3271

K19/C31/250MW | **TABLE 008** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	221.41	0.00	0.00	21.01	3.97	277.46	1.40	0.00	312.22	102.98	19.82	97.95	91.47
2015	39.22	485.83	0.00	0.00	18.92	2.72	546.70	4.13	0.00	343.08	101.10	23.52	102.07	116.39
2016	10.66	643.32	0.00	0.00	25.89	3.96	683.82	7.55	0.00	352.81	99.25	24.59	104.39	124.57
2017	10.72	779.65	0.00	0.00	37.88	5.94	834.19	11.72	0.00	368.02	97.30	26.28	107.35	137.08
2018	12.74	549.74	0.00	0.00	39.82	17.82	620.12	14.83	0.00	347.69	94.61	28.80	109.30	114.99
2019	12.82	393.19	0.00	0.00	47.18	17.82	471.00	17.18	13.01	371.77	94.25	28.94	109.45	139.13
2020	12.89	160.55	0.36	0.00	0.01	18.48	192.29	18.14	13.22	584.79	102.60	20.77	110.79	350.63
2021	16.30	55.71	0.00	0.00	0.00	0.00	72.02	18.50	12.98	651.09	103.18	21.26	117.30	409.35
2022	164.90	0.00	93.75	0.00	0.00	0.00	258.64	19.68	13.20	643.04	101.73	21.02	119.49	400.81
2023	251.53	0.00	120.06	0.00	9.28	0.00	380.87	21.48	13.02	635.31	100.62	17.83	122.08	394.77
2024	273.27	0.00	14.90	0.00	0.00	0.00	288.17	22.92	16.96	628.62	98.79	28.97	124.50	376.36
2025	278.50	0.00	0.00	0.00	3.53	0.00	282.03	24.33	16.74	516.28	96.54	21.88	118.32	279.54
2026	753.38	0.00	0.00	0.00	3.53	0.00	756.91	28.12	16.33	492.72	94.28	24.95	122.84	250.65
2027	1196.26	0.00	73.75	0.00	42.90	0.00	1312.92	34.68	16.35	458.19	92.23	27.27	125.05	213.64
2028	1074.05	0.00	100.73	0.00	31.54	0.00	1206.32	40.71	16.42	440.37	90.35	31.94	129.82	188.26
2029	766.99	0.00	15.28	0.00	37.45	0.00	819.72	44.81	23.10	430.11	88.65	43.96	134.29	163.21
2030	531.19	0.00	0.00	0.00	64.84	0.00	596.03	47.79	19.16	449.76	89.71	38.34	129.97	191.74
2031	348.90	0.00	0.00	0.00	86.88	0.00	435.78	49.97	33.47	508.66	92.82	31.70	105.61	278.53
2032	128.50	0.00	0.00	0.00	102.39	0.00	230.89	51.12	33.68	671.87	99.86	31.02	101.12	439.87
2033	40.55	0.00	0.00	0.00	0.00	0.00	40.55	51.33	33.55	699.29	99.85	32.00	109.27	458.16
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	33.76	673.01	98.07	32.80	111.34	430.80
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.93	633.93	96.38	33.31	109.53	394.70
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.88	606.54	94.78	34.06	110.11	367.60
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.71	576.79	92.91	35.26	112.90	335.73
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.35	544.24	90.96	36.72	116.76	299.80
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	35.31	522.05	89.06	40.74	128.41	263.85
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.53	507.84	87.36	46.13	134.06	240.28
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	35.25	491.97	85.71	52.16	139.61	214.49
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	51.33	32.36	488.84	84.86	53.11	142.87	208.00
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.36	477.36	83.52	52.65	151.52	189.67
2044	0.00	0.00	80.28	0.00	0.00	0.00	80.28	51.73	34.10	461.76	81.98	66.83	152.90	160.04
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	52.64	34.10	447.17	80.56	73.59	159.00	134.02
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	52.72	38.09	438.68	79.19	83.58	167.97	107.94
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	36.57	424.39	77.80	84.57	180.84	81.17
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	35.70	436.75	79.18	80.58	169.27	107.71
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	52.72	38.59	436.75	79.18	80.58	169.27	107.71
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	52.72	35.70	436.75	79.18	80.58	169.27	107.71
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	52.72	38.60	436.75	79.18	80.58	169.27	107.71
2052	0.00	0.00	71.94	0.00	28.87	1.47	102.27	52.72	35.71	436.75	79.18	80.58	169.27	107.71
2053	0.00	0.00	98.25	0.00	20.54	4.40	123.20	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2054	0.00	0.00	14.90	0.00	16.76	4.40	36.07	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2055	0.00	0.00	0.00	0.00	0.00	4.56	4.56	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2057	0.00	0.00	73.75	0.00	0.00	0.00	73.75	52.72	37.46	436.75	79.18	80.58	169.27	107.71
2058	0.00	0.00	100.73	0.00	9.28	0.00	110.01	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2059	0.00	0.00	15.28	0.00	0.00	0.00	15.28	52.72	40.35	436.75	79.18	80.58	169.27	107.71
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2061	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.72	38.62	436.75	79.18	80.58	169.27	107.71
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2063	0.00	0.00	0.00	0.00	14.51	2.80	17.32	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2064	0.00	0.00	0.00	0.00	19.14	3.81	22.95	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2065	0.00	0.00	0.00	0.00	23.47	2.40	25.87	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2066	0.00	0.00	0.00	0.00	21.97	2.98	24.95	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2067	0.00	0.00	0.00	0.00	34.31	4.47	38.78	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2068	0.00	0.00	0.00	0.00	19.28	13.42	32.70	52.72	66.71	436.75	79.18	80.58	169.27	107.71
2069	0.00	0.00	0.00	0.00	30.42	13.42	43.84	52.72	38.62	436.75	79.18	80.58	169.27	107.71
2070	0.00	0.00	0.00	0.00	0.01	13.91	13.92	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	40.35	436.75	79.18	80.58	169.27	107.71
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	36.59	436.75	79.18	80.58	169.27	107.71
2074	0.00	0.00	80.28	0.00	0.00	0.00	80.28	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2075	0.00	0.00	109.64	0.00	2.66	0.00	112.30	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2076	0.00	0.00	16.63	0.00	2.66	0.00	19.29	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2077	0.00	0.00	0.00	0.00	32.44	0.00	32.44	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2078	0.00	0.00	0.00	0.00	17.02	0.00	17.02	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2079	0.00	0.00	0.00	0.00	28.73	0.00	28.73	52.72	38.62	436.75	79.18	80.58	169.27	107.71
2080	0.00	0.00	0.00	0.00	104.82	0.00	104.82	52.72	51.21	436.75	79.18	80.58	169.27	107.71
2081	0.00	0.00	0.00	0.00	65.95	0.00	65.95	52.72	38.62	436.75	79.18	80.58	169.27	107.71
2082	0.00	0.00	71.94	0.00	77.10	0.00	149.03	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2083	0.00	0.00	98.25	0.00	0.00	0.00	98.25	52.72	37.46	436.75	79.18	80.58	169.27	107.71
2084	0.00	0.00	14.90	0.00	10.59	0.16	25.66	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	52.72	37.46	436.75	79.18	80.58	169.27	107.71
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	52.72	52.95	436.75	79.18	80.58	169.27	107.71
2087	0.00	0.00	73.75	0.00	28.87	1.47	104.09	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2088	0.00	0.00	100.73	0.00	20.54	4.40	125.68	52.72	35.72	436.75	79.18	80.58	169.27	107.71
2089	0.00	0.00	15.28	0.00	16.76	4.40	36.44	52.72	38.62	436.75	79.18	80.58	169.27	107.71
2090	0.00	0.00	0.00	0.00	0.00	4.56	4.56	52.72	38.62	436.75	79.18	80.58	169.27	107.71
Salvage Value	17.09	0.00	10.66	0.00	11.35	1.28	40.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3127.55	2857.05	353.00	0.00	392.78	66.04	6796.42	670.23	428.42	9759.29	1887.62	805.73	2573.15	4492.79

Net Present Value -3402

All Gas

TABLE 009
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	354.71	99.24	24.61	104.31	126.54
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	373.23	97.67	25.25	106.21	144.09
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	352.87	94.88	27.63	108.96	121.39
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	344.28	92.94	24.94	110.41	115.99
2020	0.00	0.00	93.03	0.00	0.00	0.00	93.03	0.87	0.00	379.02	92.87	19.68	120.21	146.26
2021	0.00	0.00	119.13	0.00	9.28	0.00	128.41	1.40	0.00	380.91	91.04	18.54	130.64	140.70
2022	0.00	0.00	14.76	0.00	0.00	0.00	14.76	1.47	3.98	368.47	88.82	34.56	132.86	112.23
2023	0.00	0.00	72.30	0.00	0.00	0.00	72.30	1.84	3.98	353.40	86.63	42.79	138.93	85.05
2024	0.00	0.00	100.82	0.00	73.08	0.00	173.89	2.70	3.98	345.07	85.17	48.98	144.05	66.87
2025	0.00	0.00	14.98	0.00	0.00	0.00	14.98	2.77	7.98	272.52	84.68	40.97	130.73	16.14
2026	0.00	0.00	73.39	0.00	0.00	0.00	73.39	3.14	7.98	254.50	83.39	42.05	133.00	-3.94
2027	0.00	0.00	100.23	0.00	0.00	0.00	100.23	3.64	7.98	237.62	81.53	42.23	144.53	-30.68
2028	0.00	0.00	168.00	0.00	0.00	0.00	168.00	4.48	11.97	220.74	79.62	64.98	143.50	-67.35
2029	0.00	0.00	220.75	0.00	0.00	0.00	220.75	5.58	11.97	205.27	78.17	73.98	147.85	-94.74
2030	0.00	0.00	98.87	0.00	9.28	0.00	108.15	6.12	11.98	218.15	79.09	68.55	144.04	-73.53
2031	0.00	0.00	7.27	0.00	0.00	0.00	7.27	6.16	18.90	235.26	76.69	121.48	136.86	-99.76
2032	0.00	0.00	75.62	0.00	0.00	0.00	75.62	6.54	18.90	215.25	74.79	134.42	143.44	-137.40
2033	0.00	0.00	103.28	0.00	61.48	0.00	164.75	7.36	18.90	195.29	73.05	147.50	148.95	-174.22
2034	0.00	0.00	173.11	0.00	0.00	0.00	173.11	8.23	22.90	181.44	71.65	165.86	152.52	-208.59
2035	0.00	0.00	227.45	0.00	0.00	0.00	227.45	9.36	22.90	170.46	70.76	175.58	155.46	-231.34
2036	0.00	0.00	101.87	0.00	0.00	0.00	101.87	9.87	22.90	168.61	70.71	170.95	161.51	-234.55
2037	0.00	0.00	167.31	0.00	0.00	0.00	167.31	10.71	29.82	175.62	68.71	226.64	147.59	-267.33
2038	0.00	0.00	230.88	0.00	0.00	0.00	230.88	11.86	29.82	160.56	67.51	240.37	153.80	-301.12
2039	0.00	0.00	103.41	0.00	0.00	0.00	103.41	12.38	29.83	155.51	67.44	243.76	160.62	-316.31
2040	0.00	0.00	7.60	0.00	0.00	0.00	7.60	12.42	36.75	165.41	65.53	295.35	154.33	-349.80
2041	0.00	0.00	163.04	0.00	0.00	0.00	163.04	13.23	36.76	155.40	63.76	325.47	162.60	-396.42
2042	0.00	0.00	235.53	0.00	0.00	0.00	235.53	14.41	36.76	149.69	62.71	347.32	168.67	-429.01
2043	0.00	0.00	105.49	0.00	61.48	0.00	166.97	15.25	36.76	150.95	62.68	352.31	169.86	-433.90
2044	0.00	0.00	7.76	0.00	0.00	0.00	7.76	15.29	43.68	159.35	61.13	402.15	161.82	-465.75
2045	0.00	0.00	35.49	0.00	0.00	0.00	35.49	15.46	43.68	150.63	59.60	434.69	169.02	-512.68
2046	0.00	0.00	48.47	0.00	0.00	0.00	48.47	15.71	43.68	144.88	58.50	461.23	174.74	-549.58
2047	0.00	0.00	7.35	0.00	0.00	0.00	7.35	15.74	45.13	135.81	57.64	480.80	179.61	-582.24
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.13	143.77	58.58	458.91	174.45	-548.17
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	15.74	45.14	143.77	58.58	458.91	174.45	-548.17
2050	0.00	0.00	71.22	0.00	9.87	0.00	81.09	15.74	45.14	143.77	58.58	458.91	174.45	-548.17
2051	0.00	0.00	97.28	0.00	9.87	0.00	107.14	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2052	0.00	0.00	14.76	0.00	9.87	0.00	24.62	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2053	0.00	0.00	72.30	0.00	0.00	0.00	72.30	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2054	0.00	0.00	98.74	0.00	0.00	0.00	98.74	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2055	0.00	0.00	14.98	0.00	0.00	0.00	14.98	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2056	0.00	0.00	73.39	0.00	9.28	0.00	82.67	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2057	0.00	0.00	100.23	0.00	0.00	0.00	100.23	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2058	0.00	0.00	168.00	0.00	0.00	0.00	168.00	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2059	0.00	0.00	220.75	0.00	54.81	0.00	275.55	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2060	0.00	0.00	98.87	0.00	0.00	0.00	98.87	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2061	0.00	0.00	7.27	0.00	0.00	0.00	7.27	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2062	0.00	0.00	75.62	0.00	0.00	0.00	75.62	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2063	0.00	0.00	103.28	0.00	0.00	0.00	103.28	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2064	0.00	0.00	173.11	0.00	0.00	0.00	173.11	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2065	0.00	0.00	227.45	0.00	9.28	0.00	236.73	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2066	0.00	0.00	101.87	0.00	0.00	0.00	101.87	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2067	0.00	0.00	167.31	0.00	0.00	0.00	167.31	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2068	0.00	0.00	230.88	0.00	46.11	0.00	276.99	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2069	0.00	0.00	103.41	0.00	0.00	0.00	103.41	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2070	0.00	0.00	7.60	0.00	0.00	0.00	7.60	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2071	0.00	0.00	163.04	0.00	0.00	0.00	163.04	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2072	0.00	0.00	235.53	0.00	0.00	0.00	235.53	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2073	0.00	0.00	105.49	0.00	0.00	0.00	105.49	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2074	0.00	0.00	7.76	0.00	18.27	0.00	26.03	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2075	0.00	0.00	35.49	0.00	0.00	0.00	35.49	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2076	0.00	0.00	48.47	0.00	0.00	0.00	48.47	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2077	0.00	0.00	7.35	0.00	0.00	0.00	7.35	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2078	0.00	0.00	0.00	0.00	46.11	0.00	46.11	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2080	0.00	0.00	71.22	0.00	0.00	0.00	71.22	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2081	0.00	0.00	97.28	0.00	0.00	0.00	97.28	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2082	0.00	0.00	14.76	0.00	0.00	0.00	14.76	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2083	0.00	0.00	72.30	0.00	15.37	0.00	87.67	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2084	0.00	0.00	98.74	0.00	9.87	0.00	108.61	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2085	0.00	0.00	14.98	0.00	9.87	0.00	24.84	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2086	0.00	0.00	73.39	0.00	9.87	0.00	83.25	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2087	0.00	0.00	100.23	0.00	9.87	0.00	110.10	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2088	0.00	0.00	15.20	0.00	0.00	0.00	15.20	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	143.77	58.58	458.91	174.45	-548.17
Salvage Value	0.00	0.00	41.11	0.00	2.72	0.00	43.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1405.03	0.00	150.53	0.00	1618.51	130.92	343.48	5197.15	1624.63	3260.17	2836.83	-2524.47

Net Present Value -4617

Wind/Gas

TABLE 010
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	354.71	99.24	24.61	104.31	126.54
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	373.23	97.67	25.25	106.21	144.09
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	352.86	94.88	27.63	108.96	121.38
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	344.28	92.93	24.94	110.41	116.00
2020	0.00	0.00	0.00	9.58	13.53	0.00	23.11	0.63	0.00	375.38	92.41	21.23	121.42	140.31
2021	0.00	0.00	0.36	292.47	22.55	0.00	315.39	2.20	0.00	376.76	90.58	20.62	131.14	134.41
2022	0.00	0.00	0.00	297.95	27.23	0.00	325.18	3.83	6.21	381.05	88.96	20.75	131.65	139.68
2023	0.00	0.00	166.40	288.37	14.18	0.00	468.95	6.06	12.42	377.95	86.49	23.89	135.51	132.06
2024	0.00	0.00	219.34	5.47	25.01	0.00	249.82	7.20	18.63	382.20	84.74	24.28	139.18	134.00
2025	0.00	0.00	29.96	4.79	3.89	0.00	38.64	7.40	26.60	319.93	84.79	28.21	122.46	84.47
2026	0.00	0.00	73.39	146.24	9.78	0.00	229.40	8.54	26.60	307.48	83.80	27.04	123.18	73.46
2027	0.00	0.00	102.31	148.97	88.61	0.00	339.89	10.23	29.70	292.82	81.47	33.04	127.29	51.02
2028	0.00	0.00	15.20	148.97	21.53	0.00	185.71	11.16	36.81	287.63	79.73	42.71	130.36	34.83
2029	0.00	0.00	74.49	148.97	21.61	0.00	245.08	12.39	39.91	279.80	78.15	46.21	134.01	21.42
2030	0.00	0.00	101.74	148.97	21.61	0.00	272.32	13.75	43.02	282.73	77.26	48.36	135.34	21.77
2031	0.00	0.00	90.67	148.97	21.61	0.00	261.26	15.06	50.10	284.67	76.04	57.53	137.30	13.79
2032	0.00	0.00	102.76	148.97	83.09	0.00	334.82	16.73	53.22	281.32	74.94	58.04	140.69	7.65
2033	0.00	0.00	15.59	148.97	21.61	0.00	186.17	17.66	60.32	286.64	74.29	61.33	143.11	7.91
2034	0.00	0.00	76.37	148.97	21.61	0.00	246.96	18.90	63.43	273.94	72.51	71.43	145.95	-15.96
2035	0.00	0.00	104.31	148.97	21.61	0.00	274.89	20.27	66.55	261.54	70.85	77.44	150.47	-37.22
2036	0.00	0.00	92.96	148.97	21.61	0.00	263.55	21.59	73.63	256.46	69.51	89.05	153.37	-55.46
2037	0.00	0.00	105.36	148.97	21.61	0.00	275.94	22.97	76.75	247.70	68.25	94.20	157.57	-72.32
2038	0.00	0.00	93.90	148.97	21.61	0.00	264.48	24.29	83.84	246.65	67.22	103.71	161.55	-85.83
2039	0.00	0.00	106.41	148.97	83.09	0.00	338.47	25.98	86.95	240.29	66.08	103.95	176.67	-106.40
2040	0.00	0.00	16.14	158.55	21.61	0.00	196.31	26.96	94.06	242.98	65.30	109.51	182.81	-114.63
2041	0.00	0.00	79.09	441.45	21.61	0.00	542.15	29.67	97.17	229.85	63.79	130.50	180.84	-145.29
2042	0.00	0.00	108.02	446.92	21.61	0.00	576.55	32.56	100.27	218.87	62.44	139.59	187.37	-170.52
2043	0.00	0.00	96.27	437.34	21.45	0.00	555.06	35.33	107.36	213.85	61.28	154.36	191.49	-193.28
2044	0.00	0.00	109.10	154.45	20.96	0.00	284.51	36.75	110.47	209.15	60.35	160.24	196.74	-208.19
2045	0.00	0.00	52.04	153.76	19.66	0.00	225.47	37.88	117.57	205.96	59.28	169.67	205.42	-228.42
2046	0.00	0.00	48.47	290.42	17.72	0.00	356.61	39.67	120.68	201.39	58.27	170.59	219.02	-246.48
2047	0.00	0.00	7.35	151.71	11.83	0.00	170.90	40.52	125.23	195.23	57.22	176.20	222.48	-260.67
2048	0.00	0.00	0.00	148.97	6.08	0.00	155.05	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2049	0.00	0.00	0.00	148.97	9.95	0.00	158.92	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2050	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2051	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2052	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2053	0.00	0.00	144.60	148.97	0.00	0.00	293.57	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2054	0.00	0.00	197.48	148.97	0.00	0.00	346.46	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2055	0.00	0.00	29.96	148.97	3.38	0.00	182.32	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2056	0.00	0.00	73.39	148.97	5.64	0.00	228.00	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2057	0.00	0.00	100.23	148.97	6.85	0.00	256.05	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2058	0.00	0.00	15.20	148.97	3.79	0.00	167.97	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2059	0.00	0.00	74.49	148.97	20.42	0.00	243.88	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2060	0.00	0.00	101.74	158.55	1.70	0.00	262.00	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2061	0.00	0.00	90.67	441.45	2.73	0.00	534.85	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2062	0.00	0.00	102.76	446.92	58.75	0.00	608.43	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2063	0.00	0.00	15.59	437.34	5.40	0.00	458.33	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2064	0.00	0.00	76.37	154.45	5.40	0.00	236.23	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2065	0.00	0.00	104.31	153.76	5.40	0.00	263.48	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2066	0.00	0.00	92.96	290.42	5.40	0.00	388.79	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2067	0.00	0.00	105.36	151.71	51.51	0.00	308.58	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2068	0.00	0.00	93.90	148.97	5.40	0.00	248.27	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2069	0.00	0.00	106.41	148.97	5.40	0.00	260.79	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2070	0.00	0.00	16.14	148.97	15.55	0.00	180.67	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2071	0.00	0.00	79.09	148.97	22.32	0.00	250.38	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2072	0.00	0.00	108.02	148.97	25.78	0.00	282.77	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2073	0.00	0.00	96.27	148.97	15.79	0.00	261.04	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2074	0.00	0.00	109.10	148.97	56.11	0.00	314.18	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2075	0.00	0.00	52.04	148.97	7.59	0.00	208.60	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2076	0.00	0.00	48.47	148.97	12.45	0.00	209.90	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2077	0.00	0.00	7.35	148.97	35.26	0.00	191.59	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2078	0.00	0.00	0.00	148.97	21.45	0.00	170.42	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2079	0.00	0.00	0.00	148.97	21.20	0.00	170.18	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2080	0.00	0.00	0.00	158.55	20.88	0.00	179.43	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2081	0.00	0.00	0.00	441.45	19.91	0.00	461.36	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2082	0.00	0.00	0.00	446.92	34.25	0.00	481.17	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2083	0.00	0.00	144.60	437.34	17.67	0.00	599.60	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2084	0.00	0.00	197.48	154.45	25.99	0.00	377.92	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2085	0.00	0.00	29.96	153.76	25.83	0.00	209.55	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2086	0.00	0.00	73.39	290.42	24.86	0.00	388.67	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2087	0.00	0.00	100.23	151.71	23.88	0.00	275.83	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2088	0.00	0.00	15.20	148.97	9.16	0.00	173.34	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2089	0.00	0.00	0.00	144.18	19.99	0.00	164.17	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
2090	0.00	0.00	0.00	2.74	0.08	0.00	2.82	40.52	125.23	200.86	58.26	172.16	215.64	-245.19
Salvage Value	0.00	0.00	21.35	52.69	9.71	0.00	83.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1026.26	2582.12	374.98	0.00	4046.32	315.52	974.12	5994.47	1620.82	1437.43	2992.92	-56.69

Net Present Value -5393

K22/Gas

TABLE 011
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	104.90	0.00	0.00	9.87	0.00	114.77	0.57	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	31.84	0.00	0.00	10.78	0.00	42.62	0.79	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	28.25	0.00	0.00	10.87	0.00	39.11	0.98	0.00	354.31	99.24	24.61	104.31	126.14
2017	0.00	210.82	0.00	0.00	27.15	0.00	237.97	2.17	0.00	372.21	97.67	25.27	106.24	143.03
2018	0.00	411.14	0.00	0.00	8.86	0.00	420.01	4.27	0.00	350.82	94.89	27.65	109.04	119.23
2019	0.00	670.60	0.00	0.00	15.43	0.00	686.04	7.70	0.00	342.16	92.94	24.95	110.49	113.77
2020	0.00	746.81	0.00	0.00	28.08	0.00	774.89	11.58	0.00	370.41	92.24	21.91	122.13	134.12
2021	0.00	610.51	0.00	0.00	39.84	0.00	650.35	14.83	0.00	374.32	90.53	21.04	132.54	130.21
2022	0.00	354.56	0.00	0.00	47.18	0.00	401.74	16.84	13.01	381.13	90.51	24.00	126.20	140.42
2023	0.00	164.83	0.00	0.00	0.01	0.00	164.84	17.66	13.22	499.77	96.18	23.80	115.03	264.76
2024	0.00	56.99	0.00	0.00	0.00	0.00	56.99	17.95	12.93	515.68	96.08	27.04	119.94	272.62
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	17.95	13.15	458.53	96.02	18.97	110.74	232.80
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.95	12.97	439.88	94.17	19.26	113.51	212.94
2027	0.00	0.00	95.56	0.00	0.00	0.00	95.56	18.32	12.93	397.98	92.34	18.43	112.77	174.44
2028	0.00	0.00	122.58	0.00	9.28	0.00	131.86	18.87	12.69	377.17	90.78	19.18	115.78	151.44
2029	0.00	0.00	15.28	0.00	0.00	0.00	15.28	18.94	16.24	370.63	89.95	24.01	116.20	140.47
2030	0.00	0.00	74.87	0.00	0.00	0.00	74.87	19.32	16.24	359.98	88.21	29.50	120.17	122.10
2031	0.00	0.00	259.43	0.00	73.08	0.00	332.51	20.97	16.28	348.62	86.56	34.46	124.96	102.65
2032	0.00	0.00	239.59	0.00	0.00	0.00	239.59	22.17	22.98	339.24	84.98	46.58	129.31	78.37
2033	0.00	0.00	100.36	0.00	9.28	0.00	109.64	22.71	19.04	345.87	85.15	40.69	130.04	89.99
2034	0.00	0.00	7.38	0.00	0.00	0.00	7.38	22.75	25.96	368.13	82.71	97.35	124.10	63.96
2035	0.00	0.00	158.23	0.00	0.00	0.00	158.23	23.54	25.96	351.15	80.68	109.35	130.19	30.94
2036	0.00	0.00	228.59	0.00	0.00	0.00	228.59	24.69	25.96	337.81	79.17	119.09	134.54	5.02
2037	0.00	0.00	102.38	0.00	0.00	0.00	102.38	25.20	25.97	346.57	79.61	113.46	132.27	21.24
2038	0.00	0.00	168.14	0.00	0.00	0.00	168.14	26.04	32.23	367.72	77.23	174.74	130.04	-14.29
2039	0.00	0.00	232.04	0.00	0.00	0.00	232.04	27.20	32.24	355.74	75.87	187.53	140.71	-48.37
2040	0.00	0.00	103.92	0.00	61.48	0.00	165.40	28.03	32.24	355.25	75.42	192.27	142.72	-55.16
2041	0.00	0.00	7.64	0.00	0.00	0.00	7.64	28.06	39.16	380.22	73.44	254.36	138.86	-86.43
2042	0.00	0.00	163.85	0.00	0.00	0.00	163.85	28.88	42.06	366.63	71.62	277.15	144.65	-126.79
2043	0.00	0.00	236.71	0.00	0.00	0.00	236.71	30.07	39.16	356.59	70.30	293.82	149.12	-156.65
2044	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.60	39.16	344.85	69.95	291.10	149.77	-165.97
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	30.64	46.09	371.95	68.34	353.70	146.04	-196.13
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.09	362.95	67.11	374.76	149.22	-228.16
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	47.84	340.43	65.75	388.84	153.48	-267.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	47.84	358.44	67.07	372.44	149.58	-230.64
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	47.84	358.44	67.07	372.44	149.58	-230.64
2050	0.00	0.00	0.00	0.00	10.27	0.00	10.27	30.64	46.97	358.44	67.07	372.44	149.58	-230.64
2051	0.00	0.00	0.00	0.00	10.32	0.00	10.32	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2052	0.00	0.00	0.00	0.00	10.34	0.00	10.34	30.64	49.00	358.44	67.07	372.44	149.58	-230.64
2053	0.00	0.00	0.00	0.00	0.44	0.00	0.44	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2054	0.00	0.00	0.00	0.00	14.33	0.00	14.33	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2055	0.00	0.00	0.00	0.00	19.00	0.00	19.00	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2056	0.00	0.00	0.00	0.00	20.54	0.00	20.54	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2057	0.00	0.00	73.75	0.00	16.76	0.00	90.51	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2058	0.00	0.00	100.73	0.00	0.00	0.00	100.73	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2059	0.00	0.00	15.28	0.00	0.00	0.00	15.28	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2060	0.00	0.00	74.87	0.00	0.00	0.00	74.87	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2061	0.00	0.00	257.35	0.00	0.00	0.00	257.35	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2062	0.00	0.00	239.59	0.00	0.00	0.00	239.59	30.64	49.00	358.44	67.07	372.44	149.58	-230.64
2063	0.00	0.00	100.36	0.00	9.28	0.00	109.64	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2064	0.00	0.00	7.38	0.00	0.00	0.00	7.38	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2065	0.00	0.00	158.23	0.00	0.51	0.00	158.74	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2066	0.00	0.00	228.59	0.00	55.35	0.00	283.94	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2067	0.00	0.00	102.38	0.00	16.82	0.00	119.20	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2068	0.00	0.00	168.14	0.00	17.71	0.00	185.85	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2069	0.00	0.00	232.04	0.00	1.11	0.00	233.14	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2070	0.00	0.00	103.92	0.00	9.08	0.00	113.01	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2071	0.00	0.00	7.64	0.00	19.30	0.00	26.94	30.64	61.60	358.44	67.07	372.44	149.58	-230.64
2072	0.00	0.00	163.85	0.00	30.42	0.00	194.27	30.64	49.00	358.44	67.07	372.44	149.58	-230.64
2073	0.00	0.00	236.71	0.00	0.01	0.00	236.72	30.64	47.84	358.44	67.07	372.44	149.58	-230.64
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.64	47.84	358.44	67.07	372.44	149.58	-230.64
2075	0.00	0.00	7.80	0.00	46.12	0.00	53.91	30.64	47.84	358.44	67.07	372.44	149.58	-230.64
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.97	358.44	67.07	372.44	149.58	-230.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2081	0.00	0.00	0.00	0.00	18.27	0.00	18.27	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	49.00	358.44	67.07	372.44	149.58	-230.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2087	0.00	0.00	73.75	0.00	9.87	0.00	83.62	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2088	0.00	0.00	100.73	0.00	0.00	0.00	100.73	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2089	0.00	0.00	15.28	0.00	0.00	0.00	15.28	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
2090	0.00	0.00	0.00	0.00	15.37	0.00	15.37	30.64	46.10	358.44	67.07	372.44	149.58	-230.64
Salvage Value	0.00	0.00	19.65	0.00	4.12	0.00	23.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2572.26	1020.22	0.00	238.16	0.00	3830.64	360.75	393.87	7560.42	1749.83	2418.61	2537.09	854.89

Net Present Value -3730

K22/C29

TABLE 012
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	104.90	0.00	0.00	9.87	0.00	145.84	0.73	0.00	312.96	102.97	19.80	97.89	92.30
2015	39.75	31.84	0.00	0.00	10.78	0.00	82.37	1.14	0.00	344.96	101.09	23.52	102.04	118.31
2016	11.18	28.25	0.00	0.00	10.87	0.00	50.30	1.39	0.00	354.31	99.24	24.61	104.31	126.14
2017	11.92	210.82	0.00	0.00	27.15	0.00	249.88	2.64	0.00	372.21	97.67	25.27	106.24	143.03
2018	11.99	411.14	0.00	0.00	8.86	0.00	431.99	4.80	0.00	350.82	94.89	27.65	109.04	119.23
2019	14.33	670.60	0.00	0.00	15.43	0.00	700.37	8.30	0.00	342.16	92.94	24.95	110.49	113.77
2020	166.16	746.81	0.00	0.00	28.08	0.00	941.05	13.01	0.00	370.42	92.24	21.91	122.13	134.14
2021	251.80	610.51	0.00	0.00	39.84	0.00	902.15	17.52	0.00	374.08	90.53	21.05	132.68	129.82
2022	270.08	354.56	0.00	0.00	47.18	0.00	671.81	20.88	13.01	380.84	90.52	23.95	126.38	139.99
2023	275.25	164.83	0.00	0.00	3.54	0.00	443.62	23.10	13.22	498.84	96.18	23.85	115.15	263.65
2024	744.58	56.99	0.00	0.00	3.53	0.00	805.11	27.12	12.93	513.72	96.07	27.05	120.04	270.56
2025	1182.29	0.00	0.00	0.00	42.90	0.00	1225.20	33.25	13.15	456.14	96.05	19.00	110.92	230.18
2026	1061.52	0.00	0.00	0.00	22.26	0.00	1083.77	38.67	12.97	436.88	94.18	19.31	113.73	209.66
2027	758.04	0.00	0.00	0.00	37.45	0.00	795.49	42.64	12.93	396.05	92.57	17.68	112.68	173.12
2028	524.99	0.00	0.00	0.00	64.84	0.00	589.83	45.59	12.69	370.29	90.69	19.42	116.59	143.60
2029	344.82	0.00	0.00	0.00	86.88	0.00	431.70	47.75	26.56	479.01	94.49	22.19	100.26	262.07
2030	127.00	0.00	0.00	0.00	102.39	0.00	229.39	48.90	26.78	633.94	101.62	21.64	92.28	418.40
2031	40.08	0.00	0.00	0.00	0.00	0.00	40.08	49.10	26.68	653.42	101.40	22.12	95.97	433.92
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	29.59	632.63	99.72	21.85	97.48	413.58
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.48	609.97	98.10	21.80	98.82	391.25
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.44	590.28	96.51	22.24	101.01	370.52
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.27	569.35	94.98	22.36	102.29	349.73
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	49.10	24.90	545.15	93.44	22.30	103.59	325.82
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	24.97	520.74	91.91	22.38	105.51	300.94
2038	0.00	0.00	99.72	0.00	0.00	0.00	99.72	49.49	24.43	497.35	90.41	22.41	108.95	275.58
2039	0.00	0.00	128.22	0.00	9.28	0.00	137.50	50.07	27.15	489.88	89.05	21.93	123.40	255.51
2040	0.00	0.00	16.14	0.00	0.00	0.00	16.14	50.15	28.24	477.99	87.33	38.46	125.13	227.07
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.15	28.24	466.16	85.89	42.99	130.53	206.74
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	50.55	31.13	454.76	84.49	44.36	138.38	187.53
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	51.14	28.24	441.35	83.02	45.04	148.15	165.13
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	51.62	32.22	431.21	81.57	69.39	145.66	134.59
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	52.53	31.56	419.75	80.33	74.17	151.38	113.86
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	52.62	35.56	431.27	79.96	73.36	157.94	120.02
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.30	402.55	77.77	97.84	162.94	64.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.30	417.86	79.35	81.79	157.42	99.30
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	40.20	417.86	79.35	81.79	157.42	99.30
2050	0.00	0.00	0.00	0.00	10.27	0.00	10.27	52.62	36.44	417.86	79.35	81.79	157.42	99.30
2051	0.00	0.00	0.00	0.00	10.32	0.00	10.32	52.62	35.57	417.86	79.35	81.79	157.42	99.30
2052	0.00	0.00	0.00	0.00	10.34	0.00	10.34	52.62	38.48	417.86	79.35	81.79	157.42	99.30
2053	0.00	0.00	0.00	0.00	0.44	0.00	0.44	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2054	0.00	0.00	0.00	0.00	14.33	0.00	14.33	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2055	0.00	0.00	0.00	0.00	19.00	0.00	19.00	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2056	0.00	0.00	0.00	0.00	20.54	0.00	20.54	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2057	0.00	0.00	0.00	0.00	16.76	0.00	16.76	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2058	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2059	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.62	53.98	417.86	79.35	81.79	157.42	99.30
2060	0.00	0.00	0.00	0.00	10.47	0.00	10.47	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2061	0.00	0.00	0.00	0.00	5.23	0.00	5.23	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2062	0.00	0.00	0.00	0.00	8.72	0.00	8.72	52.62	38.48	417.86	79.35	81.79	157.42	99.30
2063	0.00	0.00	0.00	0.00	14.83	0.00	14.83	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2064	0.00	0.00	0.00	0.00	20.93	0.00	20.93	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2065	0.00	0.00	0.00	0.00	25.81	0.00	25.81	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2066	0.00	0.00	0.00	0.00	0.54	0.00	0.54	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2067	0.00	0.00	0.00	0.00	16.82	0.00	16.82	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2068	0.00	0.00	77.91	0.00	8.43	0.00	86.34	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2069	0.00	0.00	106.41	0.00	1.11	0.00	107.52	52.62	53.98	417.86	79.35	81.79	157.42	99.30
2070	0.00	0.00	16.14	0.00	9.08	0.00	25.22	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2071	0.00	0.00	0.00	0.00	19.30	0.00	19.30	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2072	0.00	0.00	79.48	0.00	30.42	0.00	109.91	52.62	53.98	417.86	79.35	81.79	157.42	99.30
2073	0.00	0.00	108.56	0.00	2.67	0.00	111.22	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2074	0.00	0.00	96.75	0.00	11.94	0.00	108.69	52.62	52.82	417.86	79.35	81.79	157.42	99.30
2075	0.00	0.00	109.64	0.00	32.44	0.00	142.08	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2076	0.00	0.00	16.63	0.00	17.02	0.00	33.66	52.62	51.95	417.86	79.35	81.79	157.42	99.30
2077	0.00	0.00	0.00	0.00	28.73	0.00	28.73	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2078	0.00	0.00	0.00	0.00	59.30	0.00	59.30	52.62	51.08	417.86	79.35	81.79	157.42	99.30
2079	0.00	0.00	0.00	0.00	65.95	0.00	65.95	52.62	38.48	417.86	79.35	81.79	157.42	99.30
2080	0.00	0.00	0.00	0.00	131.90	0.00	131.90	52.62	52.82	417.86	79.35	81.79	157.42	99.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	55.71	417.86	79.35	81.79	157.42	99.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.32	417.86	79.35	81.79	157.42	99.30
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	52.82	417.86	79.35	81.79	157.42	99.30
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	35.59	417.86	79.35	81.79	157.42	99.30
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	38.48	417.86	79.35	81.79	157.42	99.30
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	35.59	417.86	79.35	81.79	157.42	99.30
Salvage Value	11.98	0.00	6.36	0.00	9.70	0.00	28.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3392.16	2572.26	197.32	0.00	391.93	0.00	6553.68	650.13	364.53	8808.39	1867.94	731.04	2452.56	3756.84

Net Present Value: -3811

SCGT/C26

TABLE 013
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	312.96	102.97	19.80	97.89	92.30
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	344.96	101.09	23.52	102.04	118.31
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	354.71	99.24	24.61	104.31	126.54
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	373.23	97.67	25.25	106.21	144.09
2018	213.28	0.00	0.36	0.00	0.00	0.00	213.64	3.29	0.00	352.45	94.88	27.64	108.97	120.95
2019	256.36	0.00	0.00	0.00	0.00	0.00	256.36	4.57	0.00	343.62	92.94	24.95	110.43	115.30
2020	262.51	0.00	93.03	0.00	0.00	0.00	355.54	6.24	0.00	377.79	92.85	19.78	120.34	144.82
2021	723.60	0.00	119.08	0.00	9.28	0.00	851.97	10.39	0.00	379.86	91.01	18.79	131.08	138.98
2022	1161.65	0.00	14.76	0.00	0.54	0.00	1176.95	16.27	3.98	367.07	88.84	34.95	133.23	110.04
2023	1042.98	0.00	0.00	0.00	1.07	0.00	1044.05	21.49	3.98	350.33	86.49	44.24	139.70	79.90
2024	744.80	0.00	0.00	0.00	2.14	0.00	746.95	25.23	3.98	345.06	85.34	48.61	144.33	66.78
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	27.83	3.98	276.64	85.84	29.71	134.85	26.24
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	29.54	18.29	348.37	89.76	22.30	110.06	126.24
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	30.16	18.51	492.28	97.52	21.14	98.60	275.02
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	30.36	18.21	519.49	97.61	23.17	107.04	291.67
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.43	495.88	95.91	23.84	108.41	267.71
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.26	480.39	94.72	23.56	108.40	253.71
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.21	458.30	92.77	25.66	112.41	227.46
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.97	431.27	90.85	27.24	115.84	197.35
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.54	412.36	88.92	32.08	120.39	170.98
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.54	401.60	87.36	37.06	125.99	151.18
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.58	391.63	86.07	41.11	128.82	135.63
2036	0.00	0.00	77.14	0.00	0.00	0.00	77.14	30.74	20.30	384.46	85.01	41.58	133.46	124.42
2037	0.00	0.00	105.40	0.00	9.28	0.00	114.68	31.32	17.41	372.68	83.51	42.31	143.91	102.95
2038	0.00	0.00	15.98	0.00	0.00	0.00	15.98	31.40	21.39	362.84	82.04	65.11	142.70	72.99
2039	0.00	0.00	78.30	0.00	0.00	0.00	78.30	31.79	21.39	351.82	80.79	70.53	154.71	45.80
2040	0.00	0.00	109.02	0.00	73.08	0.00	182.10	32.69	21.39	342.26	79.45	70.05	167.78	24.97
2041	0.00	0.00	95.31	0.00	0.00	0.00	95.31	33.17	25.39	328.59	77.82	98.39	166.29	-13.90
2042	0.00	0.00	108.02	0.00	0.00	0.00	108.02	33.71	24.73	315.39	76.48	110.33	171.86	-43.28
2043	0.00	0.00	96.27	0.00	0.00	0.00	96.27	34.19	28.71	307.75	75.18	123.78	180.70	-71.91
2044	0.00	0.00	109.10	0.00	61.48	0.00	170.58	35.04	28.71	297.18	73.88	125.35	197.16	-99.21
2045	0.00	0.00	16.55	0.00	0.00	0.00	16.55	35.12	32.72	288.74	72.56	172.24	185.24	-141.29
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	35.62	279.27	71.39	189.93	189.91	-171.97
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.73	269.09	70.08	193.12	209.44	-203.55
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.73	279.03	71.34	185.09	194.86	-172.27
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.74	279.03	71.34	185.09	194.86	-172.27
2050	0.00	0.00	71.22	0.00	9.87	0.00	81.09	35.12	32.75	279.03	71.34	185.09	194.86	-172.27
2051	0.00	0.00	97.28	0.00	9.87	0.00	107.14	35.12	34.49	279.03	71.34	185.09	194.86	-172.27
2052	0.00	0.00	14.76	0.00	9.87	0.00	24.62	35.12	34.50	279.03	71.34	185.09	194.86	-172.27
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	279.03	71.34	185.09	194.86	-172.27
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	279.03	71.34	185.09	194.86	-172.27
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	279.03	71.34	185.09	194.86	-172.27
2056	0.00	0.00	0.00	0.00	9.28	0.00	9.28	35.12	35.65	279.03	71.34	185.09	194.86	-172.27
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2066	0.00	0.00	77.14	0.00	0.00	0.00	77.14	35.12	35.65	279.03	71.34	185.09	194.86	-172.27
2067	0.00	0.00	105.36	0.00	0.00	0.00	105.36	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2068	0.00	0.00	15.98	0.00	0.00	0.00	15.98	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2069	0.00	0.00	78.30	0.00	0.00	0.00	78.30	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2070	0.00	0.00	106.94	0.00	0.00	0.00	106.94	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2071	0.00	0.00	95.31	0.00	0.00	0.00	95.31	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2072	0.00	0.00	108.02	0.00	9.82	0.00	117.83	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2073	0.00	0.00	96.27	0.00	1.07	0.00	97.34	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2074	0.00	0.00	109.10	0.00	2.14	0.00	111.24	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2075	0.00	0.00	16.55	0.00	59.63	0.00	76.18	35.12	48.25	279.03	71.34	185.09	194.86	-172.27
2076	0.00	0.00	0.00	0.00	2.14	0.00	2.14	35.12	35.65	279.03	71.34	185.09	194.86	-172.27
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	49.99	279.03	71.34	185.09	194.86	-172.27
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	279.03	71.34	185.09	194.86	-172.27
2079	0.00	0.00	0.00	0.00	46.12	0.00	46.12	35.12	49.99	279.03	71.34	185.09	194.86	-172.27
2080	0.00	0.00	71.22	0.00	0.00	0.00	71.22	35.12	34.50	279.03	71.34	185.09	194.86	-172.27
2081	0.00	0.00	97.28	0.00	0.00	0.00	97.28	35.12	49.99	279.03	71.34	185.09	194.86	-172.27
2082	0.00	0.00	14.76	0.00	0.00	0.00	14.76	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	35.65	279.03	71.34	185.09	194.86	-172.27
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
2090	0.00	0.00	0.00	0.00	18.27	0.00	18.27	35.12	32.76	279.03	71.34	185.09	194.86	-172.27
Salvage Value	4.70	0.00	10.58	0.00	3.05	0.00	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	462.69	0.00	98.87	0.00	4490.74	438.50	293.52	7228.68	1779.56	1324.86	2780.67	1343.59

Net Present Value: -3879

CCGT/C26

TABLE 014
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	312.96	102.97	19.80	97.89	92.30
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	344.96	101.09	23.52	102.04	118.31
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	354.71	99.24	24.61	104.31	126.54
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	373.23	97.67	25.25	106.21	144.09
2018	213.28	0.00	0.36	0.00	0.00	0.00	213.64	3.29	0.00	352.45	94.88	27.64	108.97	120.95
2019	256.36	0.00	146.09	0.00	0.00	0.00	402.45	5.30	0.00	343.62	92.94	24.95	110.43	115.30
2020	262.51	0.00	232.87	0.00	0.00	0.00	495.38	7.67	0.00	377.79	92.85	19.78	120.34	144.82
2021	723.60	0.00	116.34	0.00	9.28	0.00	849.22	11.81	0.00	386.54	91.75	16.48	128.89	149.42
2022	1161.65	0.00	6.95	0.00	0.54	0.00	1169.14	17.65	6.91	406.60	89.34	68.47	115.32	133.47
2023	1042.98	0.00	0.00	0.00	1.07	0.00	1044.05	22.87	6.91	395.71	87.29	76.61	120.48	111.33
2024	744.80	0.00	0.00	0.00	2.14	0.00	746.95	26.61	6.91	393.90	86.30	82.05	123.19	102.36
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	29.21	6.91	321.75	85.97	68.25	118.26	49.27
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	30.91	21.22	380.89	89.68	56.52	100.67	134.02
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	31.54	21.44	514.16	97.50	41.82	92.86	281.99
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	31.74	21.14	542.72	97.74	42.27	100.66	302.05
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.36	521.81	96.03	46.46	101.02	278.29
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.19	496.03	93.93	49.92	103.82	248.36
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.14	499.65	93.87	46.40	101.57	257.80
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.90	464.34	91.02	53.65	107.16	212.52
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.47	450.17	89.34	58.52	111.11	191.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.47	434.91	87.33	64.67	117.95	164.96
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.51	426.39	85.89	70.17	122.04	148.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	23.23	413.58	84.27	79.81	125.06	124.44
2037	0.00	0.00	77.53	0.00	0.00	0.00	77.53	32.12	20.34	412.89	83.54	83.26	127.45	118.64
2038	0.00	0.00	105.93	0.00	9.28	0.00	115.21	32.70	20.34	406.14	82.37	86.69	134.05	103.03
2039	0.00	0.00	16.06	0.00	0.00	0.00	16.06	32.78	24.32	393.80	80.61	107.66	142.91	62.62
2040	0.00	0.00	78.69	0.00	0.00	0.00	78.69	33.17	24.32	382.02	79.20	117.57	147.71	37.54
2041	0.00	0.00	109.56	0.00	73.08	0.00	182.63	34.08	24.32	370.98	77.89	124.33	154.32	14.43
2042	0.00	0.00	95.79	0.00	0.00	0.00	95.79	34.55	27.66	362.76	76.56	136.62	162.24	-12.66
2043	0.00	0.00	108.56	0.00	0.00	0.00	108.56	35.10	27.66	349.85	75.18	157.75	161.30	-44.38
2044	0.00	0.00	16.47	0.00	0.00	0.00	16.47	35.18	31.64	338.91	73.87	175.07	165.93	-75.97
2045	0.00	0.00	80.68	0.00	0.00	0.00	80.68	35.58	31.64	327.68	72.56	181.77	177.51	-104.16
2046	0.00	0.00	110.19	0.00	61.48	0.00	171.67	36.44	34.55	323.38	71.66	181.96	189.65	-119.89
2047	0.00	0.00	16.72	0.00	0.00	0.00	16.72	36.52	35.65	300.32	70.11	216.54	183.54	-169.87
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.66	317.13	71.44	193.42	183.57	-131.30
2049	0.00	0.00	146.09	0.00	9.87	0.00	155.96	36.52	35.66	317.13	71.44	193.42	183.57	-131.30
2050	0.00	0.00	211.06	0.00	9.87	0.00	220.92	36.52	35.66	317.13	71.44	193.42	183.57	-131.30
2051	0.00	0.00	94.53	0.00	9.87	0.00	104.39	36.52	37.41	317.13	71.44	193.42	183.57	-131.30
2052	0.00	0.00	6.95	0.00	9.87	0.00	16.82	36.52	37.41	317.13	71.44	193.42	183.57	-131.30
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.42	317.13	71.44	193.42	183.57	-131.30
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	317.13	71.44	193.42	183.57	-131.30
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	317.13	71.44	193.42	183.57	-131.30
2056	0.00	0.00	0.00	0.00	9.28	0.00	9.28	36.52	38.58	317.13	71.44	193.42	183.57	-131.30
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	38.58	317.13	71.44	193.42	183.57	-131.30
2067	0.00	0.00	77.53	0.00	0.00	0.00	77.53	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2068	0.00	0.00	105.88	0.00	0.00	0.00	105.88	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2069	0.00	0.00	16.06	0.00	0.00	0.00	16.06	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2070	0.00	0.00	78.69	0.00	0.00	0.00	78.69	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2071	0.00	0.00	107.48	0.00	0.00	0.00	107.48	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2072	0.00	0.00	95.79	0.00	0.54	0.00	96.32	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2073	0.00	0.00	108.56	0.00	10.35	0.00	118.91	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2074	0.00	0.00	16.47	0.00	2.14	0.00	18.61	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2075	0.00	0.00	80.68	0.00	4.82	0.00	85.50	36.52	51.18	317.13	71.44	193.42	183.57	-131.30
2076	0.00	0.00	110.19	0.00	56.95	0.00	167.14	36.52	38.58	317.13	71.44	193.42	183.57	-131.30
2077	0.00	0.00	16.72	0.00	0.00	0.00	16.72	36.52	52.92	317.13	71.44	193.42	183.57	-131.30
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	317.13	71.44	193.42	183.57	-131.30
2079	0.00	0.00	146.09	0.00	0.00	0.00	146.09	36.52	52.92	317.13	71.44	193.42	183.57	-131.30
2080	0.00	0.00	211.06	0.00	0.00	0.00	211.06	36.52	37.43	317.13	71.44	193.42	183.57	-131.30
2081	0.00	0.00	94.53	0.00	46.11	0.00	140.64	36.52	52.92	317.13	71.44	193.42	183.57	-131.30
2082	0.00	0.00	6.95	0.00	0.00	0.00	6.95	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	38.58	317.13	71.44	193.42	183.57	-131.30
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	317.13	71.44	193.42	183.57	-131.30
Salvage Value	4.70	0.00	16.67	0.00	2.74	0.00	24.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	712.52	0.00	95.97	0.00	4737.68	458.33	328.31	7733.49	1782.11	1645.82	2615.05	1690.51

Net Present Value -3834

Wind/C26

TABLE 015
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	312.96	102.97	19.80	97.89	92.30
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	344.96	101.09	23.52	102.04	118.31
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	354.71	99.24	24.61	104.31	126.54
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	373.23	97.67	25.25	106.20	144.10
2018	213.28	0.00	0.00	0.00	0.00	0.00	213.28	3.29	0.00	352.45	94.88	27.64	108.97	120.95
2019	256.36	0.00	0.00	0.00	0.00	0.00	256.36	4.57	0.00	343.62	92.94	24.95	110.43	115.30
2020	262.51	0.00	0.00	9.58	13.53	0.00	285.62	6.00	0.00	374.45	92.42	21.22	121.45	139.37
2021	723.60	0.00	0.00	292.47	22.55	0.00	1038.63	11.19	0.00	375.97	90.58	20.70	131.56	133.13
2022	1161.65	0.00	0.00	297.95	27.60	0.00	1487.20	18.63	6.21	379.83	88.96	20.76	132.49	137.61
2023	1042.98	0.00	0.00	288.37	14.60	0.00	1345.96	25.36	12.42	376.75	86.51	23.85	136.37	130.01
2024	744.80	0.00	0.00	5.47	6.65	0.00	756.93	29.14	18.63	379.16	84.64	24.57	141.21	128.74
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	31.75	18.63	306.90	84.53	16.18	156.84	49.36
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	33.45	32.93	404.17	88.56	19.25	108.52	187.84
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	34.07	33.15	548.88	96.29	17.35	96.93	338.30
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	34.27	32.86	571.33	96.18	18.99	104.82	351.34
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	33.07	548.16	94.53	19.29	105.98	328.35
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.90	535.45	93.47	18.80	105.56	317.63
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.85	521.60	92.04	19.42	108.13	302.01
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	34.27	32.61	502.02	90.61	19.36	110.34	281.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.18	476.09	89.10	19.23	111.90	255.86
2034	0.00	0.00	98.18	0.00	0.00	0.00	98.18	34.65	32.18	452.14	87.64	19.33	113.77	231.40
2035	0.00	0.00	126.12	0.00	9.28	0.00	135.40	35.22	32.22	443.96	86.64	17.85	117.25	222.23
2036	0.00	0.00	92.96	0.00	0.00	0.00	92.96	35.69	38.93	427.14	84.56	32.78	121.14	188.65
2037	0.00	0.00	105.40	0.00	9.28	0.00	114.68	36.26	36.03	413.52	83.12	37.04	126.23	167.13
2038	0.00	0.00	15.98	0.00	0.00	0.00	15.98	36.34	40.02	406.52	81.86	48.09	130.38	146.19
2039	0.00	0.00	78.30	0.00	0.00	0.00	78.30	36.73	40.02	396.72	80.70	47.33	144.65	124.03
2040	0.00	0.00	109.02	9.58	73.08	0.00	191.68	37.68	40.02	380.49	79.03	60.87	148.29	92.31
2041	0.00	0.00	95.31	292.47	0.00	0.00	387.79	39.62	44.02	370.05	77.64	74.51	153.34	64.56
2042	0.00	0.00	108.02	297.95	0.00	0.00	405.96	41.65	43.36	358.80	76.36	77.89	162.80	41.76
2043	0.00	0.00	96.27	288.37	0.00	0.00	384.64	43.57	47.34	351.38	75.07	86.98	173.83	15.49
2044	0.00	0.00	109.10	5.47	61.48	0.00	176.05	44.45	47.34	335.47	73.72	108.79	171.56	-18.60
2045	0.00	0.00	16.55	0.00	0.00	0.00	16.55	44.53	51.35	325.83	72.45	126.88	176.78	-50.28
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	54.25	314.34	71.19	129.49	191.37	-77.72
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.36	303.35	69.95	131.22	208.91	-106.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.36	314.51	71.20	129.20	192.36	-78.24
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.37	314.51	71.20	129.20	192.36	-78.24
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.38	314.51	71.20	129.20	192.36	-78.24
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	53.12	314.51	71.20	129.20	192.36	-78.24
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	53.13	314.51	71.20	129.20	192.36	-78.24
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	314.51	71.20	129.20	192.36	-78.24
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	314.51	71.20	129.20	192.36	-78.24
2055	0.00	0.00	0.00	0.00	3.38	0.00	3.38	44.53	53.13	314.51	71.20	129.20	192.36	-78.24
2056	0.00	0.00	0.00	0.00	5.64	0.00	5.64	44.53	54.28	314.51	71.20	129.20	192.36	-78.24
2057	0.00	0.00	0.00	0.00	6.77	0.00	6.77	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2058	0.00	0.00	0.00	0.00	3.38	0.00	3.38	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2059	0.00	0.00	0.00	0.00	1.13	0.00	1.13	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2060	0.00	0.00	0.00	9.58	0.00	0.00	9.58	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2061	0.00	0.00	0.00	292.47	0.00	0.00	292.47	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2062	0.00	0.00	0.00	297.95	0.00	0.00	297.95	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2063	0.00	0.00	0.00	288.37	0.00	0.00	288.37	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2064	0.00	0.00	76.37	5.47	0.00	0.00	81.85	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2065	0.00	0.00	104.31	0.00	0.00	0.00	104.31	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2066	0.00	0.00	92.96	0.00	0.00	0.00	92.96	44.53	54.28	314.51	71.20	129.20	192.36	-78.24
2067	0.00	0.00	105.36	0.00	0.00	0.00	105.36	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2068	0.00	0.00	15.98	0.00	0.00	0.00	15.98	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2069	0.00	0.00	78.30	0.00	0.00	0.00	78.30	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2070	0.00	0.00	106.94	0.00	19.43	0.00	126.37	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2071	0.00	0.00	95.31	0.00	16.92	0.00	112.23	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2072	0.00	0.00	108.02	0.00	30.11	0.00	138.13	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2073	0.00	0.00	96.27	0.00	11.22	0.00	107.49	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2074	0.00	0.00	109.10	0.00	5.53	0.00	114.63	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2075	0.00	0.00	16.55	0.00	59.63	0.00	76.18	44.53	66.88	314.51	71.20	129.20	192.36	-78.24
2076	0.00	0.00	0.00	0.00	2.14	0.00	2.14	44.53	54.28	314.51	71.20	129.20	192.36	-78.24
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	68.62	314.51	71.20	129.20	192.36	-78.24
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	314.51	71.20	129.20	192.36	-78.24
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	44.53	68.62	314.51	71.20	129.20	192.36	-78.24
2080	0.00	0.00	0.00	9.58	0.00	0.00	9.58	44.53	53.13	314.51	71.20	129.20	192.36	-78.24
2081	0.00	0.00	0.00	292.47	0.00	0.00	292.47	44.53	68.62	314.51	71.20	129.20	192.36	-78.24
2082	0.00	0.00	0.00	297.95	0.00	0.00	297.95	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2083	0.00	0.00	0.00	288.37	0.00	0.00	288.37	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2084	0.00	0.00	0.00	5.47	9.87	0.00	15.34	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	54.28	314.51	71.20	129.20	192.36	-78.24
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
2090	0.00	0.00	0.00	0.00	18.27	0.00	18.27	44.53	51.39	314.51	71.20	129.20	192.36	-78.24
Salvage Value	4.70	0.00	8.17	13.34	4.15	0.00	30.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	367.50	931.16	155.69	0.00	5383.54	519.43	505.89	7792.58	1773.33	973.66	2723.24	2322.35

Net Present Value -4087

K19/C25/750MW (WPS Sale &Inv)

TABLE 016
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	4.85	313.82	1.57	0.00	311.23	102.98	19.82	98.34	90.08
2015	88.09	546.76	0.00	0.00	21.74	8.74	665.32	4.90	0.00	341.10	101.10	23.49	102.11	114.39
2016	199.23	726.88	0.00	0.00	30.88	22.51	979.50	9.79	0.00	351.61	99.26	24.63	104.47	123.24
2017	235.75	881.35	0.00	0.00	46.60	32.83	1196.53	15.78	0.00	367.37	97.30	26.31	107.43	136.33
2018	283.83	628.16	0.00	0.00	52.22	132.68	1096.88	21.26	0.00	351.91	95.21	26.94	108.58	121.18
2019	291.12	440.82	0.00	0.00	66.10	110.86	908.90	25.80	13.01	378.89	95.14	25.52	108.28	149.94
2020	803.86	182.49	0.00	0.00	4.25	198.41	1189.00	31.75	44.86	617.12	102.28	20.22	123.67	370.96
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	38.79	42.99	697.22	102.84	22.23	133.26	438.89
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	44.74	41.65	694.56	101.65	22.24	135.74	434.92
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	49.12	39.80	664.06	99.33	22.12	139.94	402.68
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	52.41	38.24	641.23	97.13	24.58	145.52	374.00
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	54.83	50.89	661.04	101.75	21.82	113.58	423.89
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	56.14	49.35	862.16	109.86	21.76	114.33	616.22
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	56.36	47.92	899.07	109.90	21.29	125.05	642.84
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	46.91	889.29	108.23	22.00	128.24	630.82
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	48.20	868.89	106.31	22.04	131.31	609.24
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	43.02	859.25	104.97	21.57	133.01	599.70
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	41.70	846.94	103.31	22.04	136.64	584.95
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	40.22	828.23	101.62	22.09	139.90	564.62
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	39.21	804.17	99.84	22.11	143.08	539.15
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	38.27	781.53	98.11	22.27	147.20	513.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	39.54	741.75	96.43	22.07	143.82	479.43
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	36.10	672.95	94.82	22.47	128.55	427.11
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	56.36	35.57	640.80	93.20	22.58	129.84	395.19
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	35.06	615.74	91.55	22.53	134.49	367.17
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	56.93	37.47	592.43	89.94	22.48	146.19	333.82
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	57.75	34.09	589.00	88.66	21.37	156.31	322.66
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	57.87	36.95	570.11	86.66	38.13	158.02	287.31
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	58.44	36.51	555.62	85.12	42.52	164.06	263.91
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	59.29	36.07	545.01	83.76	44.88	172.02	244.36
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	59.99	41.37	541.23	82.55	51.48	180.82	226.39
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	61.26	43.86	516.67	80.70	66.61	181.87	187.49
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	61.38	44.56	505.17	79.26	80.82	187.57	157.51
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	43.31	491.59	77.99	84.47	196.24	132.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	42.07	504.47	79.32	77.30	188.56	159.30
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	61.38	44.61	504.47	79.32	77.30	188.56	159.30
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	61.38	43.11	504.47	79.32	77.30	188.56	159.30
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	61.38	42.78	504.47	79.32	77.30	188.56	159.30
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	61.38	42.46	504.47	79.32	77.30	188.56	159.30
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	61.38	42.15	504.47	79.32	77.30	188.56	159.30
2054	0.00	0.00	0.00	0.00	23.02	24.33	47.35	61.38	41.84	504.47	79.32	77.30	188.56	159.30
2055	0.00	0.00	0.00	0.00	1.05	25.23	26.28	61.38	42.71	504.47	79.32	77.30	188.56	159.30
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	61.38	55.02	504.47	79.32	77.30	188.56	159.30
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	61.38	39.25	504.47	79.32	77.30	188.56	159.30
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	61.38	54.48	504.47	79.32	77.30	188.56	159.30
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	61.38	41.62	504.47	79.32	77.30	188.56	159.30
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	61.38	51.26	504.47	79.32	77.30	188.56	159.30
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	66.75	504.47	79.32	77.30	188.56	159.30
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	61.38	66.75	504.47	79.32	77.30	188.56	159.30
2065	0.00	0.00	0.00	0.00	11.34	5.49	16.83	61.38	38.66	504.47	79.32	77.30	188.56	159.30
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	61.38	66.75	504.47	79.32	77.30	188.56	159.30
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	61.38	66.75	504.47	79.32	77.30	188.56	159.30
2069	0.00	0.00	112.14	0.00	43.08	74.17	229.39	61.38	38.66	504.47	79.32	77.30	188.56	159.30
2070	0.00	0.00	153.46	0.00	3.20	76.92	233.57	61.38	53.00	504.47	79.32	77.30	188.56	159.30
2071	0.00	0.00	23.33	0.00	39.09	0.00	62.41	61.38	37.50	504.47	79.32	77.30	188.56	159.30
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	61.38	53.00	504.47	79.32	77.30	188.56	159.30
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	61.38	36.63	504.47	79.32	77.30	188.56	159.30
2074	0.00	0.00	139.93	0.00	61.47	0.00	201.40	61.38	51.26	504.47	79.32	77.30	188.56	159.30
2075	0.00	0.00	158.90	0.00	91.86	0.00	250.76	61.38	38.66	504.47	79.32	77.30	188.56	159.30
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	61.38	53.00	504.47	79.32	77.30	188.56	159.30
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	37.50	504.47	79.32	77.30	188.56	159.30
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	61.38	53.00	504.47	79.32	77.30	188.56	159.30
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	40.40	504.47	79.32	77.30	188.56	159.30
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	61.38	53.00	504.47	79.32	77.30	188.56	159.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	61.38	38.66	504.47	79.32	77.30	188.56	159.30
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	61.38	35.76	504.47	79.32	77.30	188.56	159.30
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	61.38	38.66	504.47	79.32	77.30	188.56	159.30
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	61.38	38.66	504.47	79.32	77.30	188.56	159.30
Salvage Value	2.58	0.00	9.43	0.00	12.68	6.30	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	272.89	0.00	551.46	432.79	8953.82	888.95	651.85	11808.35	1938.98	705.38	2816.45	6347.54

Net Present Value -4147

K19/C25/750MW

TABLE 017
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	6.66	315.63	1.58	0.00	312.22	102.98	19.82	97.95	91.47
2015	88.09	546.76	0.00	0.00	21.74	10.91	667.49	4.92	0.00	343.08	101.10	23.52	102.06	116.40
2016	199.23	726.88	0.00	0.00	30.88	23.45	980.43	9.82	0.00	352.81	99.25	24.59	104.39	124.57
2017	235.75	881.35	0.00	0.00	46.60	32.83	1196.53	15.80	0.00	367.62	97.30	26.28	107.35	136.68
2018	283.83	628.16	0.00	0.00	52.22	183.95	1148.15	21.54	0.00	350.91	95.20	26.86	108.55	120.29
2019	291.12	440.82	0.00	0.00	66.10	129.40	927.44	26.18	13.01	377.59	95.13	25.49	108.28	148.68
2020	803.86	182.49	0.00	0.00	4.25	342.80	1333.39	32.85	47.98	620.46	102.28	20.19	123.28	374.71
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	39.88	46.21	700.66	102.85	22.38	133.18	442.25
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	45.83	44.90	698.00	101.65	22.24	135.49	438.62
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	50.22	42.92	668.14	99.33	22.12	139.76	406.93
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	53.50	41.22	645.50	97.10	24.63	145.36	378.41
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	55.92	53.76	665.29	101.74	21.85	113.29	428.41
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	57.24	52.09	846.18	109.85	21.85	110.96	603.53
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	57.46	50.55	861.04	109.91	21.13	116.32	613.69
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	49.42	849.74	108.24	21.96	118.84	600.71
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	50.61	831.77	106.31	22.04	122.13	581.30
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	45.33	824.74	104.96	21.59	123.93	574.27
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	43.90	815.39	103.30	22.14	127.59	562.36
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	42.32	799.96	101.61	22.14	131.28	544.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	41.21	779.42	99.85	22.05	134.97	522.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	40.19	760.42	98.12	22.17	139.75	500.37
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	41.37	691.55	96.49	22.28	123.89	448.89
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	37.85	661.63	94.82	22.50	125.41	418.90
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	57.46	37.25	638.65	93.18	22.51	129.14	393.82
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	36.67	614.52	91.55	22.49	133.67	366.81
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	58.02	39.01	592.02	89.94	22.52	145.33	334.23
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	58.85	35.57	588.44	88.66	21.37	155.44	322.97
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	58.97	38.37	569.71	86.66	38.13	157.40	287.52
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	59.54	37.86	555.39	85.12	42.52	163.53	264.21
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	60.38	37.36	544.55	83.76	44.88	171.37	244.53
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	61.08	42.61	540.93	82.55	51.48	180.29	226.62
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	62.35	45.04	516.46	80.70	66.61	181.47	187.69
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	62.47	45.69	504.83	79.26	80.82	187.03	157.71
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	44.39	491.28	77.99	84.47	195.74	133.09
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	43.10	504.19	79.32	77.30	188.08	159.49
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	62.47	45.59	504.19	79.32	77.30	188.08	159.49
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	62.47	44.04	504.19	79.32	77.30	188.08	159.49
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	62.47	43.67	504.19	79.32	77.30	188.08	159.49
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	62.47	43.30	504.19	79.32	77.30	188.08	159.49
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	62.47	42.95	504.19	79.32	77.30	188.08	159.49
2054	0.00	0.00	0.00	0.00	23.02	24.33	47.35	62.47	42.61	504.19	79.32	77.30	188.08	159.49
2055	0.00	0.00	0.00	0.00	1.05	25.23	26.28	62.47	43.43	504.19	79.32	77.30	188.08	159.49
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	62.47	55.71	504.19	79.32	77.30	188.08	159.49
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	62.47	39.90	504.19	79.32	77.30	188.08	159.49
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	62.47	55.10	504.19	79.32	77.30	188.08	159.49
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	62.47	42.21	504.19	79.32	77.30	188.08	159.49
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	62.47	51.26	504.19	79.32	77.30	188.08	159.49
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	66.75	504.19	79.32	77.30	188.08	159.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	62.47	66.75	504.19	79.32	77.30	188.08	159.49
2065	0.00	0.00	0.00	0.00	11.34	5.49	16.83	62.47	38.66	504.19	79.32	77.30	188.08	159.49
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	62.47	66.75	504.19	79.32	77.30	188.08	159.49
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	62.47	66.75	504.19	79.32	77.30	188.08	159.49
2069	0.00	0.00	112.14	0.00	43.08	74.17	229.39	62.47	38.66	504.19	79.32	77.30	188.08	159.49
2070	0.00	0.00	153.46	0.00	3.20	76.92	233.57	62.47	53.00	504.19	79.32	77.30	188.08	159.49
2071	0.00	0.00	23.33	0.00	39.09	0.00	62.41	62.47	37.50	504.19	79.32	77.30	188.08	159.49
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	62.47	53.00	504.19	79.32	77.30	188.08	159.49
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	62.47	36.63	504.19	79.32	77.30	188.08	159.49
2074	0.00	0.00	139.93	0.00	61.47	0.00	201.40	62.47	51.26	504.19	79.32	77.30	188.08	159.49
2075	0.00	0.00	158.90	0.00	91.86	0.00	250.76	62.47	38.66	504.19	79.32	77.30	188.08	159.49
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	62.47	53.00	504.19	79.32	77.30	188.08	159.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	37.50	504.19	79.32	77.30	188.08	159.49
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	62.47	53.00	504.19	79.32	77.30	188.08	159.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	40.40	504.19	79.32	77.30	188.08	159.49
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	62.47	53.00	504.19	79.32	77.30	188.08	159.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	62.47	38.66	504.19	79.32	77.30	188.08	159.49
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	62.47	35.76	504.19	79.32	77.30	188.08	159.49
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	62.47	38.66	504.19	79.32	77.30	188.08	159.49
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	62.47	38.66	504.19	79.32	77.30	188.08	159.49
Salvage Value	2.58	0.00	9.43	0.00	12.68	6.30	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	272.89	0.00	551.46	601.54	9122.57	905.99	680.39	11676.08	1938.95	705.41	2770.18	6261.53

Net Present Value -4447

K19/Gas25/750MW (WPS Sale & INV)

TABLE 018
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	4.85	281.90	1.41	0.00	311.23	102.98	19.82	98.34	90.08
2015	0.00	546.76	0.00	0.00	21.74	8.74	577.24	4.30	0.00	341.12	101.11	23.48	102.11	114.42
2016	0.00	726.88	0.00	0.00	30.88	22.51	780.27	8.20	0.00	351.63	99.26	24.62	104.46	123.28
2017	0.00	881.35	0.00	0.00	46.60	32.83	960.79	13.00	0.00	367.67	97.30	26.29	107.39	136.69
2018	0.00	628.16	0.00	0.00	52.22	132.68	813.06	17.07	0.00	352.38	95.20	26.89	108.53	121.77
2019	0.00	440.82	0.00	0.00	61.87	110.86	613.54	20.13	13.01	379.77	95.14	25.50	108.26	150.86
2020	0.00	182.49	0.00	0.00	0.01	198.41	380.91	22.04	44.86	618.54	102.28	20.19	123.54	372.53
2021	0.00	63.43	0.36	0.00	0.00	0.00	63.79	22.36	42.99	699.74	102.84	22.22	133.02	441.66
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	22.36	41.65	697.31	101.65	22.20	135.46	437.99
2023	0.00	0.00	122.10	0.00	0.00	0.00	122.10	22.86	39.80	664.33	98.83	23.67	140.13	401.71
2024	0.00	0.00	260.05	0.00	12.08	0.00	272.13	24.11	38.24	645.35	96.80	25.97	145.65	376.92
2025	0.00	0.00	161.15	0.00	95.12	0.00	256.27	25.38	40.58	570.21	96.51	25.19	132.15	316.35
2026	0.00	0.00	123.42	0.00	0.00	0.00	123.42	26.00	42.81	583.20	95.20	30.18	138.54	319.28
2027	0.00	0.00	140.15	0.00	0.00	0.00	140.15	26.70	41.52	570.60	93.22	29.59	148.44	299.35
2028	0.00	0.00	21.30	0.00	0.00	0.00	21.30	26.80	44.28	553.39	90.89	44.24	152.98	265.28
2029	0.00	0.00	104.58	0.00	0.00	0.00	104.58	27.33	45.74	537.53	89.10	49.21	159.17	240.05
2030	0.00	0.00	143.12	0.00	80.02	0.00	223.14	28.44	40.62	534.88	88.02	54.22	163.59	229.06
2031	0.00	0.00	127.80	0.00	0.00	0.00	127.80	29.08	43.47	542.47	87.65	59.05	166.37	229.40
2032	0.00	0.00	145.13	0.00	0.00	0.00	145.13	29.81	42.36	521.61	85.28	70.92	175.26	190.16
2033	0.00	0.00	22.06	0.00	0.00	0.00	22.06	29.92	45.27	512.19	83.74	84.97	181.65	161.83
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	44.22	508.64	83.00	89.58	186.26	149.79
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	42.77	435.77	80.86	85.92	179.28	89.71
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	42.23	356.55	79.41	87.59	158.43	31.11
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	41.71	329.27	77.99	95.69	159.84	-4.25
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	41.21	325.57	77.26	94.19	169.64	-15.51
2039	0.00	0.00	234.92	0.00	0.00	0.00	234.92	31.09	43.61	299.78	75.31	115.57	177.11	-68.20
2040	0.00	0.00	340.07	0.00	0.00	0.00	340.07	32.79	40.24	285.20	73.97	127.84	182.89	-99.50
2041	0.00	0.00	152.61	0.00	12.08	0.00	164.69	33.62	39.77	297.06	74.25	127.03	182.70	-86.93
2042	0.00	0.00	11.24	0.00	0.00	0.00	11.24	33.67	46.24	342.17	71.97	196.23	184.67	-110.71
2043	0.00	0.00	115.31	0.00	0.00	0.00	115.31	34.25	45.80	319.80	70.24	212.87	192.04	-155.35
2044	0.00	0.00	157.80	0.00	80.02	0.00	237.82	35.44	47.12	296.16	68.62	227.71	199.56	-199.72
2045	0.00	0.00	75.42	0.00	0.00	0.00	75.42	35.82	50.71	285.17	67.30	250.73	205.46	-238.32
2046	0.00	0.00	70.39	0.00	0.00	0.00	70.39	36.17	50.31	272.80	66.11	269.87	211.73	-274.91
2047	0.00	0.00	10.70	0.00	0.00	0.00	10.70	36.22	50.50	266.82	65.30	277.64	222.33	-298.45
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	49.26	274.93	66.24	266.08	213.17	-270.56
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	36.22	51.80	274.93	66.24	266.08	213.17	-270.56
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	36.22	48.56	274.93	66.24	266.08	213.17	-270.56
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	36.22	48.23	274.93	66.24	266.08	213.17	-270.56
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	36.22	47.91	274.93	66.24	266.08	213.17	-270.56
2053	0.00	0.00	100.29	0.00	26.94	24.33	151.56	36.22	47.60	274.93	66.24	266.08	213.17	-270.56
2054	0.00	0.00	238.25	0.00	21.98	24.33	284.55	36.22	47.29	274.93	66.24	266.08	213.17	-270.56
2055	0.00	0.00	159.07	0.00	0.00	25.23	184.31	36.22	47.00	274.93	66.24	266.08	213.17	-270.56
2056	0.00	0.00	123.42	0.00	0.00	0.00	123.42	36.22	62.21	274.93	66.24	266.08	213.17	-270.56
2057	0.00	0.00	140.15	0.00	0.00	0.00	140.15	36.22	46.44	274.93	66.24	266.08	213.17	-270.56
2058	0.00	0.00	21.30	0.00	0.00	0.00	21.30	36.22	61.67	274.93	66.24	266.08	213.17	-270.56
2059	0.00	0.00	104.58	0.00	12.08	0.00	116.66	36.22	48.81	274.93	66.24	266.08	213.17	-270.56
2060	0.00	0.00	143.12	0.00	71.34	0.00	214.46	36.22	58.45	274.93	66.24	266.08	213.17	-270.56
2061	0.00	0.00	127.80	0.00	0.00	0.00	127.80	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2062	0.00	0.00	145.13	0.00	0.00	0.00	145.13	36.22	58.45	274.93	66.24	266.08	213.17	-270.56
2063	0.00	0.00	22.06	0.00	0.00	0.00	22.06	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	36.22	58.45	274.93	66.24	266.08	213.17	-270.56
2065	0.00	0.00	0.00	0.00	71.35	5.49	76.85	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	36.22	58.45	274.93	66.24	266.08	213.17	-270.56
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	36.22	58.45	274.93	66.24	266.08	213.17	-270.56
2069	0.00	0.00	234.92	0.00	39.89	74.17	348.98	36.22	45.85	274.93	66.24	266.08	213.17	-270.56
2070	0.00	0.00	340.07	0.00	0.01	76.92	416.99	36.22	44.69	274.93	66.24	266.08	213.17	-270.56
2071	0.00	0.00	152.61	0.00	0.00	0.00	152.61	36.22	44.69	274.93	66.24	266.08	213.17	-270.56
2072	0.00	0.00	11.24	0.00	0.00	0.00	11.24	36.22	44.69	274.93	66.24	266.08	213.17	-270.56
2073	0.00	0.00	115.31	0.00	0.00	0.00	115.31	36.22	43.82	274.93	66.24	266.08	213.17	-270.56
2074	0.00	0.00	157.80	0.00	0.00	0.00	157.80	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2075	0.00	0.00	75.42	0.00	23.78	0.00	99.20	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2076	0.00	0.00	70.39	0.00	12.08	0.00	82.47	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2077	0.00	0.00	10.70	0.00	0.00	0.00	10.70	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	36.22	45.85	274.93	66.24	266.08	213.17	-270.56
2080	0.00	0.00	0.00	0.00	20.01	0.00	20.01	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2083	0.00	0.00	100.29	0.00	0.00	0.00	100.29	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2084	0.00	0.00	238.25	0.00	10.82	0.90	249.97	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2085	0.00	0.00	159.07	0.00	10.40	1.80	171.28	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2086	0.00	0.00	123.42	0.00	29.51	5.41	158.34	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2087	0.00	0.00	140.15	0.00	34.78	8.11	183.05	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2088	0.00	0.00	21.30	0.00	26.94	24.33	72.57	36.22	42.95	274.93	66.24	266.08	213.17	-270.56
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	36.22	45.85	274.93	66.24	266.08	213.17	-270.56
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	36.22	45.85	274.93	66.24	266.08	213.17	-270.56
Salvage Value	0.00	0.00	29.53	0.00	7.12	6.30	42.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1247.35	0.00	368.56	432.79	5281.76	498.95	675.38	8748.00	1774.09	1896.73	3129.33	1947.85

Net Present Value -4508

K19/C31/750MW

TABLE 019
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	252.57	0.00	0.00	24.48	6.66	314.97	1.57	0.00	312.22	102.98	19.82	97.95	91.47
2015	39.48	546.76	0.00	0.00	21.74	10.91	618.88	4.67	0.00	343.08	101.10	23.52	102.06	116.40
2016	10.75	726.88	0.00	0.00	30.88	23.45	791.95	8.63	0.00	352.81	99.25	24.59	104.39	124.57
2017	10.83	881.35	0.00	0.00	46.60	32.83	971.62	13.49	0.00	368.02	97.30	26.28	107.35	137.08
2018	12.89	628.16	0.00	0.00	52.22	183.95	877.22	17.87	0.00	351.36	95.18	26.85	108.49	120.83
2019	13.00	440.82	0.00	0.00	61.87	129.40	645.08	21.10	13.01	378.40	95.12	25.54	108.25	149.49
2020	13.10	182.49	0.00	0.00	0.01	342.80	538.39	23.79	47.98	621.96	102.27	20.24	123.16	376.30
2021	16.59	63.43	0.00	0.00	0.00	0.00	80.02	24.19	46.21	702.77	102.83	22.34	132.88	444.73
2022	184.48	0.00	0.00	0.00	0.00	0.00	184.48	25.11	44.90	701.08	101.66	22.22	135.15	442.04
2023	279.81	0.00	0.00	0.00	0.00	0.00	279.81	26.51	42.92	666.93	98.72	23.93	140.21	404.07
2024	307.13	0.00	0.00	0.00	0.00	0.00	307.13	28.05	41.22	647.32	96.62	26.62	146.62	377.47
2025	313.64	0.00	0.00	0.00	4.24	0.00	317.88	29.64	39.45	571.08	96.53	19.18	139.38	315.99
2026	851.45	0.00	0.00	0.00	4.24	0.00	855.69	33.92	37.57	551.71	94.63	19.80	152.90	284.38
2027	1355.87	0.00	0.00	0.00	51.65	0.00	1407.52	40.95	36.17	505.81	92.70	18.64	151.36	243.11
2028	1219.64	0.00	0.00	0.00	27.03	0.00	1246.66	47.19	34.83	484.10	91.13	19.36	164.55	209.06
2029	872.58	0.00	0.00	0.00	45.58	0.00	918.16	51.78	36.18	468.22	89.51	19.93	181.32	177.46
2030	605.44	0.00	0.00	0.00	79.26	0.00	684.70	55.20	30.95	464.17	88.18	20.37	195.22	160.40
2031	398.41	0.00	0.00	0.00	104.90	0.00	503.31	57.72	44.00	545.01	92.22	23.54	122.12	307.13
2032	147.01	0.00	0.00	0.00	122.87	0.00	269.88	59.07	43.00	725.20	99.46	23.12	117.91	484.71
2033	46.48	0.00	0.00	0.00	0.00	0.00	46.48	59.30	41.68	783.08	99.93	22.61	135.32	525.22
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	40.76	760.57	98.13	22.16	139.66	500.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	39.05	690.45	96.49	22.14	123.81	448.00
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	38.38	661.56	94.82	22.63	125.40	418.71
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	59.30	37.61	639.08	93.19	22.57	129.17	394.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	36.66	614.58	91.55	22.48	133.67	366.88
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	59.86	39.07	592.11	89.95	22.51	145.33	334.32
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	60.69	35.74	588.44	88.66	21.37	155.45	322.95
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	60.80	41.92	569.71	86.66	38.13	157.39	287.53
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	61.38	38.52	555.39	85.12	42.52	163.54	264.20
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	62.22	38.02	544.55	83.76	44.88	171.38	244.52
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	62.92	43.27	540.93	82.55	51.48	180.28	226.63
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	64.19	42.80	516.46	80.70	66.61	181.47	187.69
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	64.31	46.35	504.83	79.26	80.82	187.04	157.70
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	44.39	491.28	77.99	84.47	195.74	133.09
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	43.10	504.19	79.32	77.30	188.08	159.49
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	64.31	45.59	504.19	79.32	77.30	188.08	159.49
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	64.31	42.30	504.19	79.32	77.30	188.08	159.49
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	64.31	44.82	504.19	79.32	77.30	188.08	159.49
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	64.31	41.57	504.19	79.32	77.30	188.08	159.49
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	64.31	41.22	504.19	79.32	77.30	188.08	159.49
2054	0.00	0.00	0.00	0.00	21.98	24.33	46.31	64.31	40.87	504.19	79.32	77.30	188.08	159.49
2055	0.00	0.00	0.00	0.00	0.00	25.23	25.23	64.31	40.54	504.19	79.32	77.30	188.08	159.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	57.45	504.19	79.32	77.30	188.08	159.49
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	41.64	504.19	79.32	77.30	188.08	159.49
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	56.83	504.19	79.32	77.30	188.08	159.49
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	43.95	504.19	79.32	77.30	188.08	159.49
2060	0.00	0.00	0.00	0.00	1.05	0.00	1.05	64.31	53.00	504.19	79.32	77.30	188.08	159.49
2061	0.00	0.00	0.00	0.00	1.05	0.00	1.05	64.31	38.66	504.19	79.32	77.30	188.08	159.49
2062	0.00	0.00	0.00	0.00	12.56	0.00	12.56	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2063	0.00	0.00	0.00	0.00	6.28	0.00	6.28	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2064	0.00	0.00	0.00	0.00	24.12	2.75	26.87	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2065	0.00	0.00	0.00	0.00	29.13	5.49	34.62	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2066	0.00	0.00	0.00	0.00	26.48	16.48	42.96	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2067	0.00	0.00	0.00	0.00	42.17	24.72	66.90	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	64.31	66.75	504.19	79.32	77.30	188.08	159.49
2069	0.00	0.00	112.14	0.00	39.89	74.17	226.20	64.31	38.66	504.19	79.32	77.30	188.08	159.49
2070	0.00	0.00	153.46	0.00	0.01	76.92	230.38	64.31	53.00	504.19	79.32	77.30	188.08	159.49
2071	0.00	0.00	23.33	0.00	0.00	0.00	23.33	64.31	40.40	504.19	79.32	77.30	188.08	159.49
2072	0.00	0.00	114.51	0.00	0.00	0.00	114.51	64.31	53.00	504.19	79.32	77.30	188.08	159.49
2073	0.00	0.00	156.70	0.00	0.00	0.00	156.70	64.31	36.63	504.19	79.32	77.30	188.08	159.49
2074	0.00	0.00	139.93	0.00	0.00	0.00	139.93	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2075	0.00	0.00	158.90	0.00	15.27	0.00	174.17	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2076	0.00	0.00	24.15	0.00	3.19	0.00	27.34	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2077	0.00	0.00	0.00	0.00	39.09	0.00	39.09	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2078	0.00	0.00	0.00	0.00	32.83	0.00	32.83	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2079	0.00	0.00	0.00	0.00	35.12	0.00	35.12	64.31	38.66	504.19	79.32	77.30	188.08	159.49
2080	0.00	0.00	0.00	0.00	132.81	0.00	132.81	64.31	51.26	504.19	79.32	77.30	188.08	159.49
2081	0.00	0.00	0.00	0.00	79.78	0.00	79.78	64.31	38.66	504.19	79.32	77.30	188.08	159.49
2082	0.00	0.00	0.00	0.00	92.52	0.00	92.52	64.31	53.00	504.19	79.32	77.30	188.08	159.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	37.50	504.19	79.32	77.30	188.08	159.49
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	64.31	53.00	504.19	79.32	77.30	188.08	159.49
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	64.31	37.50	504.19	79.32	77.30	188.08	159.49
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	64.31	53.00	504.19	79.32	77.30	188.08	159.49
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	64.31	35.76	504.19	79.32	77.30	188.08	159.49
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	64.31	38.66	504.19	79.32	77.30	188.08	159.49
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	64.31	38.66	504.19	79.32	77.30	188.08	159.49
Salvage Value	19.27	0.00	9.43	0.00	14.19	6.30	49.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3526.11	3233.06	272.89	0.00	474.00	601.54	8107.60	802.22	634.27	10609.85	1887.85	702.17	2903.34	5116.50

Net Present Value -4428

K19/Gas31/750MW

TABLE 020
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	6.66	283.70	1.42	0.00	312.22	102.98	19.82	97.95	91.47
2015	0.00	546.76	0.00	0.00	21.74	10.91	579.40	4.32	0.00	343.08	101.10	23.52	102.06	116.40
2016	0.00	726.88	0.00	0.00	30.88	23.45	781.20	8.22	0.00	352.81	99.25	24.59	104.39	124.57
2017	0.00	881.35	0.00	0.00	46.60	32.83	960.79	13.03	0.00	368.02	97.30	26.28	107.35	137.08
2018	0.00	628.16	0.00	0.00	52.22	183.95	864.32	17.35	0.00	351.36	95.18	26.85	108.49	120.83
2019	0.00	440.82	0.00	0.00	61.87	129.40	632.08	20.51	13.01	378.40	95.12	25.54	108.25	149.49
2020	0.00	182.49	0.00	0.00	0.01	342.80	525.29	23.13	47.98	621.96	102.27	20.24	123.16	376.30
2021	0.00	63.43	0.00	0.00	0.00	0.00	63.43	23.45	46.21	702.77	102.83	22.34	132.88	444.73
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	44.90	701.03	101.66	22.24	135.18	441.94
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	42.92	667.47	98.72	23.93	140.19	404.63
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	41.22	648.20	96.62	26.64	146.54	378.41
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	39.45	573.30	96.52	19.20	139.74	317.84
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	37.57	556.00	94.62	19.93	153.75	287.70
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	23.45	36.17	511.22	92.69	18.70	152.06	247.77
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	23.45	34.83	492.18	91.11	19.36	166.34	215.37
2029	0.00	0.00	230.97	0.00	0.00	0.00	230.97	24.50	36.18	474.77	89.58	19.63	181.17	184.41
2030	0.00	0.00	413.35	0.00	24.16	0.00	437.51	26.58	30.95	477.17	88.98	17.48	190.98	179.73
2031	0.00	0.00	189.70	0.00	95.12	0.00	284.83	27.99	37.66	465.70	86.82	40.26	154.94	183.68
2032	0.00	0.00	128.70	0.00	0.00	0.00	128.70	28.63	40.44	455.29	85.25	51.12	159.61	159.32
2033	0.00	0.00	146.14	0.00	0.00	0.00	146.14	29.36	39.27	441.06	83.80	56.20	165.19	135.86
2034	0.00	0.00	22.21	0.00	0.00	0.00	22.21	29.47	42.11	441.27	83.01	60.94	171.52	125.81
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.47	40.58	366.35	80.89	73.81	152.84	58.81
2036	0.00	0.00	230.06	0.00	0.00	0.00	230.06	30.62	39.95	340.55	79.46	80.63	154.42	26.03
2037	0.00	0.00	333.02	0.00	0.00	0.00	333.02	32.29	39.36	325.72	78.14	88.21	159.19	0.18
2038	0.00	0.00	149.45	0.00	80.02	0.00	229.48	33.44	38.79	333.31	78.02	81.56	168.95	4.78
2039	0.00	0.00	11.01	0.00	0.00	0.00	11.01	33.49	48.06	380.65	75.73	158.73	169.92	-23.73
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.49	44.62	357.75	73.85	171.82	177.53	-65.45
2041	0.00	0.00	113.71	0.00	0.00	0.00	113.71	34.06	44.09	340.46	72.39	184.16	183.61	-99.69
2042	0.00	0.00	395.50	0.00	0.00	0.00	395.50	36.04	43.58	324.55	71.04	198.01	189.54	-134.03
2043	0.00	0.00	370.91	0.00	0.00	0.00	370.91	37.89	47.08	319.58	70.18	210.44	195.08	-156.12
2044	0.00	0.00	155.84	0.00	80.02	0.00	235.86	39.07	48.34	318.09	69.87	201.73	205.56	-159.06
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	39.13	54.81	367.45	67.87	289.98	195.55	-185.95
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	54.37	353.04	66.68	303.83	201.17	-218.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	53.07	331.09	65.42	316.22	206.93	-257.48
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	51.78	350.53	66.66	303.34	201.21	-220.69
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	39.13	54.27	350.53	66.66	303.34	201.21	-220.69
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	39.13	50.99	350.53	66.66	303.34	201.21	-220.69
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	39.13	50.61	350.53	66.66	303.34	201.21	-220.69
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	39.13	50.25	350.53	66.66	303.34	201.21	-220.69
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	39.13	49.89	350.53	66.66	303.34	201.21	-220.69
2054	0.00	0.00	0.00	0.00	21.98	24.33	46.31	39.13	49.55	350.53	66.66	303.34	201.21	-220.69
2055	0.00	0.00	0.00	0.00	0.00	25.23	25.23	39.13	49.22	350.53	66.66	303.34	201.21	-220.69
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	64.39	350.53	66.66	303.34	201.21	-220.69
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	48.58	350.53	66.66	303.34	201.21	-220.69
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	63.78	350.53	66.66	303.34	201.21	-220.69
2059	0.00	0.00	209.16	0.00	0.00	0.00	209.16	39.13	50.89	350.53	66.66	303.34	201.21	-220.69
2060	0.00	0.00	391.55	0.00	0.00	0.00	391.55	39.13	59.94	350.53	66.66	303.34	201.21	-220.69
2061	0.00	0.00	187.63	0.00	0.00	0.00	187.63	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2062	0.00	0.00	128.70	0.00	0.00	0.00	128.70	39.13	59.94	350.53	66.66	303.34	201.21	-220.69
2063	0.00	0.00	146.14	0.00	0.00	0.00	146.14	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2064	0.00	0.00	22.21	0.00	13.66	2.75	38.62	39.13	59.94	350.53	66.66	303.34	201.21	-220.69
2065	0.00	0.00	0.00	0.00	35.49	5.49	40.99	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2066	0.00	0.00	230.06	0.00	72.71	16.48	319.25	39.13	59.94	350.53	66.66	303.34	201.21	-220.69
2067	0.00	0.00	333.02	0.00	11.82	24.72	369.57	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2068	0.00	0.00	149.45	0.00	25.28	74.17	248.90	39.13	59.94	350.53	66.66	303.34	201.21	-220.69
2069	0.00	0.00	11.01	0.00	39.89	74.17	125.07	39.13	47.34	350.53	66.66	303.34	201.21	-220.69
2070	0.00	0.00	0.00	0.00	0.01	76.92	76.93	39.13	46.18	350.53	66.66	303.34	201.21	-220.69
2071	0.00	0.00	113.71	0.00	0.00	0.00	113.71	39.13	46.18	350.53	66.66	303.34	201.21	-220.69
2072	0.00	0.00	395.50	0.00	0.00	0.00	395.50	39.13	46.18	350.53	66.66	303.34	201.21	-220.69
2073	0.00	0.00	370.91	0.00	60.02	0.00	430.93	39.13	45.31	350.53	66.66	303.34	201.21	-220.69
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2075	0.00	0.00	11.48	0.00	0.00	0.00	11.48	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	39.13	47.34	350.53	66.66	303.34	201.21	-220.69
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2081	0.00	0.00	0.00	0.00	23.78	0.00	23.78	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2088	0.00	0.00	0.00	0.00	46.94	24.33	71.28	39.13	44.44	350.53	66.66	303.34	201.21	-220.69
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	39.13	47.34	350.53	66.66	303.34	201.21	-220.69
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	39.13	47.34	350.53	66.66	303.34	201.21	-220.69
Salvage Value	0.00	0.00	18.17	0.00	7.84	6.30	32.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1192.51	0.00	338.28	601.54	5365.39	509.50	668.78	8849.35	1775.34	1972.76	3090.27	2010.97

Net Present Value -4533

K19/C25/250MW

TABLE 021
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	4.18	313.15	1.58	0.00	312.22	102.98	19.82	97.95	91.47
2015	88.09	546.76	0.00	0.00	21.74	3.13	659.72	4.88	0.00	343.08	101.10	23.52	102.06	116.40
2016	199.23	726.88	0.00	0.00	30.88	5.20	962.18	9.69	0.00	352.81	99.25	24.59	104.39	124.57
2017	235.75	881.35	0.00	0.00	46.60	7.80	1171.50	15.55	0.00	367.62	97.30	26.28	107.35	136.68
2018	283.83	628.16	0.00	0.00	52.22	23.39	987.59	20.48	0.00	347.14	94.61	28.84	109.36	114.33
2019	291.12	440.82	0.00	0.00	66.10	23.39	821.43	24.59	13.01	370.88	94.25	28.94	109.48	138.21
2020	803.86	182.49	0.00	0.00	4.25	24.25	1014.85	29.67	13.22	583.26	102.60	20.76	110.86	349.04
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	36.71	12.98	648.62	103.20	21.25	117.48	406.69
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	42.65	13.20	636.66	101.30	22.22	121.05	392.08
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	47.04	13.02	620.72	99.11	22.25	129.22	370.13
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	50.32	12.98	609.09	96.79	24.70	139.70	347.89
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	52.74	27.06	615.43	101.54	22.01	100.62	391.25
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	54.06	26.87	774.21	109.20	21.59	96.64	546.78
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	54.28	26.75	771.31	108.62	20.42	99.65	542.63
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	27.03	757.22	106.89	21.24	102.02	527.08
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	29.55	737.79	105.11	21.41	103.36	507.91
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.57	728.42	103.83	21.16	103.81	499.61
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.40	714.64	102.21	21.61	105.75	485.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.04	696.87	100.58	21.78	108.09	466.42
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.11	674.48	98.91	21.87	109.95	443.75
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.22	652.84	97.27	22.05	112.44	421.08
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	27.29	614.70	95.66	22.21	110.02	386.81
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	54.28	24.39	586.75	94.08	22.53	111.45	358.69
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	24.39	561.79	92.52	22.48	113.66	333.12
2038	0.00	0.00	133.16	0.00	0.00	0.00	133.16	54.84	24.39	535.38	90.97	22.45	116.61	305.35
2039	0.00	0.00	174.20	0.00	12.08	0.00	186.28	55.66	27.29	527.00	89.78	21.22	128.94	287.06
2040	0.00	0.00	23.16	0.00	0.00	0.00	23.16	55.78	28.37	510.17	87.77	37.23	132.64	252.54
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.78	27.72	496.78	86.25	41.81	138.08	230.64
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	56.35	27.72	485.90	84.92	44.49	143.98	212.51
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	57.19	27.72	473.37	83.53	44.21	153.17	192.46
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	57.89	33.44	461.65	81.97	66.87	152.99	159.82
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	59.16	36.33	447.14	80.56	73.63	159.06	133.90
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	59.28	37.43	438.64	79.19	83.60	167.98	107.86
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	36.57	424.38	77.79	84.57	180.84	81.17
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.70	436.72	79.18	80.60	169.29	107.64
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	59.28	38.59	436.72	79.18	80.60	169.29	107.64
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	59.28	37.44	436.72	79.18	80.60	169.29	107.64
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	59.28	37.45	436.72	79.18	80.60	169.29	107.64
2052	0.00	0.00	0.00	0.00	34.78	1.93	36.71	59.28	37.45	436.72	79.18	80.60	169.29	107.64
2053	0.00	0.00	0.00	0.00	26.94	5.78	32.72	59.28	37.46	436.72	79.18	80.60	169.29	107.64
2054	0.00	0.00	0.00	0.00	23.02	5.78	28.80	59.28	37.46	436.72	79.18	80.60	169.29	107.64
2055	0.00	0.00	0.00	0.00	1.05	5.99	7.04	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	59.28	51.21	436.72	79.18	80.60	169.29	107.64
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	59.28	51.21	436.72	79.18	80.60	169.29	107.64
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	59.28	51.21	436.72	79.18	80.60	169.29	107.64
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	66.71	436.72	79.18	80.60	169.29	107.64
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2064	0.00	0.00	0.00	0.00	13.66	3.96	17.62	59.28	66.71	436.72	79.18	80.60	169.29	107.64
2065	0.00	0.00	0.00	0.00	11.34	2.71	14.04	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2066	0.00	0.00	0.00	0.00	1.36	3.91	5.28	59.28	66.71	436.72	79.18	80.60	169.29	107.64
2067	0.00	0.00	0.00	0.00	11.82	5.87	17.69	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2068	0.00	0.00	111.36	0.00	25.28	17.61	154.25	59.28	66.71	436.72	79.18	80.60	169.29	107.64
2069	0.00	0.00	152.39	0.00	43.08	17.61	213.08	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2070	0.00	0.00	23.16	0.00	3.20	18.26	44.63	59.28	52.95	436.72	79.18	80.60	169.29	107.64
2071	0.00	0.00	0.00	0.00	39.09	0.00	39.09	59.28	37.46	436.72	79.18	80.60	169.29	107.64
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	59.28	52.95	436.72	79.18	80.60	169.29	107.64
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	59.28	36.59	436.72	79.18	80.60	169.29	107.64
2074	0.00	0.00	139.93	0.00	73.54	0.00	213.48	59.28	51.21	436.72	79.18	80.60	169.29	107.64
2075	0.00	0.00	158.90	0.00	79.78	0.00	238.68	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	59.28	52.95	436.72	79.18	80.60	169.29	107.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	37.46	436.72	79.18	80.60	169.29	107.64
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	59.28	52.95	436.72	79.18	80.60	169.29	107.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	40.35	436.72	79.18	80.60	169.29	107.64
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	59.28	52.95	436.72	79.18	80.60	169.29	107.64
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2084	0.00	0.00	0.00	0.00	10.82	0.21	11.03	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2087	0.00	0.00	0.00	0.00	34.78	1.93	36.71	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2088	0.00	0.00	0.00	0.00	26.94	5.78	32.72	59.28	35.72	436.72	79.18	80.60	169.29	107.64
2089	0.00	0.00	0.00	0.00	21.98	5.78	27.75	59.28	38.62	436.72	79.18	80.60	169.29	107.64
2090	0.00	0.00	0.00	0.00	0.00	5.99	5.99	59.28	38.62	436.72	79.18	80.60	169.29	107.64
Salvage Value	2.58	0.00	9.17	0.00	12.67	1.63	26.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	278.11	0.00	551.66	84.15	8610.60	856.19	426.24	10603.08	1931.10	729.93	2514.10	5427.96

Net Present Value -4465

K19/Gas24/250MW

TABLE 022
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	4.18	281.22	1.42	0.00	312.22	102.98	19.82	97.95	91.47
2015	0.00	546.76	0.00	0.00	21.74	3.13	571.63	4.28	0.00	343.08	101.10	23.52	102.07	116.39
2016	0.00	726.88	0.00	0.00	30.88	5.20	762.96	8.09	0.00	352.81	99.25	24.59	104.39	124.57
2017	0.00	881.35	0.00	0.00	46.60	7.80	935.75	12.77	0.00	368.02	97.30	26.28	107.35	137.08
2018	0.00	628.16	0.00	0.00	52.22	23.39	703.76	16.29	0.00	347.69	94.61	28.80	109.30	114.99
2019	0.00	440.82	0.00	0.00	61.87	23.39	526.07	18.92	13.01	371.77	94.25	28.94	109.45	139.13
2020	0.00	182.49	0.36	0.00	0.01	24.25	207.11	19.95	13.22	584.79	102.60	20.77	110.79	350.63
2021	0.00	63.43	0.00	0.00	0.00	0.00	63.43	20.27	12.98	651.09	103.18	21.26	117.30	409.35
2022	0.00	0.00	121.40	0.00	0.00	0.00	121.40	20.77	13.20	643.16	101.74	20.99	119.46	400.97
2023	0.00	0.00	158.10	0.00	12.08	0.00	170.18	21.51	13.02	635.90	100.66	17.68	121.88	395.68
2024	0.00	0.00	20.72	0.00	0.00	0.00	20.72	21.62	16.96	629.30	98.82	28.79	124.19	377.51
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.62	16.74	517.61	96.57	21.81	118.03	281.20
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.62	16.33	493.80	94.29	24.75	122.48	252.28
2027	0.00	0.00	103.13	0.00	0.00	0.00	103.13	22.13	16.35	459.90	92.23	26.90	124.74	216.04
2028	0.00	0.00	143.21	0.00	95.12	0.00	238.33	23.31	16.42	442.83	90.43	31.11	129.17	192.12
2029	0.00	0.00	240.55	0.00	0.00	0.00	240.55	24.51	23.11	433.36	88.69	43.02	133.62	168.03
2030	0.00	0.00	317.15	0.00	0.00	0.00	317.15	26.10	19.18	432.31	87.78	46.71	136.25	161.57
2031	0.00	0.00	142.33	0.00	12.08	0.00	154.41	26.87	19.18	446.45	88.36	40.01	135.71	182.36
2032	0.00	0.00	10.49	0.00	0.00	0.00	10.49	26.93	26.09	473.14	85.80	97.30	131.36	158.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.93	26.10	461.12	84.29	105.18	135.43	136.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.93	26.10	449.99	82.81	114.22	140.18	112.78
2035	0.00	0.00	228.46	0.00	0.00	0.00	228.46	28.07	25.45	385.60	80.80	114.36	138.21	52.23
2036	0.00	0.00	330.71	0.00	0.00	0.00	330.71	29.72	25.46	359.88	79.33	122.48	139.00	19.08
2037	0.00	0.00	148.41	0.00	0.00	0.00	148.41	30.46	25.46	369.35	79.76	117.96	136.42	35.21
2038	0.00	0.00	244.23	0.00	0.00	0.00	244.23	31.68	32.37	395.52	77.33	183.67	134.90	-0.38
2039	0.00	0.00	337.70	0.00	0.00	0.00	337.70	33.37	35.27	383.24	75.95	196.21	145.74	-34.67
2040	0.00	0.00	151.55	0.00	80.02	0.00	231.58	34.53	32.37	379.78	75.37	201.96	147.95	-45.49
2041	0.00	0.00	11.17	0.00	0.00	0.00	11.17	34.59	39.30	410.45	73.49	266.79	143.74	-73.56
2042	0.00	0.00	239.89	0.00	0.00	0.00	239.89	35.79	39.30	396.48	71.70	288.56	149.41	-113.20
2043	0.00	0.00	347.26	0.00	0.00	0.00	347.26	37.52	39.30	386.20	70.39	304.80	153.90	-142.89
2044	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.30	41.04	370.45	69.89	302.37	155.24	-157.04
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	38.36	47.96	394.58	67.58	379.02	153.64	-205.66
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	47.96	399.93	67.77	377.09	151.89	-196.82
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	47.10	370.09	65.81	400.48	158.20	-254.40
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	38.36	49.14	388.20	67.05	385.53	154.58	-218.96
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2052	0.00	0.00	99.60	0.00	34.78	1.93	136.31	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2053	0.00	0.00	136.30	0.00	26.94	5.78	169.01	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2054	0.00	0.00	20.72	0.00	21.98	5.78	48.47	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2055	0.00	0.00	0.00	0.00	0.00	5.99	5.99	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2057	0.00	0.00	103.13	0.00	0.00	0.00	103.13	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2058	0.00	0.00	141.13	0.00	12.08	0.00	153.21	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2059	0.00	0.00	240.55	0.00	0.00	0.00	240.55	38.36	49.14	388.20	67.05	385.53	154.58	-218.96
2060	0.00	0.00	317.15	0.00	0.00	0.00	317.15	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2061	0.00	0.00	142.33	0.00	0.00	0.00	142.33	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2062	0.00	0.00	10.49	0.00	0.00	0.00	10.49	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2063	0.00	0.00	0.00	0.00	71.34	2.80	74.15	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2064	0.00	0.00	0.00	0.00	13.66	3.96	17.62	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2065	0.00	0.00	228.46	0.00	11.34	2.71	242.50	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2066	0.00	0.00	330.71	0.00	13.44	3.91	348.06	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2067	0.00	0.00	148.41	0.00	11.82	5.87	166.10	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2068	0.00	0.00	244.23	0.00	25.28	17.61	287.12	38.36	61.73	388.20	67.05	385.53	154.58	-218.96
2069	0.00	0.00	337.70	0.00	39.89	17.61	395.20	38.36	49.14	388.20	67.05	385.53	154.58	-218.96
2070	0.00	0.00	151.55	0.00	0.01	18.26	169.83	38.36	47.98	388.20	67.05	385.53	154.58	-218.96
2071	0.00	0.00	11.17	0.00	0.00	0.00	11.17	38.36	47.98	388.20	67.05	385.53	154.58	-218.96
2072	0.00	0.00	239.89	0.00	0.00	0.00	239.89	38.36	47.98	388.20	67.05	385.53	154.58	-218.96
2073	0.00	0.00	347.26	0.00	0.00	0.00	347.26	38.36	47.11	388.20	67.05	385.53	154.58	-218.96
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2075	0.00	0.00	11.48	0.00	60.02	0.00	71.50	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2078	0.00	0.00	0.00	0.00	23.78	0.00	23.78	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	49.14	388.20	67.05	385.53	154.58	-218.96
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2082	0.00	0.00	99.60	0.00	0.00	0.00	99.60	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2083	0.00	0.00	136.30	0.00	0.00	0.00	136.30	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2084	0.00	0.00	20.72	0.00	10.82	0.21	31.75	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2087	0.00	0.00	103.13	0.00	34.78	1.93	139.84	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2088	0.00	0.00	141.13	0.00	26.94	5.78	173.85	38.36	46.24	388.20	67.05	385.53	154.58	-218.96
2089	0.00	0.00	21.45	0.00	21.98	5.78	49.21	38.36	49.14	388.20	67.05	385.53	154.58	-218.96
2090	0.00	0.00	0.00	0.00	20.01	5.99	26.00	38.36	49.14	388.20	67.05	385.53	154.58	-218.96
Salvage Value	0.00	0.00	31.87	0.00	6.75	1.63	40.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1559.35	0.00	325.94	84.15	5202.50	487.11	445.49	8827.68	1779.44	2581.74	2607.54	1858.95

Net Present Value -4276

K19/C31/250MW

TABLE 023
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	252.57	0.00	0.00	24.48	4.18	312.49	1.58	0.00	312.22	102.98	19.82	97.95	91.47
2015	39.48	546.76	0.00	0.00	21.74	3.13	611.11	4.63	0.00	343.08	101.10	23.52	102.07	116.39
2016	10.75	726.88	0.00	0.00	30.88	5.20	773.70	8.50	0.00	352.81	99.25	24.59	104.39	124.57
2017	10.83	881.35	0.00	0.00	46.60	7.80	946.58	13.23	0.00	368.02	97.30	26.28	107.35	137.08
2018	12.89	628.16	0.00	0.00	52.22	23.39	716.66	16.82	0.00	347.69	94.61	28.80	109.30	114.99
2019	13.00	440.82	0.00	0.00	61.87	23.39	539.07	19.51	13.01	371.77	94.25	28.94	109.45	139.13
2020	13.10	182.49	0.36	0.00	0.01	24.25	220.21	20.61	13.22	584.79	102.60	20.77	110.79	350.63
2021	16.59	63.43	0.00	0.00	0.00	0.00	80.02	21.01	12.98	651.09	103.18	21.26	117.30	409.35
2022	184.48	0.00	121.40	0.00	0.00	0.00	305.88	22.43	13.20	643.04	101.73	21.02	119.49	400.81
2023	279.81	0.00	158.10	0.00	12.08	0.00	449.99	24.57	13.02	635.31	100.62	17.83	122.08	394.77
2024	307.13	0.00	20.72	0.00	0.00	0.00	327.85	26.21	16.96	628.62	98.79	28.97	124.50	376.36
2025	313.64	0.00	0.00	0.00	4.24	0.00	317.88	27.80	16.74	516.28	96.54	21.88	118.32	279.54
2026	851.45	0.00	0.00	0.00	4.24	0.00	855.69	32.08	16.33	492.72	94.28	24.95	122.84	250.65
2027	1355.87	0.00	103.13	0.00	51.65	0.00	1510.65	39.63	16.35	458.19	92.23	27.27	125.05	213.64
2028	1219.64	0.00	141.13	0.00	39.11	0.00	1399.88	46.63	16.42	440.37	90.35	31.94	129.82	188.26
2029	872.58	0.00	21.45	0.00	45.58	0.00	939.61	51.33	23.10	430.11	88.65	43.96	134.29	163.21
2030	605.44	0.00	0.00	0.00	79.26	0.00	684.70	54.75	19.16	449.76	89.71	38.34	129.97	191.74
2031	398.41	0.00	0.00	0.00	104.90	0.00	503.31	57.27	33.47	508.66	92.82	31.70	105.61	278.53
2032	147.01	0.00	0.00	0.00	122.87	0.00	269.88	58.62	33.68	671.87	99.86	31.02	101.12	439.87
2033	46.48	0.00	0.00	0.00	0.00	0.00	46.48	58.85	33.55	699.29	99.85	32.00	109.27	458.16
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	33.76	673.01	98.07	32.80	111.34	430.80
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.93	633.93	96.38	33.31	109.53	394.70
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.88	606.54	94.78	34.06	110.11	367.60
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.71	576.79	92.91	35.26	112.90	335.73
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.35	544.24	90.96	36.72	116.76	299.80
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	35.31	522.05	89.06	40.74	128.41	263.85
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.53	507.84	87.36	46.13	134.06	240.28
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	35.25	491.97	85.71	52.16	139.61	214.49
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	58.85	32.36	488.84	84.86	53.11	142.87	208.00
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.36	477.36	83.52	52.65	151.52	189.67
2044	0.00	0.00	116.12	0.00	0.00	0.00	116.12	59.43	34.10	461.76	81.98	66.83	152.90	160.04
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	60.70	34.10	447.17	80.56	73.59	159.00	134.02
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	60.82	38.09	438.68	79.19	83.58	167.97	107.94
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	36.57	424.39	77.80	84.57	180.84	81.17
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.70	436.75	79.18	80.58	169.27	107.71
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	60.82	38.59	436.75	79.18	80.58	169.27	107.71
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	60.82	35.70	436.75	79.18	80.58	169.27	107.71
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	60.82	38.60	436.75	79.18	80.58	169.27	107.71
2052	0.00	0.00	99.60	0.00	34.78	1.93	136.31	60.82	35.71	436.75	79.18	80.58	169.27	107.71
2053	0.00	0.00	136.30	0.00	26.94	5.78	169.01	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2054	0.00	0.00	20.72	0.00	21.98	5.78	48.47	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2055	0.00	0.00	0.00	0.00	0.00	5.99	5.99	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2057	0.00	0.00	103.13	0.00	0.00	0.00	103.13	60.82	37.46	436.75	79.18	80.58	169.27	107.71
2058	0.00	0.00	141.13	0.00	12.08	0.00	153.21	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2059	0.00	0.00	21.45	0.00	0.00	0.00	21.45	60.82	40.35	436.75	79.18	80.58	169.27	107.71
2060	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2061	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	38.62	436.75	79.18	80.58	169.27	107.71
2062	0.00	0.00	0.00	0.00	12.56	0.00	12.56	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2063	0.00	0.00	0.00	0.00	18.36	2.80	21.16	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2064	0.00	0.00	0.00	0.00	24.12	3.96	28.09	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2065	0.00	0.00	0.00	0.00	29.13	2.71	31.84	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2066	0.00	0.00	0.00	0.00	26.48	3.91	30.40	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2067	0.00	0.00	0.00	0.00	42.17	5.87	48.04	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2068	0.00	0.00	0.00	0.00	25.28	17.61	42.89	60.82	66.71	436.75	79.18	80.58	169.27	107.71
2069	0.00	0.00	0.00	0.00	39.89	17.61	57.50	60.82	38.62	436.75	79.18	80.58	169.27	107.71
2070	0.00	0.00	0.00	0.00	0.01	18.26	18.27	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	40.35	436.75	79.18	80.58	169.27	107.71
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	36.59	436.75	79.18	80.58	169.27	107.71
2074	0.00	0.00	116.12	0.00	0.00	0.00	116.12	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2075	0.00	0.00	158.90	0.00	3.19	0.00	162.09	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2076	0.00	0.00	24.15	0.00	3.19	0.00	27.34	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2077	0.00	0.00	0.00	0.00	39.09	0.00	39.09	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2078	0.00	0.00	0.00	0.00	20.75	0.00	20.75	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2079	0.00	0.00	0.00	0.00	35.12	0.00	35.12	60.82	38.62	436.75	79.18	80.58	169.27	107.71
2080	0.00	0.00	0.00	0.00	132.81	0.00	132.81	60.82	51.21	436.75	79.18	80.58	169.27	107.71
2081	0.00	0.00	0.00	0.00	79.78	0.00	79.78	60.82	38.62	436.75	79.18	80.58	169.27	107.71
2082	0.00	0.00	99.60	0.00	92.52	0.00	192.11	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2083	0.00	0.00	136.30	0.00	0.00	0.00	136.30	60.82	37.46	436.75	79.18	80.58	169.27	107.71
2084	0.00	0.00	20.72	0.00	10.82	0.21	31.75	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	60.82	37.46	436.75	79.18	80.58	169.27	107.71
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	60.82	52.95	436.75	79.18	80.58	169.27	107.71
2087	0.00	0.00	103.13	0.00	34.78	1.93	139.84	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2088	0.00	0.00	141.13	0.00	26.94	5.78	173.85	60.82	35.72	436.75	79.18	80.58	169.27	107.71
2089	0.00	0.00	21.45	0.00	21.98	5.78	49.21	60.82	38.62	436.75	79.18	80.58	169.27	107.71
2090	0.00	0.00	0.00	0.00	0.00	5.99	5.99	60.82	38.62	436.75	79.18	80.58	169.27	107.71
Salvage Value	19.27	0.00	15.00	0.00	13.93	1.63	49.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3526.11	3233.06	482.96	0.00	483.18	84.15	7809.46	768.50	428.42	9759.29	1887.62	805.73	2573.15	4492.79

Net Present Value -4514

All Gas

TABLE 024
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	354.71	99.24	24.61	104.31	126.54
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	373.23	97.67	25.25	106.21	144.09
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	352.87	94.88	27.63	108.96	121.39
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	344.28	92.94	24.94	110.41	115.99
2020	0.00	0.00	120.02	0.00	0.00	0.00	120.02	1.00	0.00	379.02	92.87	19.68	120.21	146.26
2021	0.00	0.00	156.26	0.00	12.08	0.00	168.34	1.74	0.00	380.91	91.04	18.54	130.64	140.70
2022	0.00	0.00	20.43	0.00	0.00	0.00	20.43	1.84	3.98	368.47	88.82	34.56	132.86	112.23
2023	0.00	0.00	100.29	0.00	0.00	0.00	100.29	2.34	3.98	353.40	86.63	42.79	138.93	85.05
2024	0.00	0.00	139.33	0.00	95.12	0.00	234.45	3.50	3.98	345.07	85.17	48.98	144.05	66.87
2025	0.00	0.00	20.86	0.00	0.00	0.00	20.86	3.61	7.98	272.52	84.68	40.97	130.73	16.14
2026	0.00	0.00	102.41	0.00	0.00	0.00	102.41	4.12	7.98	254.50	83.39	42.05	133.00	-3.94
2027	0.00	0.00	140.15	0.00	0.00	0.00	140.15	4.82	7.98	237.62	81.53	42.23	144.53	-30.68
2028	0.00	0.00	238.87	0.00	0.00	0.00	238.87	6.01	11.97	220.74	79.62	64.98	143.50	-67.35
2029	0.00	0.00	314.95	0.00	0.00	0.00	314.95	7.59	11.97	205.27	78.17	73.98	147.85	-94.74
2030	0.00	0.00	141.34	0.00	12.08	0.00	153.42	8.35	11.98	218.15	79.09	68.55	144.04	-73.53
2031	0.00	0.00	10.41	0.00	0.00	0.00	10.41	8.41	18.90	235.26	76.69	121.48	136.86	-99.76
2032	0.00	0.00	106.79	0.00	0.00	0.00	106.79	8.94	18.90	215.25	74.79	134.42	143.44	-137.40
2033	0.00	0.00	146.14	0.00	80.02	0.00	226.17	10.07	18.90	195.29	73.05	147.50	148.95	-174.22
2034	0.00	0.00	249.08	0.00	0.00	0.00	249.08	11.32	22.90	181.44	71.65	165.86	152.52	-208.59
2035	0.00	0.00	328.41	0.00	0.00	0.00	328.41	12.96	22.90	170.46	70.76	175.58	155.46	-231.34
2036	0.00	0.00	147.38	0.00	0.00	0.00	147.38	13.70	22.90	168.61	70.71	170.95	161.51	-234.55
2037	0.00	0.00	242.53	0.00	0.00	0.00	242.53	14.91	29.82	175.62	68.71	226.64	147.59	-267.33
2038	0.00	0.00	335.35	0.00	0.00	0.00	335.35	16.59	29.82	160.56	67.51	240.37	153.80	-301.12
2039	0.00	0.00	150.50	0.00	0.00	0.00	150.50	17.34	29.83	155.51	67.44	243.76	160.62	-316.31
2040	0.00	0.00	11.09	0.00	0.00	0.00	11.09	17.39	36.75	165.41	65.53	295.35	154.33	-349.80
2041	0.00	0.00	238.22	0.00	0.00	0.00	238.22	18.58	36.76	155.40	63.76	325.47	162.60	-396.42
2042	0.00	0.00	344.84	0.00	0.00	0.00	344.84	20.31	36.76	149.69	62.71	347.32	168.67	-429.01
2043	0.00	0.00	154.76	0.00	80.02	0.00	234.78	21.48	36.76	150.95	62.68	352.31	169.86	-433.90
2044	0.00	0.00	11.40	0.00	0.00	0.00	11.40	21.54	43.68	159.35	61.13	402.15	161.82	-465.75
2045	0.00	0.00	51.43	0.00	0.00	0.00	51.43	21.80	43.68	150.63	59.60	434.69	169.02	-512.68
2046	0.00	0.00	70.39	0.00	0.00	0.00	70.39	22.15	43.68	144.88	58.50	461.23	174.74	-549.58
2047	0.00	0.00	10.70	0.00	0.00	0.00	10.70	22.20	45.13	135.81	57.64	480.80	179.61	-582.24
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.13	143.77	58.58	458.91	174.45	-548.17
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	22.20	45.14	143.77	58.58	458.91	174.45	-548.17
2050	0.00	0.00	98.22	0.00	9.87	0.00	108.08	22.20	45.14	143.77	58.58	458.91	174.45	-548.17
2051	0.00	0.00	134.41	0.00	9.87	0.00	144.27	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2052	0.00	0.00	20.43	0.00	9.87	0.00	30.30	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2053	0.00	0.00	100.29	0.00	0.00	0.00	100.29	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2054	0.00	0.00	137.25	0.00	0.00	0.00	137.25	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2055	0.00	0.00	20.86	0.00	0.00	0.00	20.86	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2056	0.00	0.00	102.41	0.00	12.08	0.00	114.49	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2057	0.00	0.00	140.15	0.00	0.00	0.00	140.15	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2058	0.00	0.00	238.87	0.00	0.00	0.00	238.87	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2059	0.00	0.00	314.95	0.00	71.34	0.00	386.29	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2060	0.00	0.00	141.34	0.00	0.00	0.00	141.34	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2061	0.00	0.00	10.41	0.00	0.00	0.00	10.41	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2062	0.00	0.00	106.79	0.00	0.00	0.00	106.79	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2063	0.00	0.00	146.14	0.00	0.00	0.00	146.14	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2064	0.00	0.00	249.08	0.00	0.00	0.00	249.08	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2065	0.00	0.00	328.41	0.00	12.08	0.00	340.49	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2066	0.00	0.00	147.38	0.00	0.00	0.00	147.38	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2067	0.00	0.00	242.53	0.00	0.00	0.00	242.53	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2068	0.00	0.00	335.35	0.00	60.02	0.00	395.37	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2069	0.00	0.00	150.50	0.00	0.00	0.00	150.50	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2070	0.00	0.00	11.09	0.00	0.00	0.00	11.09	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2071	0.00	0.00	238.22	0.00	0.00	0.00	238.22	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2072	0.00	0.00	344.84	0.00	0.00	0.00	344.84	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2073	0.00	0.00	154.76	0.00	0.00	0.00	154.76	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2074	0.00	0.00	11.40	0.00	23.78	0.00	35.18	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2075	0.00	0.00	51.43	0.00	0.00	0.00	51.43	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2076	0.00	0.00	70.39	0.00	0.00	0.00	70.39	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2077	0.00	0.00	10.70	0.00	0.00	0.00	10.70	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2078	0.00	0.00	0.00	0.00	60.02	0.00	60.02	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2080	0.00	0.00	98.22	0.00	0.00	0.00	98.22	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2081	0.00	0.00	134.41	0.00	0.00	0.00	134.41	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2082	0.00	0.00	20.43	0.00	0.00	0.00	20.43	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2083	0.00	0.00	100.29	0.00	20.01	0.00	120.30	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2084	0.00	0.00	137.25	0.00	9.87	0.00	147.12	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2085	0.00	0.00	20.86	0.00	9.87	0.00	30.73	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2086	0.00	0.00	102.41	0.00	9.87	0.00	112.28	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2087	0.00	0.00	140.15	0.00	9.87	0.00	150.02	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2088	0.00	0.00	21.30	0.00	0.00	0.00	21.30	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	143.77	58.58	458.91	174.45	-548.17
Salvage Value	0.00	0.00	51.90	0.00	3.28	0.00	55.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1993.71	0.00	182.81	0.00	2239.47	181.03	343.48	5197.15	1624.63	3260.17	2836.83	-2524.47

Net Present Value: -5288

Wind/Gas

TABLE 025
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	354.71	99.24	24.61	104.31	126.54
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	373.23	97.67	25.25	106.21	144.09
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	352.86	94.88	27.63	108.96	121.38
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	344.28	92.93	24.94	110.41	116.00
2020	0.00	0.00	0.00	12.81	20.76	0.00	33.57	0.68	0.00	375.38	92.41	21.23	121.42	140.31
2021	0.00	0.00	0.36	391.21	34.60	0.00	426.17	2.81	0.00	376.76	90.58	20.62	131.14	134.41
2022	0.00	0.00	0.00	398.53	41.80	0.00	440.33	5.01	6.21	381.05	88.96	20.75	131.65	139.68
2023	0.00	0.00	222.39	385.72	21.87	0.00	629.98	8.05	12.42	377.95	86.49	23.89	135.51	132.06
2024	0.00	0.00	296.35	7.32	34.41	0.00	338.09	9.63	18.63	382.20	84.74	24.28	139.18	134.00
2025	0.00	0.00	41.72	6.41	6.66	0.00	54.80	9.91	26.60	319.93	84.79	28.21	122.46	84.47
2026	0.00	0.00	102.41	195.61	16.75	0.00	314.77	11.48	26.60	307.48	83.80	27.04	123.18	73.46
2027	0.00	0.00	142.23	199.27	121.74	0.00	463.23	13.79	29.70	292.82	81.47	33.04	127.29	51.02
2028	0.00	0.00	21.30	199.27	36.89	0.00	257.46	15.07	36.81	287.63	79.73	42.71	130.36	34.83
2029	0.00	0.00	104.58	199.27	37.03	0.00	340.87	16.78	39.91	279.80	78.15	46.21	134.01	21.42
2030	0.00	0.00	143.12	199.27	37.03	0.00	379.41	18.68	43.02	282.73	77.26	48.36	135.34	21.77
2031	0.00	0.00	127.80	199.27	37.03	0.00	364.10	20.50	50.10	284.67	76.04	57.53	137.30	13.79
2032	0.00	0.00	145.13	199.27	117.05	0.00	461.45	22.80	53.22	281.32	74.94	58.04	140.69	7.65
2033	0.00	0.00	22.06	199.27	37.03	0.00	258.35	24.09	60.32	286.64	74.29	61.33	143.11	7.91
2034	0.00	0.00	108.29	199.27	37.03	0.00	344.59	25.82	63.43	273.94	72.51	71.43	145.95	-15.96
2035	0.00	0.00	148.20	199.27	37.03	0.00	384.49	27.74	66.55	261.54	70.85	77.44	150.47	-37.22
2036	0.00	0.00	132.34	199.27	37.03	0.00	368.63	29.58	73.63	256.46	69.51	89.05	153.37	-55.46
2037	0.00	0.00	150.28	199.27	37.03	0.00	386.57	31.52	76.75	247.70	68.25	94.20	157.57	-72.32
2038	0.00	0.00	134.20	199.27	37.03	0.00	370.49	33.37	83.84	246.65	67.22	103.71	161.55	-85.83
2039	0.00	0.00	152.39	199.27	117.05	0.00	468.71	35.71	86.95	240.29	66.08	103.95	176.67	-106.40
2040	0.00	0.00	23.16	212.08	37.03	0.00	272.27	37.07	94.06	242.98	65.30	109.51	182.81	-114.63
2041	0.00	0.00	113.71	590.48	37.03	0.00	741.22	40.78	97.17	229.85	63.79	130.50	180.84	-145.29
2042	0.00	0.00	155.61	597.80	37.03	0.00	790.44	44.73	100.27	218.87	62.44	139.59	187.37	-170.52
2043	0.00	0.00	138.96	584.98	36.75	0.00	760.70	48.54	107.36	213.85	61.28	154.36	191.49	-193.28
2044	0.00	0.00	157.80	206.59	35.92	0.00	400.30	50.54	110.47	209.15	60.35	160.24	196.74	-208.19
2045	0.00	0.00	75.42	205.67	33.69	0.00	314.79	52.11	117.57	205.96	59.28	169.67	205.42	-228.42
2046	0.00	0.00	70.39	388.46	30.36	0.00	489.21	54.56	120.68	201.39	58.27	170.59	219.02	-246.48
2047	0.00	0.00	10.70	202.93	20.27	0.00	233.90	55.73	125.23	195.23	57.22	176.20	222.48	-260.67
2048	0.00	0.00	0.00	199.27	10.41	0.00	209.68	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2049	0.00	0.00	0.00	199.27	10.00	0.00	209.27	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2050	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2051	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2052	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2053	0.00	0.00	200.59	199.27	0.00	0.00	399.85	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2054	0.00	0.00	274.50	199.27	0.00	0.00	473.77	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2055	0.00	0.00	41.72	199.27	5.19	0.00	246.18	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2056	0.00	0.00	102.41	199.27	8.65	0.00	310.33	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2057	0.00	0.00	140.15	199.27	10.52	0.00	349.94	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2058	0.00	0.00	21.30	199.27	5.88	0.00	226.45	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2059	0.00	0.00	104.58	199.27	27.14	0.00	330.98	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2060	0.00	0.00	143.12	212.08	2.92	0.00	358.11	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2061	0.00	0.00	127.80	590.48	4.67	0.00	722.95	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2062	0.00	0.00	145.13	597.80	78.10	0.00	821.03	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2063	0.00	0.00	22.06	584.98	9.26	0.00	616.30	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2064	0.00	0.00	108.29	206.59	9.26	0.00	324.14	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2065	0.00	0.00	148.20	205.67	9.26	0.00	363.13	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2066	0.00	0.00	132.34	388.46	9.26	0.00	530.06	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2067	0.00	0.00	150.28	202.93	69.27	0.00	422.48	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2068	0.00	0.00	134.20	199.27	9.26	0.00	342.72	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2069	0.00	0.00	152.39	199.27	9.26	0.00	360.91	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2070	0.00	0.00	23.16	199.27	24.83	0.00	247.26	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2071	0.00	0.00	113.71	199.27	35.21	0.00	348.18	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2072	0.00	0.00	155.61	199.27	40.53	0.00	395.41	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2073	0.00	0.00	138.96	199.27	25.24	0.00	363.47	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2074	0.00	0.00	157.80	199.27	76.55	0.00	433.61	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2075	0.00	0.00	75.42	199.27	13.01	0.00	287.69	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2076	0.00	0.00	70.39	199.27	21.34	0.00	290.99	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2077	0.00	0.00	10.70	199.27	52.89	0.00	262.86	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2078	0.00	0.00	0.00	199.27	36.75	0.00	236.02	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2079	0.00	0.00	0.00	199.27	36.33	0.00	235.60	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2080	0.00	0.00	0.00	212.08	35.78	0.00	247.86	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2081	0.00	0.00	0.00	590.48	34.11	0.00	624.59	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2082	0.00	0.00	0.00	597.80	52.36	0.00	650.16	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2083	0.00	0.00	200.59	584.98	30.27	0.00	815.84	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2084	0.00	0.00	274.50	206.59	37.50	0.00	518.59	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2085	0.00	0.00	41.72	205.67	37.22	0.00	284.62	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2086	0.00	0.00	102.41	388.46	35.55	0.00	526.43	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2087	0.00	0.00	140.15	202.93	33.89	0.00	376.97	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2088	0.00	0.00	21.30	199.27	15.69	0.00	236.26	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2089	0.00	0.00	0.00	192.86	27.92	0.00	220.78	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
2090	0.00	0.00	0.00	3.66	0.14	0.00	3.80	55.73	125.23	200.86	58.26	172.16	215.64	-245.19
Salvage Value	0.00	0.00	30.14	70.48	14.94	0.00	115.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1435.66	3453.82	557.04	0.00	5509.47	430.90	974.12	5994.47	1620.82	1437.43	2992.92	-56.69

Net Present Value -6971

K22/Gas

TABLE 026
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	105.39	0.00	0.00	9.87	0.00	115.25	0.58	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	34.73	0.00	0.00	11.07	0.00	45.80	0.81	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	37.30	0.00	0.00	11.18	0.00	48.48	1.05	0.00	354.31	99.24	24.61	104.31	126.14
2017	0.00	243.59	0.00	0.00	32.53	0.00	276.12	2.43	0.00	372.21	97.67	25.27	106.24	143.03
2018	0.00	475.71	0.00	0.00	11.62	0.00	487.33	4.86	0.00	350.82	94.89	27.65	109.04	119.23
2019	0.00	760.82	0.00	0.00	20.24	0.00	781.05	8.77	0.00	342.16	92.94	24.95	110.49	113.77
2020	0.00	855.73	0.00	0.00	36.83	0.00	892.55	13.23	0.00	370.41	92.24	21.91	122.13	134.12
2021	0.00	696.05	0.00	0.00	52.24	0.00	748.29	16.97	0.00	374.32	90.53	21.04	132.54	130.21
2022	0.00	405.11	0.00	0.00	61.87	0.00	466.98	19.31	13.01	381.13	90.51	24.00	126.20	140.42
2023	0.00	188.58	0.00	0.00	0.01	0.00	188.60	20.25	13.22	499.77	96.18	23.80	115.03	264.76
2024	0.00	65.35	0.00	0.00	0.00	0.00	65.35	20.58	12.93	515.68	96.08	27.04	119.94	272.62
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	20.58	13.15	458.53	96.02	18.97	110.74	232.80
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.58	12.97	439.88	94.17	19.26	113.51	212.94
2027	0.00	0.00	124.94	0.00	0.00	0.00	124.94	21.09	12.93	397.98	92.34	18.43	112.77	174.44
2028	0.00	0.00	162.99	0.00	12.08	0.00	175.07	21.86	12.69	377.17	90.78	19.18	115.78	151.44
2029	0.00	0.00	21.45	0.00	0.00	0.00	21.45	21.97	16.24	370.63	89.95	24.01	116.20	140.47
2030	0.00	0.00	105.31	0.00	0.00	0.00	105.31	22.49	16.24	359.98	88.21	29.50	120.17	122.10
2031	0.00	0.00	368.37	0.00	95.12	0.00	463.49	24.80	16.28	348.62	86.56	34.46	124.96	102.65
2032	0.00	0.00	343.51	0.00	0.00	0.00	343.51	26.52	22.98	339.24	84.98	46.58	129.31	78.37
2033	0.00	0.00	144.33	0.00	12.08	0.00	156.41	27.30	19.04	345.87	85.15	40.69	130.04	89.99
2034	0.00	0.00	10.63	0.00	0.00	0.00	10.63	27.35	25.96	368.13	82.71	97.35	124.10	63.96
2035	0.00	0.00	228.46	0.00	0.00	0.00	228.46	28.50	25.96	351.15	80.68	109.35	130.19	30.94
2036	0.00	0.00	330.71	0.00	0.00	0.00	330.71	30.15	25.96	337.81	79.17	119.09	134.54	5.02
2037	0.00	0.00	148.41	0.00	0.00	0.00	148.41	30.89	25.97	346.57	79.61	113.46	132.27	21.24
2038	0.00	0.00	244.23	0.00	0.00	0.00	244.23	32.11	32.23	367.72	77.23	174.74	130.04	-14.29
2039	0.00	0.00	337.70	0.00	0.00	0.00	337.70	33.80	32.24	355.74	75.87	187.53	140.71	-48.37
2040	0.00	0.00	151.55	0.00	80.02	0.00	231.58	34.96	32.24	355.25	75.42	192.27	142.72	-55.16
2041	0.00	0.00	11.17	0.00	0.00	0.00	11.17	35.02	39.16	380.22	73.44	254.36	138.86	-86.43
2042	0.00	0.00	239.89	0.00	0.00	0.00	239.89	36.22	42.06	366.63	71.62	277.15	144.65	-126.79
2043	0.00	0.00	347.26	0.00	0.00	0.00	347.26	37.95	39.16	356.59	70.30	293.82	149.12	-156.65
2044	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.73	39.16	344.85	69.95	291.10	149.77	-165.97
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	38.79	46.09	371.95	68.34	353.70	146.04	-196.13
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.09	362.95	67.11	374.76	149.22	-228.16
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	47.84	340.43	65.75	388.84	153.48	-267.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	47.84	358.44	67.07	372.44	149.58	-230.64
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	47.84	358.44	67.07	372.44	149.58	-230.64
2050	0.00	0.00	0.00	0.00	10.40	0.00	10.40	38.79	46.97	358.44	67.07	372.44	149.58	-230.64
2051	0.00	0.00	0.00	0.00	10.47	0.00	10.47	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2052	0.00	0.00	0.00	0.00	10.48	0.00	10.48	38.79	49.00	358.44	67.07	372.44	149.58	-230.64
2053	0.00	0.00	0.00	0.00	0.57	0.00	0.57	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2054	0.00	0.00	0.00	0.00	18.78	0.00	18.78	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2055	0.00	0.00	0.00	0.00	24.92	0.00	24.92	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2056	0.00	0.00	0.00	0.00	26.94	0.00	26.94	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2057	0.00	0.00	103.13	0.00	21.98	0.00	125.11	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2058	0.00	0.00	141.13	0.00	0.00	0.00	141.13	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2059	0.00	0.00	21.45	0.00	0.00	0.00	21.45	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2060	0.00	0.00	105.31	0.00	0.00	0.00	105.31	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2061	0.00	0.00	366.29	0.00	0.00	0.00	366.29	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2062	0.00	0.00	343.51	0.00	0.00	0.00	343.51	38.79	49.00	358.44	67.07	372.44	149.58	-230.64
2063	0.00	0.00	144.33	0.00	12.08	0.00	156.41	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2064	0.00	0.00	10.63	0.00	0.00	0.00	10.63	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2065	0.00	0.00	228.46	0.00	0.67	0.00	229.13	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2066	0.00	0.00	330.71	0.00	72.05	0.00	402.76	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2067	0.00	0.00	148.41	0.00	22.05	0.00	170.46	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2068	0.00	0.00	244.23	0.00	23.13	0.00	267.36	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2069	0.00	0.00	337.70	0.00	1.45	0.00	339.15	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2070	0.00	0.00	151.55	0.00	11.91	0.00	163.46	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2071	0.00	0.00	11.17	0.00	25.30	0.00	36.47	38.79	61.60	358.44	67.07	372.44	149.58	-230.64
2072	0.00	0.00	239.89	0.00	39.89	0.00	279.78	38.79	49.00	358.44	67.07	372.44	149.58	-230.64
2073	0.00	0.00	347.26	0.00	0.01	0.00	347.27	38.79	47.84	358.44	67.07	372.44	149.58	-230.64
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.79	47.84	358.44	67.07	372.44	149.58	-230.64
2075	0.00	0.00	11.48	0.00	60.02	0.00	71.50	38.79	47.84	358.44	67.07	372.44	149.58	-230.64
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.97	358.44	67.07	372.44	149.58	-230.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2081	0.00	0.00	0.00	0.00	23.78	0.00	23.78	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	49.00	358.44	67.07	372.44	149.58	-230.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2087	0.00	0.00	103.13	0.00	9.87	0.00	113.00	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2088	0.00	0.00	141.13	0.00	0.00	0.00	141.13	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2089	0.00	0.00	21.45	0.00	0.00	0.00	21.45	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
2090	0.00	0.00	0.00	0.00	20.01	0.00	20.01	38.79	46.10	358.44	67.07	372.44	149.58	-230.64
Salvage Value	0.00	0.00	28.36	0.00	5.11	0.00	33.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2931.58	1457.36	0.00	298.13	0.00	4687.07	437.47	393.87	7560.42	1749.83	2418.61	2537.09	854.89

Net Present Value: -4664

K22/C29

TABLE 027
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	105.39	0.00	0.00	9.87	0.00	146.52	0.73	0.00	312.96	102.97	19.80	97.89	92.30
2015	40.00	34.73	0.00	0.00	11.07	0.00	85.80	1.16	0.00	344.96	101.09	23.52	102.04	118.31
2016	11.28	37.30	0.00	0.00	11.18	0.00	59.76	1.46	0.00	354.31	99.24	24.61	104.31	126.14
2017	12.04	243.59	0.00	0.00	32.53	0.00	288.16	2.90	0.00	372.21	97.67	25.27	106.24	143.03
2018	12.13	475.71	0.00	0.00	11.62	0.00	499.46	5.40	0.00	350.82	94.89	27.65	109.04	119.23
2019	14.53	760.82	0.00	0.00	20.24	0.00	795.59	9.38	0.00	342.16	92.94	24.95	110.49	113.77
2020	184.88	855.73	0.00	0.00	36.83	0.00	1077.44	14.76	0.00	370.42	92.24	21.91	122.13	134.14
2021	278.78	696.05	0.00	0.00	52.24	0.00	1027.06	19.90	0.00	374.08	90.53	21.05	132.68	129.82
2022	302.41	405.11	0.00	0.00	61.87	0.00	769.39	23.75	13.01	380.84	90.52	23.95	126.38	139.99
2023	308.82	188.58	0.00	0.00	4.25	0.00	501.66	26.25	13.22	498.84	96.18	23.85	115.15	263.65
2024	838.38	65.35	0.00	0.00	4.24	0.00	907.97	30.79	12.93	513.72	96.07	27.05	120.04	270.56
2025	1335.05	0.00	0.00	0.00	51.65	0.00	1386.70	37.73	13.15	456.14	96.05	19.00	110.92	230.18
2026	1200.91	0.00	0.00	0.00	27.03	0.00	1227.94	43.87	12.97	436.88	94.18	19.31	113.73	209.66
2027	859.18	0.00	0.00	0.00	45.58	0.00	904.76	48.39	12.93	396.05	92.57	17.68	112.68	173.12
2028	596.14	0.00	0.00	0.00	79.26	0.00	675.40	51.77	12.69	370.29	90.69	19.42	116.59	143.60
2029	392.30	0.00	0.00	0.00	104.90	0.00	497.20	54.25	26.56	479.01	94.49	22.19	100.26	262.07
2030	144.76	0.00	0.00	0.00	122.87	0.00	267.62	55.59	26.78	633.94	101.62	21.64	92.28	418.40
2031	45.77	0.00	0.00	0.00	0.00	0.00	45.77	55.82	26.68	653.42	101.40	22.12	95.97	433.92
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	29.59	632.63	99.72	21.85	97.48	413.58
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.48	609.97	98.10	21.80	98.82	391.25
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.44	590.28	96.51	22.24	101.01	370.52
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.27	569.35	94.98	22.36	102.29	349.73
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	55.82	24.90	545.15	93.44	22.30	103.59	325.82
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	24.97	520.74	91.91	22.38	105.51	300.94
2038	0.00	0.00	133.16	0.00	0.00	0.00	133.16	56.38	24.43	497.35	90.41	22.41	108.95	275.58
2039	0.00	0.00	174.20	0.00	12.08	0.00	186.28	57.20	27.15	489.88	89.05	21.93	123.40	255.51
2040	0.00	0.00	23.16	0.00	0.00	0.00	23.16	57.32	28.24	477.99	87.33	38.46	125.13	227.07
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.32	28.24	466.16	85.89	42.99	130.53	206.74
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	57.89	31.13	454.76	84.49	44.36	138.38	187.53
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	58.73	28.24	441.35	83.02	45.04	148.15	165.13
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	59.43	32.22	431.21	81.57	69.39	145.66	134.59
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	60.70	31.56	419.75	80.33	74.17	151.38	113.86
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	60.82	35.56	431.27	79.96	73.36	157.94	120.02
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.30	402.55	77.77	97.84	162.94	64.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.30	417.86	79.35	81.79	157.42	99.30
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	40.20	417.86	79.35	81.79	157.42	99.30
2050	0.00	0.00	0.00	0.00	10.40	0.00	10.40	60.82	36.44	417.86	79.35	81.79	157.42	99.30
2051	0.00	0.00	0.00	0.00	10.47	0.00	10.47	60.82	35.57	417.86	79.35	81.79	157.42	99.30
2052	0.00	0.00	0.00	0.00	10.48	0.00	10.48	60.82	38.48	417.86	79.35	81.79	157.42	99.30
2053	0.00	0.00	0.00	0.00	0.57	0.00	0.57	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2054	0.00	0.00	0.00	0.00	18.78	0.00	18.78	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2055	0.00	0.00	0.00	0.00	24.92	0.00	24.92	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2056	0.00	0.00	0.00	0.00	26.94	0.00	26.94	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2057	0.00	0.00	0.00	0.00	21.98	0.00	21.98	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2058	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2059	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	53.98	417.86	79.35	81.79	157.42	99.30
2060	0.00	0.00	0.00	0.00	12.56	0.00	12.56	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2061	0.00	0.00	0.00	0.00	6.28	0.00	6.28	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	60.82	38.48	417.86	79.35	81.79	157.42	99.30
2063	0.00	0.00	0.00	0.00	17.79	0.00	17.79	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2064	0.00	0.00	0.00	0.00	25.12	0.00	25.12	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2065	0.00	0.00	0.00	0.00	31.02	0.00	31.02	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2066	0.00	0.00	0.00	0.00	0.71	0.00	0.71	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2067	0.00	0.00	0.00	0.00	22.05	0.00	22.05	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2068	0.00	0.00	111.36	0.00	11.05	0.00	122.41	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2069	0.00	0.00	152.39	0.00	1.45	0.00	153.84	60.82	53.98	417.86	79.35	81.79	157.42	99.30
2070	0.00	0.00	23.16	0.00	11.91	0.00	35.07	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2071	0.00	0.00	0.00	0.00	25.30	0.00	25.30	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2072	0.00	0.00	114.51	0.00	39.89	0.00	154.40	60.82	53.98	417.86	79.35	81.79	157.42	99.30
2073	0.00	0.00	156.70	0.00	3.20	0.00	159.90	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2074	0.00	0.00	139.93	0.00	15.27	0.00	155.20	60.82	52.82	417.86	79.35	81.79	157.42	99.30
2075	0.00	0.00	158.90	0.00	39.09	0.00	197.99	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2076	0.00	0.00	24.15	0.00	20.75	0.00	44.90	60.82	51.95	417.86	79.35	81.79	157.42	99.30
2077	0.00	0.00	0.00	0.00	35.12	0.00	35.12	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2078	0.00	0.00	0.00	0.00	73.54	0.00	73.54	60.82	51.08	417.86	79.35	81.79	157.42	99.30
2079	0.00	0.00	0.00	0.00	79.78	0.00	79.78	60.82	38.48	417.86	79.35	81.79	157.42	99.30
2080	0.00	0.00	0.00	0.00	163.86	0.00	163.86	60.82	52.82	417.86	79.35	81.79	157.42	99.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	55.71	417.86	79.35	81.79	157.42	99.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.32	417.86	79.35	81.79	157.42	99.30
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	52.82	417.86	79.35	81.79	157.42	99.30
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.59	417.86	79.35	81.79	157.42	99.30
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	38.48	417.86	79.35	81.79	157.42	99.30
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.59	417.86	79.35	81.79	157.42	99.30
Salvage Value	13.46	0.00	9.17	0.00	11.80	0.00	34.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3813.51	2931.58	278.11	0.00	480.15	0.00	7503.35	743.12	364.53	8808.39	1867.94	731.04	2452.56	3756.84

Net Present Value: -4854

SCGT/C26

TABLE 028
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	312.96	102.97	19.80	97.89	92.30
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	344.96	101.09	23.52	102.04	118.31
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	354.71	99.24	24.61	104.31	126.54
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	373.23	97.67	25.25	106.21	144.09
2018	237.84	0.00	0.36	0.00	0.00	0.00	238.20	3.51	0.00	352.45	94.88	27.64	108.97	120.95
2019	286.35	0.00	0.00	0.00	0.00	0.00	286.35	4.94	0.00	343.62	92.94	24.95	110.43	115.30
2020	293.68	0.00	120.02	0.00	0.00	0.00	413.70	6.90	0.00	377.79	92.85	19.78	120.34	144.82
2021	811.02	0.00	156.22	0.00	12.08	0.00	979.32	11.68	0.00	379.86	91.01	18.79	131.08	138.98
2022	1304.42	0.00	20.43	0.00	0.80	0.00	1325.66	18.31	3.98	367.07	88.84	34.95	133.23	110.04
2023	1173.36	0.00	0.00	0.00	1.61	0.00	1174.96	24.19	3.98	350.33	86.49	44.24	139.70	79.90
2024	839.47	0.00	0.00	0.00	3.21	0.00	842.68	28.40	3.98	345.06	85.34	48.61	144.33	66.78
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	31.35	3.98	276.64	85.84	29.71	134.85	26.24
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	33.28	18.29	348.37	89.76	22.30	110.06	126.24
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	33.99	18.51	492.28	97.52	21.14	98.60	275.02
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	34.21	18.21	519.49	97.61	23.17	107.04	291.67
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.43	495.88	95.91	23.84	108.41	267.71
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.26	480.39	94.72	23.56	108.40	253.71
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.21	458.30	92.77	25.66	112.41	227.46
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.97	431.27	90.85	27.24	115.84	197.35
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.54	412.36	88.92	32.08	120.39	170.98
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.54	401.60	87.36	37.06	125.99	151.18
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.58	391.63	86.07	41.11	128.82	135.63
2036	0.00	0.00	109.81	0.00	0.00	0.00	109.81	34.76	20.30	384.46	85.01	41.58	133.46	124.42
2037	0.00	0.00	150.32	0.00	12.08	0.00	162.40	35.57	17.41	372.68	83.51	42.31	143.91	102.95
2038	0.00	0.00	22.84	0.00	0.00	0.00	22.84	35.69	21.39	362.84	82.04	65.11	142.70	72.99
2039	0.00	0.00	112.14	0.00	0.00	0.00	112.14	36.25	21.39	351.82	80.79	70.53	154.71	45.80
2040	0.00	0.00	155.53	0.00	95.12	0.00	250.66	37.49	21.39	342.26	79.45	70.05	167.78	24.97
2041	0.00	0.00	137.04	0.00	0.00	0.00	137.04	38.18	25.39	328.59	77.82	98.39	166.29	-13.90
2042	0.00	0.00	155.61	0.00	0.00	0.00	155.61	38.95	24.73	315.39	76.48	110.33	171.86	-43.28
2043	0.00	0.00	138.96	0.00	0.00	0.00	138.96	39.65	28.71	307.75	75.18	123.78	180.70	-71.91
2044	0.00	0.00	157.80	0.00	80.02	0.00	237.82	40.84	28.71	297.18	73.88	125.35	197.16	-99.21
2045	0.00	0.00	23.99	0.00	0.00	0.00	23.99	40.96	32.72	288.74	72.56	172.24	185.24	-141.29
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	35.62	279.27	71.39	189.93	189.91	-171.97
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.73	269.09	70.08	193.12	209.44	-203.55
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.73	279.03	71.34	185.09	194.86	-172.27
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.74	279.03	71.34	185.09	194.86	-172.27
2050	0.00	0.00	98.22	0.00	9.87	0.00	108.08	40.96	32.75	279.03	71.34	185.09	194.86	-172.27
2051	0.00	0.00	134.41	0.00	9.87	0.00	144.27	40.96	34.49	279.03	71.34	185.09	194.86	-172.27
2052	0.00	0.00	20.43	0.00	9.87	0.00	30.30	40.96	34.50	279.03	71.34	185.09	194.86	-172.27
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	279.03	71.34	185.09	194.86	-172.27
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	279.03	71.34	185.09	194.86	-172.27
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	279.03	71.34	185.09	194.86	-172.27
2056	0.00	0.00	0.00	0.00	12.08	0.00	12.08	40.96	35.65	279.03	71.34	185.09	194.86	-172.27
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2066	0.00	0.00	109.81	0.00	0.00	0.00	109.81	40.96	35.65	279.03	71.34	185.09	194.86	-172.27
2067	0.00	0.00	150.28	0.00	0.00	0.00	150.28	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2068	0.00	0.00	22.84	0.00	0.00	0.00	22.84	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2069	0.00	0.00	112.14	0.00	0.00	0.00	112.14	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2070	0.00	0.00	153.46	0.00	0.00	0.00	153.46	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2071	0.00	0.00	137.04	0.00	0.00	0.00	137.04	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2072	0.00	0.00	155.61	0.00	12.88	0.00	168.50	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2073	0.00	0.00	138.96	0.00	1.61	0.00	140.57	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2074	0.00	0.00	157.80	0.00	3.21	0.00	161.01	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2075	0.00	0.00	23.99	0.00	78.57	0.00	102.56	40.96	48.25	279.03	71.34	185.09	194.86	-172.27
2076	0.00	0.00	0.00	0.00	3.21	0.00	3.21	40.96	35.65	279.03	71.34	185.09	194.86	-172.27
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	49.99	279.03	71.34	185.09	194.86	-172.27
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	279.03	71.34	185.09	194.86	-172.27
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	40.96	49.99	279.03	71.34	185.09	194.86	-172.27
2080	0.00	0.00	98.22	0.00	0.00	0.00	98.22	40.96	34.50	279.03	71.34	185.09	194.86	-172.27
2081	0.00	0.00	134.41	0.00	0.00	0.00	134.41	40.96	49.99	279.03	71.34	185.09	194.86	-172.27
2082	0.00	0.00	20.43	0.00	0.00	0.00	20.43	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	35.65	279.03	71.34	185.09	194.86	-172.27
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
2090	0.00	0.00	0.00	0.00	23.78	0.00	23.78	40.96	32.76	279.03	71.34	185.09	194.86	-172.27
Salvage Value	5.25	0.00	15.02	0.00	3.74	0.00	24.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	640.88	0.00	116.89	0.00	5144.03	500.32	293.52	7228.68	1779.56	1324.86	2780.67	1343.59

Net Present Value: -4594

CCGT/C26

TABLE 029
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	312.96	102.97	19.80	97.89	92.30
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	344.96	101.09	23.52	102.04	118.31
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	354.71	99.24	24.61	104.31	126.54
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	373.23	97.67	25.25	106.21	144.09
2018	237.84	0.00	0.36	0.00	0.00	0.00	238.20	3.51	0.00	352.45	94.88	27.64	108.97	120.95
2019	286.35	0.00	204.33	0.00	0.00	0.00	490.68	5.96	0.00	343.62	92.94	24.95	110.43	115.30
2020	293.68	0.00	317.59	0.00	0.00	0.00	611.27	8.91	0.00	377.79	92.85	19.78	120.34	144.82
2021	811.02	0.00	154.55	0.00	12.08	0.00	977.65	13.68	0.00	386.54	91.75	16.48	128.89	149.42
2022	1304.42	0.00	9.78	0.00	0.80	0.00	1315.01	20.26	6.91	406.60	89.34	68.47	115.32	133.47
2023	1173.36	0.00	0.00	0.00	1.61	0.00	1174.96	26.13	6.91	395.71	87.29	76.61	120.48	111.33
2024	839.47	0.00	0.00	0.00	3.21	0.00	842.68	30.35	6.91	393.90	86.30	82.05	123.19	102.36
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	33.30	6.91	321.75	85.97	68.25	118.26	49.27
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	35.23	21.22	380.89	89.68	56.52	100.67	134.02
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	35.94	21.44	514.16	97.50	41.82	92.86	281.99
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	36.16	21.14	542.72	97.74	42.27	100.66	302.05
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.36	521.81	96.03	46.46	101.02	278.29
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.19	496.03	93.93	49.92	103.82	248.36
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.14	499.65	93.87	46.40	101.57	257.80
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.90	464.34	91.02	53.65	107.16	212.52
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.47	450.17	89.34	58.52	111.11	191.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.47	434.91	87.33	64.67	117.95	164.96
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.51	426.39	85.89	70.17	122.04	148.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	23.23	413.58	84.27	79.81	125.06	124.44
2037	0.00	0.00	110.58	0.00	0.00	0.00	110.58	36.71	20.34	412.89	83.54	83.26	127.45	118.64
2038	0.00	0.00	151.38	0.00	12.08	0.00	163.45	37.53	20.34	406.14	82.37	86.69	134.05	103.03
2039	0.00	0.00	23.00	0.00	0.00	0.00	23.00	37.64	24.32	393.80	80.61	107.66	142.91	62.62
2040	0.00	0.00	112.92	0.00	0.00	0.00	112.92	38.21	24.32	382.02	79.20	117.57	147.71	37.54
2041	0.00	0.00	156.61	0.00	95.12	0.00	251.73	39.46	24.32	370.98	77.89	124.33	154.32	14.43
2042	0.00	0.00	138.00	0.00	0.00	0.00	138.00	40.15	27.66	362.76	76.56	136.62	162.24	-12.66
2043	0.00	0.00	156.70	0.00	0.00	0.00	156.70	40.93	27.66	349.85	75.18	157.75	161.30	-44.38
2044	0.00	0.00	23.82	0.00	0.00	0.00	23.82	41.05	31.64	338.91	73.87	175.07	165.93	-75.97
2045	0.00	0.00	116.93	0.00	0.00	0.00	116.93	41.64	31.64	327.68	72.56	181.77	177.51	-104.16
2046	0.00	0.00	160.02	0.00	80.02	0.00	240.04	42.84	34.55	323.38	71.66	181.96	189.65	-119.89
2047	0.00	0.00	24.32	0.00	0.00	0.00	24.32	42.96	35.65	300.32	70.11	216.54	183.54	-169.87
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.66	317.13	71.44	193.42	183.57	-131.30
2049	0.00	0.00	204.33	0.00	9.87	0.00	214.20	42.96	35.66	317.13	71.44	193.42	183.57	-131.30
2050	0.00	0.00	295.78	0.00	9.87	0.00	305.65	42.96	35.66	317.13	71.44	193.42	183.57	-131.30
2051	0.00	0.00	132.74	0.00	9.87	0.00	142.60	42.96	37.41	317.13	71.44	193.42	183.57	-131.30
2052	0.00	0.00	9.78	0.00	9.87	0.00	19.65	42.96	37.41	317.13	71.44	193.42	183.57	-131.30
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.42	317.13	71.44	193.42	183.57	-131.30
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	317.13	71.44	193.42	183.57	-131.30
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	317.13	71.44	193.42	183.57	-131.30
2056	0.00	0.00	0.00	0.00	12.08	0.00	12.08	42.96	38.58	317.13	71.44	193.42	183.57	-131.30
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	38.58	317.13	71.44	193.42	183.57	-131.30
2067	0.00	0.00	110.58	0.00	0.00	0.00	110.58	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2068	0.00	0.00	151.33	0.00	0.00	0.00	151.33	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2069	0.00	0.00	23.00	0.00	0.00	0.00	23.00	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2070	0.00	0.00	112.92	0.00	0.00	0.00	112.92	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2071	0.00	0.00	154.53	0.00	0.00	0.00	154.53	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2072	0.00	0.00	138.00	0.00	0.80	0.00	138.80	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2073	0.00	0.00	156.70	0.00	13.69	0.00	170.39	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2074	0.00	0.00	23.82	0.00	3.21	0.00	27.03	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2075	0.00	0.00	116.93	0.00	7.23	0.00	124.16	42.96	51.18	317.13	71.44	193.42	183.57	-131.30
2076	0.00	0.00	160.02	0.00	74.56	0.00	234.57	42.96	38.58	317.13	71.44	193.42	183.57	-131.30
2077	0.00	0.00	24.32	0.00	0.00	0.00	24.32	42.96	52.92	317.13	71.44	193.42	183.57	-131.30
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	317.13	71.44	193.42	183.57	-131.30
2079	0.00	0.00	204.33	0.00	0.00	0.00	204.33	42.96	52.92	317.13	71.44	193.42	183.57	-131.30
2080	0.00	0.00	295.78	0.00	0.00	0.00	295.78	42.96	37.43	317.13	71.44	193.42	183.57	-131.30
2081	0.00	0.00	132.74	0.00	60.02	0.00	192.76	42.96	52.92	317.13	71.44	193.42	183.57	-131.30
2082	0.00	0.00	9.78	0.00	0.00	0.00	9.78	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	38.58	317.13	71.44	193.42	183.57	-131.30
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	317.13	71.44	193.42	183.57	-131.30
Salvage Value	5.25	0.00	23.69	0.00	3.34	0.00	32.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	994.61	0.00	113.12	0.00	5493.99	528.43	328.31	7733.49	1782.11	1645.82	2615.05	1690.51

Net Present Value: -4660

Wind/C26

TABLE 030
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	312.96	102.97	19.80	97.89	92.30
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	344.96	101.09	23.52	102.04	118.31
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	354.71	99.24	24.61	104.31	126.54
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	373.23	97.67	25.25	106.20	144.10
2018	237.84	0.00	0.00	0.00	0.00	0.00	237.84	3.51	0.00	352.45	94.88	27.64	108.97	120.95
2019	286.35	0.00	0.00	0.00	0.00	0.00	286.35	4.94	0.00	343.62	92.94	24.95	110.43	115.30
2020	293.68	0.00	0.00	12.81	20.76	0.00	327.25	6.57	0.00	374.45	92.42	21.22	121.45	139.37
2021	811.02	0.00	0.00	391.21	34.60	0.00	1236.83	12.76	0.00	375.97	90.58	20.70	131.56	133.13
2022	1304.42	0.00	0.00	398.53	42.32	0.00	1745.28	21.48	6.21	379.83	88.96	20.76	132.49	137.61
2023	1173.36	0.00	0.00	385.72	22.37	0.00	1581.44	29.39	12.42	376.75	86.51	23.85	136.37	130.01
2024	839.47	0.00	0.00	7.32	10.13	0.00	856.92	33.68	18.63	379.16	84.64	24.57	141.21	128.74
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	36.62	18.63	306.90	84.53	16.18	156.84	49.36
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	38.56	32.93	404.17	88.56	19.25	108.52	187.84
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	39.26	33.15	548.88	96.29	17.35	96.93	338.30
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	39.49	32.86	571.33	96.18	18.99	104.82	351.34
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	33.07	548.16	94.53	19.29	105.98	328.35
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.90	535.45	93.47	18.80	105.56	317.63
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.85	521.60	92.04	19.42	108.13	302.01
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	39.49	32.61	502.02	90.61	19.36	110.34	281.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.18	476.09	89.10	19.23	111.90	255.86
2034	0.00	0.00	130.10	0.00	0.00	0.00	130.10	40.03	32.18	452.14	87.64	19.33	113.77	231.40
2035	0.00	0.00	170.00	0.00	12.08	0.00	182.08	40.83	32.22	443.96	86.64	17.85	117.25	222.23
2036	0.00	0.00	132.34	0.00	0.00	0.00	132.34	41.49	38.93	427.14	84.56	32.78	121.14	188.65
2037	0.00	0.00	150.32	0.00	12.08	0.00	162.40	42.30	36.03	413.52	83.12	37.04	126.23	167.13
2038	0.00	0.00	22.84	0.00	0.00	0.00	22.84	42.42	40.02	406.52	81.86	48.09	130.38	146.19
2039	0.00	0.00	112.14	0.00	0.00	0.00	112.14	42.98	40.02	396.72	80.70	47.33	144.65	124.03
2040	0.00	0.00	155.53	12.81	95.12	0.00	263.47	44.29	40.02	380.49	79.03	60.87	148.29	92.31
2041	0.00	0.00	137.04	391.21	0.00	0.00	528.25	46.93	44.02	370.05	77.64	74.51	153.34	64.56
2042	0.00	0.00	155.61	398.53	0.00	0.00	554.15	49.70	43.36	358.80	76.36	77.89	162.80	41.76
2043	0.00	0.00	138.96	385.72	0.00	0.00	524.68	52.32	47.34	351.38	75.07	86.98	173.83	15.49
2044	0.00	0.00	157.80	7.32	80.02	0.00	245.15	53.55	47.34	335.47	73.72	108.79	171.56	-18.60
2045	0.00	0.00	23.99	0.00	0.00	0.00	23.99	53.67	51.35	325.83	72.45	126.88	176.78	-50.28
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	54.25	314.34	71.19	129.49	191.37	-77.72
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.36	303.35	69.95	131.22	208.91	-106.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.36	314.51	71.20	129.20	192.36	-78.24
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.37	314.51	71.20	129.20	192.36	-78.24
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.38	314.51	71.20	129.20	192.36	-78.24
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	53.12	314.51	71.20	129.20	192.36	-78.24
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	53.13	314.51	71.20	129.20	192.36	-78.24
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	314.51	71.20	129.20	192.36	-78.24
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	314.51	71.20	129.20	192.36	-78.24
2055	0.00	0.00	0.00	0.00	5.19	0.00	5.19	53.67	53.13	314.51	71.20	129.20	192.36	-78.24
2056	0.00	0.00	0.00	0.00	8.65	0.00	8.65	53.67	54.28	314.51	71.20	129.20	192.36	-78.24
2057	0.00	0.00	0.00	0.00	10.38	0.00	10.38	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2058	0.00	0.00	0.00	0.00	5.19	0.00	5.19	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2059	0.00	0.00	0.00	0.00	1.73	0.00	1.73	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2060	0.00	0.00	0.00	12.81	0.00	0.00	12.81	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2061	0.00	0.00	0.00	391.21	0.00	0.00	391.21	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2062	0.00	0.00	0.00	398.53	0.00	0.00	398.53	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2063	0.00	0.00	0.00	385.72	0.00	0.00	385.72	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2064	0.00	0.00	108.29	7.32	0.00	0.00	115.61	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2065	0.00	0.00	148.20	0.00	0.00	0.00	148.20	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2066	0.00	0.00	132.34	0.00	0.00	0.00	132.34	53.67	54.28	314.51	71.20	129.20	192.36	-78.24
2067	0.00	0.00	150.28	0.00	0.00	0.00	150.28	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2068	0.00	0.00	22.84	0.00	0.00	0.00	22.84	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2069	0.00	0.00	112.14	0.00	0.00	0.00	112.14	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2070	0.00	0.00	153.46	0.00	27.65	0.00	181.11	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2071	0.00	0.00	137.04	0.00	25.95	0.00	162.99	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2072	0.00	0.00	155.61	0.00	44.02	0.00	199.63	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2073	0.00	0.00	138.96	0.00	17.18	0.00	156.14	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2074	0.00	0.00	157.80	0.00	8.40	0.00	166.20	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2075	0.00	0.00	23.99	0.00	78.57	0.00	102.56	53.67	66.88	314.51	71.20	129.20	192.36	-78.24
2076	0.00	0.00	0.00	0.00	3.21	0.00	3.21	53.67	54.28	314.51	71.20	129.20	192.36	-78.24
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	68.62	314.51	71.20	129.20	192.36	-78.24
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	314.51	71.20	129.20	192.36	-78.24
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	53.67	68.62	314.51	71.20	129.20	192.36	-78.24
2080	0.00	0.00	0.00	12.81	0.00	0.00	12.81	53.67	53.13	314.51	71.20	129.20	192.36	-78.24
2081	0.00	0.00	0.00	391.21	0.00	0.00	391.21	53.67	68.62	314.51	71.20	129.20	192.36	-78.24
2082	0.00	0.00	0.00	398.53	0.00	0.00	398.53	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2083	0.00	0.00	0.00	385.72	0.00	0.00	385.72	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2084	0.00	0.00	0.00	7.32	9.87	0.00	17.19	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	54.28	314.51	71.20	129.20	192.36	-78.24
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
2090	0.00	0.00	0.00	0.00	23.78	0.00	23.78	53.67	51.39	314.51	71.20	129.20	192.36	-78.24
Salvage Value	5.25	0.00	11.73	17.84	5.41	0.00	40.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	518.88	1245.51	204.97	0.00	6355.62	609.68	505.89	7792.58	1773.33	973.66	2723.24	2322.35

Net Present Value -5149

K19/C25/750MW (WPS Sale &Inv)

TABLE 031
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	3.03	253.83	1.27	0.00	311.23	102.98	19.82	98.34	90.08
2015	85.21	447.43	0.00	0.00	16.99	5.38	555.01	4.04	0.00	341.10	101.10	23.49	102.11	114.39
2016	169.37	590.03	0.00	0.00	22.47	13.57	795.44	8.02	0.00	351.61	99.26	24.63	104.47	123.24
2017	194.90	712.98	0.00	0.00	31.91	19.70	959.49	12.82	0.00	367.37	97.30	26.31	107.43	136.33
2018	232.72	501.27	0.00	0.00	31.33	82.84	848.16	17.06	0.00	351.91	95.21	26.94	108.58	121.18
2019	236.47	357.48	0.00	0.00	39.66	67.68	701.30	20.57	13.01	378.89	95.14	25.52	108.28	149.94
2020	649.94	145.55	0.00	0.00	2.55	128.14	926.17	25.20	44.86	617.12	102.28	20.22	123.67	370.96
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	30.81	42.99	697.22	102.84	22.23	133.26	438.89
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	35.54	41.65	694.56	101.65	22.24	135.74	434.92
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	39.00	39.80	664.06	99.33	22.12	139.94	402.68
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	41.52	38.24	641.23	97.13	24.58	145.52	374.00
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	43.34	50.89	661.04	101.75	21.82	113.58	423.89
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	44.26	49.35	862.16	109.86	21.76	114.33	616.22
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	44.43	47.92	899.07	109.90	21.29	125.05	642.84
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	46.91	889.29	108.23	22.00	128.24	630.82
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	48.20	868.89	106.31	22.04	131.31	609.24
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	43.02	859.25	104.97	21.57	133.01	599.70
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	41.70	846.94	103.31	22.04	136.64	584.95
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	40.22	828.23	101.62	22.09	139.90	564.62
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	39.21	804.17	99.84	22.11	143.08	539.15
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	38.27	781.53	98.11	22.27	147.20	513.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	39.54	741.75	96.43	22.07	143.82	479.43
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	36.10	672.95	94.82	22.47	128.55	427.11
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	44.43	35.57	640.80	93.20	22.58	129.84	395.19
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	35.06	615.74	91.55	22.53	134.49	367.17
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	44.68	37.47	592.43	89.94	22.48	146.19	333.82
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	45.06	34.09	589.00	88.66	21.37	156.31	322.66
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	45.12	36.95	570.11	86.66	38.13	158.02	287.31
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	45.37	36.51	555.62	85.12	42.52	164.06	263.91
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	45.75	36.07	545.01	83.76	44.88	172.02	244.36
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	46.06	41.37	541.23	82.55	51.48	180.82	226.39
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	46.67	43.86	516.67	80.70	66.61	181.87	187.49
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.73	44.56	505.17	79.26	80.82	187.57	157.51
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	43.31	491.59	77.99	84.47	196.24	132.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	42.07	504.47	79.32	77.30	188.56	159.30
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	46.73	44.61	504.47	79.32	77.30	188.56	159.30
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	46.73	43.11	504.47	79.32	77.30	188.56	159.30
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	46.73	42.78	504.47	79.32	77.30	188.56	159.30
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	46.73	42.46	504.47	79.32	77.30	188.56	159.30
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	46.73	42.15	504.47	79.32	77.30	188.56	159.30
2054	0.00	0.00	0.00	0.00	13.81	14.60	28.41	46.73	41.84	504.47	79.32	77.30	188.56	159.30
2055	0.00	0.00	0.00	0.00	0.63	15.14	15.77	46.73	42.71	504.47	79.32	77.30	188.56	159.30
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.73	55.02	504.47	79.32	77.30	188.56	159.30
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	46.73	39.25	504.47	79.32	77.30	188.56	159.30
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	46.73	54.48	504.47	79.32	77.30	188.56	159.30
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	46.73	41.62	504.47	79.32	77.30	188.56	159.30
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	46.73	51.26	504.47	79.32	77.30	188.56	159.30
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	66.75	504.47	79.32	77.30	188.56	159.30
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	46.73	66.75	504.47	79.32	77.30	188.56	159.30
2065	0.00	0.00	0.00	0.00	6.80	3.30	10.10	46.73	38.66	504.47	79.32	77.30	188.56	159.30
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	46.73	66.75	504.47	79.32	77.30	188.56	159.30
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	46.73	66.75	504.47	79.32	77.30	188.56	159.30
2069	0.00	0.00	50.82	0.00	25.85	44.50	121.17	46.73	38.66	504.47	79.32	77.30	188.56	159.30
2070	0.00	0.00	69.13	0.00	1.92	46.15	117.20	46.73	53.00	504.47	79.32	77.30	188.56	159.30
2071	0.00	0.00	10.44	0.00	23.45	0.00	33.90	46.73	37.50	504.47	79.32	77.30	188.56	159.30
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	46.73	53.00	504.47	79.32	77.30	188.56	159.30
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	46.73	36.63	504.47	79.32	77.30	188.56	159.30
2074	0.00	0.00	61.55	0.00	36.88	0.00	98.43	46.73	51.26	504.47	79.32	77.30	188.56	159.30
2075	0.00	0.00	69.47	0.00	54.62	0.00	124.09	46.73	38.66	504.47	79.32	77.30	188.56	159.30
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	46.73	53.00	504.47	79.32	77.30	188.56	159.30
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	37.50	504.47	79.32	77.30	188.56	159.30
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	46.73	53.00	504.47	79.32	77.30	188.56	159.30
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	40.40	504.47	79.32	77.30	188.56	159.30
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	46.73	53.00	504.47	79.32	77.30	188.56	159.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	46.73	38.66	504.47	79.32	77.30	188.56	159.30
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	46.73	35.76	504.47	79.32	77.30	188.56	159.30
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	46.73	38.66	504.47	79.32	77.30	188.56	159.30
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	46.73	38.66	504.47	79.32	77.30	188.56	159.30
Salvage Value	2.09	0.00	4.18	0.00	7.90	3.78	17.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	128.59	0.00	347.09	270.30	6973.03	695.12	651.85	11808.35	1938.98	705.38	2816.45	6347.54

Net Present Value -1972

K19/C25/750MW

TABLE 032
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	4.28	255.09	1.28	0.00	312.22	102.98	19.82	97.95	91.47
2015	85.21	447.43	0.00	0.00	16.99	6.89	556.52	4.06	0.00	343.08	101.10	23.52	102.06	116.40
2016	169.37	590.03	0.00	0.00	22.47	14.21	796.09	8.04	0.00	352.81	99.25	24.59	104.39	124.57
2017	194.90	712.98	0.00	0.00	31.91	19.70	959.49	12.84	0.00	367.62	97.30	26.28	107.35	136.68
2018	232.72	501.27	0.00	0.00	31.33	118.44	883.77	17.25	0.00	350.91	95.20	26.86	108.55	120.29
2019	236.47	357.48	0.00	0.00	39.66	80.56	714.18	20.83	13.01	377.59	95.13	25.49	108.28	148.68
2020	649.94	145.55	0.00	0.00	2.55	228.41	1026.44	25.96	47.98	620.46	102.28	20.19	123.28	374.71
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	31.57	46.21	700.66	102.85	22.38	133.18	442.25
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	36.30	44.90	698.00	101.65	22.24	135.49	438.62
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	39.76	42.92	668.14	99.33	22.12	139.76	406.93
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	42.28	41.22	645.50	97.10	24.63	145.36	378.41
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	44.10	53.76	665.29	101.74	21.85	113.29	428.41
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	45.02	52.09	846.18	109.85	21.85	110.96	603.53
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	45.19	50.55	861.04	109.91	21.13	116.32	613.69
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	49.42	849.74	108.24	21.96	118.84	600.71
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	50.61	831.77	106.31	22.04	122.13	581.30
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	45.33	824.74	104.96	21.59	123.93	574.27
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	43.90	815.39	103.30	22.14	127.59	562.36
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	42.32	799.96	101.61	22.14	131.28	544.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	41.21	779.42	99.85	22.05	134.97	522.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	40.19	760.42	98.12	22.17	139.75	500.37
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	41.37	691.55	96.49	22.28	123.89	448.89
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	37.85	661.63	94.82	22.50	125.41	418.90
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	45.19	37.25	638.65	93.18	22.51	129.14	393.82
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	36.67	614.52	91.55	22.49	133.67	366.81
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	45.45	39.01	592.02	89.94	22.52	145.33	334.23
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	45.82	35.57	588.44	88.66	21.37	155.44	322.97
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	45.88	38.37	569.71	86.66	38.13	157.40	287.52
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	46.13	37.86	555.39	85.12	42.52	163.53	264.21
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	46.51	37.36	544.55	83.76	44.88	171.37	244.53
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	46.82	42.61	540.93	82.55	51.48	180.29	226.62
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	47.43	45.04	516.46	80.70	66.61	181.47	187.69
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	47.49	45.69	504.83	79.26	80.82	187.03	157.71
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	44.39	491.28	77.99	84.47	195.74	133.09
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	43.10	504.19	79.32	77.30	188.08	159.49
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	47.49	45.59	504.19	79.32	77.30	188.08	159.49
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	47.49	44.04	504.19	79.32	77.30	188.08	159.49
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	47.49	43.67	504.19	79.32	77.30	188.08	159.49
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	47.49	43.30	504.19	79.32	77.30	188.08	159.49
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	47.49	42.95	504.19	79.32	77.30	188.08	159.49
2054	0.00	0.00	0.00	0.00	13.81	14.60	28.41	47.49	42.61	504.19	79.32	77.30	188.08	159.49
2055	0.00	0.00	0.00	0.00	0.63	15.14	15.77	47.49	43.43	504.19	79.32	77.30	188.08	159.49
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	47.49	55.71	504.19	79.32	77.30	188.08	159.49
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	47.49	39.90	504.19	79.32	77.30	188.08	159.49
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	47.49	55.10	504.19	79.32	77.30	188.08	159.49
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	47.49	42.21	504.19	79.32	77.30	188.08	159.49
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	47.49	51.26	504.19	79.32	77.30	188.08	159.49
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	66.75	504.19	79.32	77.30	188.08	159.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	47.49	66.75	504.19	79.32	77.30	188.08	159.49
2065	0.00	0.00	0.00	0.00	6.80	3.30	10.10	47.49	38.66	504.19	79.32	77.30	188.08	159.49
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	47.49	66.75	504.19	79.32	77.30	188.08	159.49
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	47.49	66.75	504.19	79.32	77.30	188.08	159.49
2069	0.00	0.00	50.82	0.00	25.85	44.50	121.17	47.49	38.66	504.19	79.32	77.30	188.08	159.49
2070	0.00	0.00	69.13	0.00	1.92	46.15	117.20	47.49	53.00	504.19	79.32	77.30	188.08	159.49
2071	0.00	0.00	10.44	0.00	23.45	0.00	33.90	47.49	37.50	504.19	79.32	77.30	188.08	159.49
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	47.49	53.00	504.19	79.32	77.30	188.08	159.49
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	47.49	36.63	504.19	79.32	77.30	188.08	159.49
2074	0.00	0.00	61.55	0.00	36.88	0.00	98.43	47.49	51.26	504.19	79.32	77.30	188.08	159.49
2075	0.00	0.00	69.47	0.00	54.62	0.00	124.09	47.49	38.66	504.19	79.32	77.30	188.08	159.49
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	47.49	53.00	504.19	79.32	77.30	188.08	159.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	37.50	504.19	79.32	77.30	188.08	159.49
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	47.49	53.00	504.19	79.32	77.30	188.08	159.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	40.40	504.19	79.32	77.30	188.08	159.49
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	47.49	53.00	504.19	79.32	77.30	188.08	159.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	47.49	38.66	504.19	79.32	77.30	188.08	159.49
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	47.49	35.76	504.19	79.32	77.30	188.08	159.49
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	47.49	38.66	504.19	79.32	77.30	188.08	159.49
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	47.49	38.66	504.19	79.32	77.30	188.08	159.49
Salvage Value	2.09	0.00	4.18	0.00	7.90	3.78	17.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	128.59	0.00	347.09	387.48	7090.21	706.95	680.39	11676.08	1938.95	705.41	2770.18	6261.53

Net Present Value -2216

K19/Gas25/750MW (WPS Sale & INV)

TABLE 033
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	3.03	223.47	1.12	0.00	311.23	102.98	19.82	98.34	90.08
2015	0.00	447.43	0.00	0.00	16.99	5.38	469.80	3.47	0.00	341.12	101.11	23.48	102.11	114.42
2016	0.00	590.03	0.00	0.00	22.47	13.57	626.07	6.60	0.00	351.63	99.26	24.62	104.46	123.28
2017	0.00	712.98	0.00	0.00	31.91	19.70	764.59	10.42	0.00	367.67	97.30	26.29	107.39	136.69
2018	0.00	501.27	0.00	0.00	31.33	82.84	615.44	13.50	0.00	352.38	95.20	26.89	108.53	121.77
2019	0.00	357.48	0.00	0.00	37.12	67.68	462.29	15.81	13.01	379.77	95.14	25.50	108.26	150.86
2020	0.00	145.55	0.00	0.00	0.01	128.14	273.69	17.18	44.86	618.54	102.28	20.19	123.54	372.53
2021	0.00	50.36	0.36	0.00	0.00	0.00	50.72	17.43	42.99	699.74	102.84	22.22	133.02	441.66
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.43	41.65	697.31	101.65	22.20	135.46	437.99
2023	0.00	0.00	71.82	0.00	0.00	0.00	71.82	17.68	39.80	664.33	98.83	23.67	140.13	401.71
2024	0.00	0.00	139.90	0.00	6.75	0.00	146.65	18.30	38.24	645.35	96.80	25.97	145.65	376.92
2025	0.00	0.00	80.45	0.00	53.19	0.00	133.64	18.96	40.58	570.21	96.51	25.19	132.15	316.35
2026	0.00	0.00	60.45	0.00	0.00	0.00	60.45	19.26	42.81	583.20	95.20	30.18	138.54	319.28
2027	0.00	0.00	68.23	0.00	0.00	0.00	68.23	19.60	41.52	570.60	93.22	29.59	148.44	299.35
2028	0.00	0.00	10.31	0.00	0.00	0.00	10.31	19.66	44.28	553.39	90.89	44.24	152.98	265.28
2029	0.00	0.00	50.31	0.00	0.00	0.00	50.31	19.91	45.74	537.53	89.10	49.21	159.17	240.05
2030	0.00	0.00	68.44	0.00	44.75	0.00	113.18	20.47	40.62	534.88	88.02	54.22	163.59	229.06
2031	0.00	0.00	60.75	0.00	0.00	0.00	60.75	20.78	43.47	542.47	87.65	59.05	166.37	229.40
2032	0.00	0.00	68.58	0.00	0.00	0.00	68.58	21.12	42.36	521.61	85.28	70.92	175.26	190.16
2033	0.00	0.00	10.36	0.00	0.00	0.00	10.36	21.17	45.27	512.19	83.74	84.97	181.65	161.83
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	44.22	508.64	83.00	89.58	186.26	149.79
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	42.77	435.77	80.86	85.92	179.28	89.71
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	42.23	356.55	79.41	87.59	158.43	31.11
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	41.71	329.27	77.99	95.69	159.84	-4.25
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	41.21	325.57	77.26	94.19	169.64	-15.51
2039	0.00	0.00	102.19	0.00	0.00	0.00	102.19	21.68	43.61	299.78	75.31	115.57	177.11	-68.20
2040	0.00	0.00	147.04	0.00	0.00	0.00	147.04	22.42	40.24	285.20	73.97	127.84	182.89	-99.50
2041	0.00	0.00	65.60	0.00	6.75	0.00	72.35	22.78	39.77	297.06	74.25	127.03	182.70	-86.93
2042	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.80	46.24	342.17	71.97	196.23	184.67	-110.71
2043	0.00	0.00	51.02	0.00	0.00	0.00	51.02	23.06	45.80	319.80	70.24	212.87	192.04	-155.35
2044	0.00	0.00	69.40	0.00	44.75	0.00	114.15	23.63	47.12	296.16	68.62	227.71	199.56	-199.72
2045	0.00	0.00	32.97	0.00	0.00	0.00	32.97	23.79	50.71	285.17	67.30	250.73	205.46	-238.32
2046	0.00	0.00	30.59	0.00	0.00	0.00	30.59	23.95	50.31	272.80	66.11	269.87	211.73	-274.91
2047	0.00	0.00	4.62	0.00	0.00	0.00	4.62	23.97	50.50	266.82	65.30	277.64	222.33	-298.45
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	49.26	274.93	66.24	266.08	213.17	-270.56
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	23.97	51.80	274.93	66.24	266.08	213.17	-270.56
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	23.97	48.56	274.93	66.24	266.08	213.17	-270.56
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	23.97	48.23	274.93	66.24	266.08	213.17	-270.56
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	23.97	47.91	274.93	66.24	266.08	213.17	-270.56
2053	0.00	0.00	50.01	0.00	16.16	14.60	80.77	23.97	47.60	274.93	66.24	266.08	213.17	-270.56
2054	0.00	0.00	118.09	0.00	13.19	14.60	145.87	23.97	47.29	274.93	66.24	266.08	213.17	-270.56
2055	0.00	0.00	78.38	0.00	0.00	15.14	93.52	23.97	47.00	274.93	66.24	266.08	213.17	-270.56
2056	0.00	0.00	60.45	0.00	0.00	0.00	60.45	23.97	62.21	274.93	66.24	266.08	213.17	-270.56
2057	0.00	0.00	68.23	0.00	0.00	0.00	68.23	23.97	46.44	274.93	66.24	266.08	213.17	-270.56
2058	0.00	0.00	10.31	0.00	0.00	0.00	10.31	23.97	61.67	274.93	66.24	266.08	213.17	-270.56
2059	0.00	0.00	50.31	0.00	6.75	0.00	57.06	23.97	48.81	274.93	66.24	266.08	213.17	-270.56
2060	0.00	0.00	68.44	0.00	39.89	0.00	108.33	23.97	58.45	274.93	66.24	266.08	213.17	-270.56
2061	0.00	0.00	60.75	0.00	0.00	0.00	60.75	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2062	0.00	0.00	68.58	0.00	0.00	0.00	68.58	23.97	58.45	274.93	66.24	266.08	213.17	-270.56
2063	0.00	0.00	10.36	0.00	0.00	0.00	10.36	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	23.97	58.45	274.93	66.24	266.08	213.17	-270.56
2065	0.00	0.00	0.00	0.00	40.36	3.30	43.66	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	23.97	58.45	274.93	66.24	266.08	213.17	-270.56
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	23.97	58.45	274.93	66.24	266.08	213.17	-270.56
2069	0.00	0.00	102.19	0.00	23.93	44.50	170.63	23.97	45.85	274.93	66.24	266.08	213.17	-270.56
2070	0.00	0.00	147.04	0.00	0.01	46.15	193.20	23.97	44.69	274.93	66.24	266.08	213.17	-270.56
2071	0.00	0.00	65.60	0.00	0.00	0.00	65.60	23.97	44.69	274.93	66.24	266.08	213.17	-270.56
2072	0.00	0.00	4.80	0.00	0.00	0.00	4.80	23.97	44.69	274.93	66.24	266.08	213.17	-270.56
2073	0.00	0.00	51.02	0.00	0.00	0.00	51.02	23.97	43.82	274.93	66.24	266.08	213.17	-270.56
2074	0.00	0.00	69.40	0.00	0.00	0.00	69.40	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2075	0.00	0.00	32.97	0.00	13.30	0.00	46.27	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2076	0.00	0.00	30.59	0.00	6.75	0.00	37.34	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2077	0.00	0.00	4.62	0.00	0.00	0.00	4.62	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	23.97	45.85	274.93	66.24	266.08	213.17	-270.56
2080	0.00	0.00	0.00	0.00	11.19	0.00	11.19	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2083	0.00	0.00	50.01	0.00	0.00	0.00	50.01	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2084	0.00	0.00	118.09	0.00	10.44	0.54	129.07	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2085	0.00	0.00	78.38	0.00	10.19	1.08	89.64	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2086	0.00	0.00	60.45	0.00	21.65	3.24	85.35	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2087	0.00	0.00	68.23	0.00	24.82	4.87	97.92	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2088	0.00	0.00	10.31	0.00	16.16	14.60	41.07	23.97	42.95	274.93	66.24	266.08	213.17	-270.56
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	23.97	45.85	274.93	66.24	266.08	213.17	-270.56
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	23.97	45.85	274.93	66.24	266.08	213.17	-270.56
Salvage Value	0.00	0.00	13.83	0.00	4.53	3.78	22.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	603.69	0.00	232.96	270.30	3719.40	357.06	675.38	8748.00	1774.09	1896.73	3129.33	1947.85

Net Present Value -2804

K19/C31/750MW

TABLE 034
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	201.82	0.00	0.00	18.63	4.28	254.46	1.27	0.00	312.22	102.98	19.82	97.95	91.47
2015	37.44	447.43	0.00	0.00	16.99	6.89	508.74	3.82	0.00	343.08	101.10	23.52	102.06	116.40
2016	10.52	590.03	0.00	0.00	22.47	14.21	637.24	7.00	0.00	352.81	99.25	24.59	104.39	124.57
2017	10.55	712.98	0.00	0.00	31.91	19.70	775.14	10.88	0.00	368.02	97.30	26.28	107.35	137.08
2018	12.50	501.27	0.00	0.00	31.33	118.44	663.55	14.20	0.00	351.36	95.18	26.85	108.49	120.83
2019	12.54	357.48	0.00	0.00	37.12	80.56	487.70	16.63	13.01	378.40	95.12	25.54	108.25	149.49
2020	12.58	145.55	0.00	0.00	0.01	228.41	386.54	18.57	47.98	621.96	102.27	20.24	123.16	376.30
2021	15.86	50.36	0.00	0.00	0.00	0.00	66.22	18.90	46.21	702.77	102.83	22.34	132.88	444.73
2022	149.25	0.00	0.00	0.00	0.00	0.00	149.25	19.64	44.90	701.08	101.66	22.22	135.15	442.04
2023	229.26	0.00	0.00	0.00	0.00	0.00	229.26	20.79	42.92	666.93	98.72	23.93	140.21	404.07
2024	245.84	0.00	0.00	0.00	0.00	0.00	245.84	22.02	41.22	647.32	96.62	26.62	146.62	377.47
2025	248.58	0.00	0.00	0.00	2.54	0.00	251.12	23.28	39.45	571.08	96.53	19.18	139.38	315.99
2026	669.49	0.00	0.00	0.00	2.54	0.00	672.03	26.64	37.57	551.71	94.63	19.80	152.90	284.38
2027	1059.04	0.00	0.00	0.00	30.99	0.00	1090.03	32.09	36.17	505.81	92.70	18.64	151.36	243.11
2028	948.10	0.00	0.00	0.00	16.22	0.00	964.31	36.91	34.83	484.10	91.13	19.36	164.55	209.06
2029	675.08	0.00	0.00	0.00	27.35	0.00	702.43	40.42	36.18	468.22	89.51	19.93	181.32	177.46
2030	466.18	0.00	0.00	0.00	47.55	0.00	513.73	42.99	30.95	464.17	88.18	20.37	195.22	160.40
2031	305.31	0.00	0.00	0.00	62.94	0.00	368.25	44.83	44.00	545.01	92.22	23.54	122.12	307.13
2032	112.12	0.00	0.00	0.00	73.72	0.00	185.84	45.76	43.00	725.20	99.46	23.12	117.91	484.71
2033	35.28	0.00	0.00	0.00	0.00	0.00	35.28	45.93	41.68	783.08	99.93	22.61	135.32	525.22
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	40.76	760.57	98.13	22.16	139.66	500.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	39.05	690.45	96.49	22.14	123.81	448.00
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	38.38	661.56	94.82	22.63	125.40	418.71
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	45.93	37.61	639.08	93.19	22.57	129.17	394.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	36.66	614.58	91.55	22.48	133.67	366.88
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	46.19	39.07	592.11	89.95	22.51	145.33	334.32
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	46.57	35.74	588.44	88.66	21.37	155.45	322.95
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	46.62	41.92	569.71	86.66	38.13	157.39	287.53
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	46.88	38.52	555.39	85.12	42.52	163.54	264.20
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	47.26	38.02	544.55	83.76	44.88	171.38	244.52
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	47.56	43.27	540.93	82.55	51.48	180.28	226.63
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	48.18	42.80	516.46	80.70	66.61	181.47	187.69
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	48.23	46.35	504.83	79.26	80.82	187.04	157.70
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	44.39	491.28	77.99	84.47	195.74	133.09
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	43.10	504.19	79.32	77.30	188.08	159.49
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	48.23	45.59	504.19	79.32	77.30	188.08	159.49
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	48.23	42.30	504.19	79.32	77.30	188.08	159.49
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	48.23	44.82	504.19	79.32	77.30	188.08	159.49
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	48.23	41.57	504.19	79.32	77.30	188.08	159.49
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	48.23	41.22	504.19	79.32	77.30	188.08	159.49
2054	0.00	0.00	0.00	0.00	13.19	14.60	27.78	48.23	40.87	504.19	79.32	77.30	188.08	159.49
2055	0.00	0.00	0.00	0.00	0.00	15.14	15.14	48.23	40.54	504.19	79.32	77.30	188.08	159.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	57.45	504.19	79.32	77.30	188.08	159.49
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	41.64	504.19	79.32	77.30	188.08	159.49
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	56.83	504.19	79.32	77.30	188.08	159.49
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	43.95	504.19	79.32	77.30	188.08	159.49
2060	0.00	0.00	0.00	0.00	0.63	0.00	0.63	48.23	53.00	504.19	79.32	77.30	188.08	159.49
2061	0.00	0.00	0.00	0.00	0.63	0.00	0.63	48.23	38.66	504.19	79.32	77.30	188.08	159.49
2062	0.00	0.00	0.00	0.00	7.54	0.00	7.54	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2063	0.00	0.00	0.00	0.00	3.77	0.00	3.77	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2064	0.00	0.00	0.00	0.00	14.47	1.65	16.12	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2065	0.00	0.00	0.00	0.00	17.48	3.30	20.77	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2066	0.00	0.00	0.00	0.00	15.89	9.89	25.78	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2067	0.00	0.00	0.00	0.00	25.30	14.83	40.14	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	48.23	66.75	504.19	79.32	77.30	188.08	159.49
2069	0.00	0.00	50.82	0.00	23.93	44.50	119.25	48.23	38.66	504.19	79.32	77.30	188.08	159.49
2070	0.00	0.00	69.13	0.00	0.01	46.15	115.28	48.23	53.00	504.19	79.32	77.30	188.08	159.49
2071	0.00	0.00	10.44	0.00	0.00	0.00	10.44	48.23	40.40	504.19	79.32	77.30	188.08	159.49
2072	0.00	0.00	50.97	0.00	0.00	0.00	50.97	48.23	53.00	504.19	79.32	77.30	188.08	159.49
2073	0.00	0.00	69.33	0.00	0.00	0.00	69.33	48.23	36.63	504.19	79.32	77.30	188.08	159.49
2074	0.00	0.00	61.55	0.00	0.00	0.00	61.55	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2075	0.00	0.00	69.47	0.00	8.67	0.00	78.14	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2076	0.00	0.00	10.50	0.00	1.91	0.00	12.41	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2077	0.00	0.00	0.00	0.00	23.45	0.00	23.45	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2078	0.00	0.00	0.00	0.00	19.20	0.00	19.20	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2079	0.00	0.00	0.00	0.00	21.07	0.00	21.07	48.23	38.66	504.19	79.32	77.30	188.08	159.49
2080	0.00	0.00	0.00	0.00	76.77	0.00	76.77	48.23	51.26	504.19	79.32	77.30	188.08	159.49
2081	0.00	0.00	0.00	0.00	47.87	0.00	47.87	48.23	38.66	504.19	79.32	77.30	188.08	159.49
2082	0.00	0.00	0.00	0.00	55.51	0.00	55.51	48.23	53.00	504.19	79.32	77.30	188.08	159.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	37.50	504.19	79.32	77.30	188.08	159.49
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	48.23	53.00	504.19	79.32	77.30	188.08	159.49
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	48.23	37.50	504.19	79.32	77.30	188.08	159.49
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	48.23	53.00	504.19	79.32	77.30	188.08	159.49
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	48.23	35.76	504.19	79.32	77.30	188.08	159.49
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	48.23	38.66	504.19	79.32	77.30	188.08	159.49
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	48.23	38.66	504.19	79.32	77.30	188.08	159.49
Salvage Value	15.21	0.00	4.18	0.00	8.81	3.78	31.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	2783.06	2612.45	128.59	0.00	300.62	387.48	6212.19	617.20	634.27	10609.85	1887.85	702.17	2903.34	5116.50

Net Present Value -2347

K19/Gas31/750MW | **TABLE 035** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	4.28	224.73	1.12	0.00	312.22	102.98	19.82	97.95	91.47
2015	0.00	447.43	0.00	0.00	16.99	6.89	471.30	3.48	0.00	343.08	101.10	23.52	102.06	116.40
2016	0.00	590.03	0.00	0.00	22.47	14.21	626.72	6.61	0.00	352.81	99.25	24.59	104.39	124.57
2017	0.00	712.98	0.00	0.00	31.91	19.70	764.59	10.44	0.00	368.02	97.30	26.28	107.35	137.08
2018	0.00	501.27	0.00	0.00	31.33	118.44	651.05	13.69	0.00	351.36	95.18	26.85	108.49	120.83
2019	0.00	357.48	0.00	0.00	37.12	80.56	475.16	16.07	13.01	378.40	95.12	25.54	108.25	149.49
2020	0.00	145.55	0.00	0.00	0.01	228.41	373.96	17.94	47.98	621.96	102.27	20.24	123.16	376.30
2021	0.00	50.36	0.00	0.00	0.00	0.00	50.36	18.19	46.21	702.77	102.83	22.34	132.88	444.73
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	44.90	701.03	101.66	22.24	135.18	441.94
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	42.92	667.47	98.72	23.93	140.19	404.63
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	41.22	648.20	96.62	26.64	146.54	378.41
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	39.45	573.30	96.52	19.20	139.74	317.84
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	37.57	556.00	94.62	19.93	153.75	287.70
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	18.19	36.17	511.22	92.69	18.70	152.06	247.77
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.19	34.83	492.18	91.11	19.36	166.34	215.37
2029	0.00	0.00	122.43	0.00	0.00	0.00	122.43	18.69	36.18	474.77	89.58	19.63	181.17	184.41
2030	0.00	0.00	209.04	0.00	13.51	0.00	222.55	19.70	30.95	477.17	88.98	17.48	190.98	179.73
2031	0.00	0.00	91.26	0.00	53.19	0.00	144.45	20.41	37.66	465.70	86.82	40.26	154.94	183.68
2032	0.00	0.00	60.81	0.00	0.00	0.00	60.81	20.71	40.44	455.29	85.25	51.12	159.61	159.32
2033	0.00	0.00	68.64	0.00	0.00	0.00	68.64	21.06	39.27	441.06	83.80	56.20	165.19	135.86
2034	0.00	0.00	10.37	0.00	0.00	0.00	10.37	21.11	42.11	441.27	83.01	60.94	171.52	125.81
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.11	40.58	366.35	80.89	73.81	152.84	58.81
2036	0.00	0.00	101.88	0.00	0.00	0.00	101.88	21.62	39.95	340.55	79.46	80.63	154.42	26.03
2037	0.00	0.00	146.60	0.00	0.00	0.00	146.60	22.35	39.36	325.72	78.14	88.21	159.19	0.18
2038	0.00	0.00	65.40	0.00	44.75	0.00	110.14	22.90	38.79	333.31	78.02	81.56	168.95	4.78
2039	0.00	0.00	4.79	0.00	0.00	0.00	4.79	22.92	48.06	380.65	75.73	158.73	169.92	-23.73
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.92	44.62	357.75	73.85	171.82	177.53	-65.45
2041	0.00	0.00	50.92	0.00	0.00	0.00	50.92	23.18	44.09	340.46	72.39	184.16	183.61	-99.69
2042	0.00	0.00	171.76	0.00	0.00	0.00	171.76	24.04	43.58	324.55	71.04	198.01	189.54	-134.03
2043	0.00	0.00	157.95	0.00	0.00	0.00	157.95	24.83	47.08	319.58	70.18	210.44	195.08	-156.12
2044	0.00	0.00	65.79	0.00	44.75	0.00	110.54	25.38	48.34	318.09	69.87	201.73	205.56	-159.06
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	25.40	54.81	367.45	67.87	289.98	195.55	-185.95
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	54.37	353.04	66.68	303.83	201.17	-218.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	53.07	331.09	65.42	316.22	206.93	-257.48
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	51.78	350.53	66.66	303.34	201.21	-220.69
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	25.40	54.27	350.53	66.66	303.34	201.21	-220.69
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	25.40	50.99	350.53	66.66	303.34	201.21	-220.69
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	25.40	50.61	350.53	66.66	303.34	201.21	-220.69
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	25.40	50.25	350.53	66.66	303.34	201.21	-220.69
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	25.40	49.89	350.53	66.66	303.34	201.21	-220.69
2054	0.00	0.00	0.00	0.00	13.19	14.60	27.78	25.40	49.55	350.53	66.66	303.34	201.21	-220.69
2055	0.00	0.00	0.00	0.00	0.00	15.14	15.14	25.40	49.22	350.53	66.66	303.34	201.21	-220.69
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	64.39	350.53	66.66	303.34	201.21	-220.69
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	48.58	350.53	66.66	303.34	201.21	-220.69
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	63.78	350.53	66.66	303.34	201.21	-220.69
2059	0.00	0.00	100.62	0.00	0.00	0.00	100.62	25.40	50.89	350.53	66.66	303.34	201.21	-220.69
2060	0.00	0.00	187.24	0.00	0.00	0.00	187.24	25.40	59.94	350.53	66.66	303.34	201.21	-220.69
2061	0.00	0.00	89.19	0.00	0.00	0.00	89.19	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2062	0.00	0.00	60.81	0.00	0.00	0.00	60.81	25.40	59.94	350.53	66.66	303.34	201.21	-220.69
2063	0.00	0.00	68.64	0.00	0.00	0.00	68.64	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2064	0.00	0.00	10.37	0.00	8.19	1.65	20.21	25.40	59.94	350.53	66.66	303.34	201.21	-220.69
2065	0.00	0.00	0.00	0.00	20.31	3.30	23.61	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2066	0.00	0.00	101.88	0.00	40.71	9.89	152.48	25.40	59.94	350.53	66.66	303.34	201.21	-220.69
2067	0.00	0.00	146.60	0.00	7.09	14.83	168.53	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2068	0.00	0.00	65.40	0.00	15.17	44.50	125.07	25.40	59.94	350.53	66.66	303.34	201.21	-220.69
2069	0.00	0.00	4.79	0.00	23.93	44.50	73.23	25.40	47.34	350.53	66.66	303.34	201.21	-220.69
2070	0.00	0.00	0.00	0.00	0.01	46.15	46.16	25.40	46.18	350.53	66.66	303.34	201.21	-220.69
2071	0.00	0.00	50.92	0.00	0.00	0.00	50.92	25.40	46.18	350.53	66.66	303.34	201.21	-220.69
2072	0.00	0.00	171.76	0.00	0.00	0.00	171.76	25.40	46.18	350.53	66.66	303.34	201.21	-220.69
2073	0.00	0.00	157.95	0.00	33.56	0.00	191.51	25.40	45.31	350.53	66.66	303.34	201.21	-220.69
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2075	0.00	0.00	4.82	0.00	0.00	0.00	4.82	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	25.40	47.34	350.53	66.66	303.34	201.21	-220.69
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2081	0.00	0.00	0.00	0.00	13.30	0.00	13.30	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2088	0.00	0.00	0.00	0.00	27.35	14.60	41.95	25.40	44.44	350.53	66.66	303.34	201.21	-220.69
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	25.40	47.34	350.53	66.66	303.34	201.21	-220.69
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	25.40	47.34	350.53	66.66	303.34	201.21	-220.69
Salvage Value	0.00	0.00	7.91	0.00	4.93	3.78	16.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	555.55	0.00	216.03	387.48	3771.51	364.12	668.78	8849.35	1775.34	1972.76	3090.27	2010.97

Net Present Value -2793

K19/C25/250MW

TABLE 036
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	3.79	254.59	1.29	0.00	312.22	102.98	19.82	97.95	91.47
2015	85.21	447.43	0.00	0.00	16.99	2.35	551.98	4.05	0.00	343.08	101.10	23.52	102.06	116.40
2016	169.37	590.03	0.00	0.00	22.47	2.85	784.72	7.97	0.00	352.81	99.25	24.59	104.39	124.57
2017	194.90	712.98	0.00	0.00	31.91	4.27	944.06	12.69	0.00	367.62	97.30	26.28	107.35	136.68
2018	232.72	501.27	0.00	0.00	31.33	12.81	778.14	16.58	0.00	347.14	94.61	28.84	109.36	114.33
2019	236.47	357.48	0.00	0.00	39.66	12.81	646.43	19.81	13.01	370.88	94.25	28.94	109.48	138.21
2020	649.94	145.55	0.00	0.00	2.55	13.28	811.32	23.87	13.22	583.26	102.60	20.76	110.86	349.04
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	29.48	12.98	648.62	103.20	21.25	117.48	406.69
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	34.22	13.20	636.66	101.30	22.22	121.05	392.08
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	37.67	13.02	620.72	99.11	22.25	129.22	370.13
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	40.20	12.98	609.09	96.79	24.70	139.70	347.89
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	42.01	27.06	615.43	101.54	22.01	100.62	391.25
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	42.93	26.87	774.21	109.20	21.59	96.64	546.78
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	43.10	26.75	771.31	108.62	20.42	99.65	542.63
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	27.03	757.22	106.89	21.24	102.02	527.08
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	29.55	737.79	105.11	21.41	103.36	507.91
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.57	728.42	103.83	21.16	103.81	499.61
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.40	714.64	102.21	21.61	105.75	485.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.04	696.87	100.58	21.78	108.09	466.42
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.11	674.48	98.91	21.87	109.95	443.75
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.22	652.84	97.27	22.05	112.44	421.08
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	27.29	614.70	95.66	22.21	110.02	386.81
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	43.10	24.39	586.75	94.08	22.53	111.45	358.69
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	24.39	561.79	92.52	22.48	113.66	333.12
2038	0.00	0.00	72.57	0.00	0.00	0.00	72.57	43.36	24.39	535.38	90.97	22.45	116.61	305.35
2039	0.00	0.00	90.86	0.00	6.75	0.00	97.62	43.74	27.29	527.00	89.78	21.22	128.94	287.06
2040	0.00	0.00	10.43	0.00	0.00	0.00	10.43	43.79	28.37	510.17	87.77	37.23	132.64	252.54
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.79	27.72	496.78	86.25	41.81	138.08	230.64
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	44.04	27.72	485.90	84.92	44.49	143.98	212.51
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	44.42	27.72	473.37	83.53	44.21	153.17	192.46
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	44.73	33.44	461.65	81.97	66.87	152.99	159.82
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	45.35	36.33	447.14	80.56	73.63	159.06	133.90
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	45.40	37.43	438.64	79.19	83.60	167.98	107.86
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	36.57	424.38	77.79	84.57	180.84	81.17
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.70	436.72	79.18	80.60	169.29	107.64
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	45.40	38.59	436.72	79.18	80.60	169.29	107.64
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	45.40	37.44	436.72	79.18	80.60	169.29	107.64
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	45.40	37.45	436.72	79.18	80.60	169.29	107.64
2052	0.00	0.00	0.00	0.00	24.82	1.05	25.87	45.40	37.45	436.72	79.18	80.60	169.29	107.64
2053	0.00	0.00	0.00	0.00	16.16	3.16	19.33	45.40	37.46	436.72	79.18	80.60	169.29	107.64
2054	0.00	0.00	0.00	0.00	13.81	3.16	16.98	45.40	37.46	436.72	79.18	80.60	169.29	107.64
2055	0.00	0.00	0.00	0.00	0.63	3.28	3.91	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	45.40	51.21	436.72	79.18	80.60	169.29	107.64
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	45.40	51.21	436.72	79.18	80.60	169.29	107.64
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	45.40	51.21	436.72	79.18	80.60	169.29	107.64
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	66.71	436.72	79.18	80.60	169.29	107.64
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2064	0.00	0.00	0.00	0.00	8.19	3.67	11.86	45.40	66.71	436.72	79.18	80.60	169.29	107.64
2065	0.00	0.00	0.00	0.00	6.80	2.12	8.92	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2066	0.00	0.00	0.00	0.00	0.82	2.14	2.96	45.40	66.71	436.72	79.18	80.60	169.29	107.64
2067	0.00	0.00	0.00	0.00	7.09	3.21	10.31	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2068	0.00	0.00	50.76	0.00	15.17	9.64	75.58	45.40	66.71	436.72	79.18	80.60	169.29	107.64
2069	0.00	0.00	69.06	0.00	25.85	9.64	104.55	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2070	0.00	0.00	10.43	0.00	1.92	10.00	22.36	45.40	52.95	436.72	79.18	80.60	169.29	107.64
2071	0.00	0.00	0.00	0.00	23.45	0.00	23.45	45.40	37.46	436.72	79.18	80.60	169.29	107.64
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	45.40	52.95	436.72	79.18	80.60	169.29	107.64
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	45.40	36.59	436.72	79.18	80.60	169.29	107.64
2074	0.00	0.00	61.55	0.00	43.63	0.00	105.18	45.40	51.21	436.72	79.18	80.60	169.29	107.64
2075	0.00	0.00	69.47	0.00	47.87	0.00	117.34	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	45.40	52.95	436.72	79.18	80.60	169.29	107.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	37.46	436.72	79.18	80.60	169.29	107.64
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	45.40	52.95	436.72	79.18	80.60	169.29	107.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.35	436.72	79.18	80.60	169.29	107.64
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	45.40	52.95	436.72	79.18	80.60	169.29	107.64
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2084	0.00	0.00	0.00	0.00	10.44	0.12	10.55	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2087	0.00	0.00	0.00	0.00	24.82	1.05	25.87	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2088	0.00	0.00	0.00	0.00	16.16	3.16	19.33	45.40	35.72	436.72	79.18	80.60	169.29	107.64
2089	0.00	0.00	0.00	0.00	13.19	3.16	16.35	45.40	38.62	436.72	79.18	80.60	169.29	107.64
2090	0.00	0.00	0.00	0.00	0.00	3.28	3.28	45.40	38.62	436.72	79.18	80.60	169.29	107.64
Salvage Value	2.09	0.00	4.07	0.00	7.89	0.96	15.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	131.57	0.00	347.21	49.75	6755.57	674.30	426.24	10603.08	1931.10	729.93	2514.10	5427.96

Net Present Value -2428

K19/Gas24/250MW

TABLE 037
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	3.79	224.23	1.14	0.00	312.22	102.98	19.82	97.95	91.47
2015	0.00	447.43	0.00	0.00	16.99	2.35	466.77	3.47	0.00	343.08	101.10	23.52	102.07	116.39
2016	0.00	590.03	0.00	0.00	22.47	2.85	615.35	6.55	0.00	352.81	99.25	24.59	104.39	124.57
2017	0.00	712.98	0.00	0.00	31.91	4.27	749.16	10.29	0.00	368.02	97.30	26.28	107.35	137.08
2018	0.00	501.27	0.00	0.00	31.33	12.81	545.41	13.02	0.00	347.69	94.61	28.80	109.30	114.99
2019	0.00	357.48	0.00	0.00	37.12	12.81	407.41	15.06	13.01	371.77	94.25	28.94	109.45	139.13
2020	0.00	145.55	0.36	0.00	0.01	13.28	159.20	15.85	13.22	584.79	102.60	20.77	110.79	350.63
2021	0.00	50.36	0.00	0.00	0.00	0.00	50.36	16.10	12.98	651.09	103.18	21.26	117.30	409.35
2022	0.00	0.00	71.77	0.00	0.00	0.00	71.77	16.35	13.20	643.16	101.74	20.99	119.46	400.97
2023	0.00	0.00	89.77	0.00	6.75	0.00	96.52	16.73	13.02	635.90	100.66	17.68	121.88	395.68
2024	0.00	0.00	10.27	0.00	0.00	0.00	10.27	16.78	16.96	629.30	98.82	28.79	124.19	377.51
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	16.78	16.74	517.61	96.57	21.81	118.03	281.20
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.78	16.33	493.80	94.29	24.75	122.48	252.28
2027	0.00	0.00	50.21	0.00	0.00	0.00	50.21	17.03	16.35	459.90	92.23	26.90	124.74	216.04
2028	0.00	0.00	70.38	0.00	53.19	0.00	123.57	17.63	16.42	442.83	90.43	31.11	129.17	192.12
2029	0.00	0.00	111.49	0.00	0.00	0.00	111.49	18.19	23.11	433.36	88.69	43.02	133.62	168.03
2030	0.00	0.00	145.58	0.00	0.00	0.00	145.58	18.92	19.18	432.31	87.78	46.71	136.25	161.57
2031	0.00	0.00	64.94	0.00	6.75	0.00	71.70	19.28	19.18	446.45	88.36	40.01	135.71	182.36
2032	0.00	0.00	4.76	0.00	0.00	0.00	4.76	19.30	26.09	473.14	85.80	97.30	131.36	158.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	26.10	461.12	84.29	105.18	135.43	136.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	26.10	449.99	82.81	114.22	140.18	112.78
2035	0.00	0.00	101.78	0.00	0.00	0.00	101.78	19.81	25.45	385.60	80.80	114.36	138.21	52.23
2036	0.00	0.00	146.46	0.00	0.00	0.00	146.46	20.54	25.46	359.88	79.33	122.48	139.00	19.08
2037	0.00	0.00	65.33	0.00	0.00	0.00	65.33	20.87	25.46	369.35	79.76	117.96	136.42	35.21
2038	0.00	0.00	106.87	0.00	0.00	0.00	106.87	21.40	32.37	395.52	77.33	183.67	134.90	-0.38
2039	0.00	0.00	146.90	0.00	0.00	0.00	146.90	22.14	35.27	383.24	75.95	196.21	145.74	-34.67
2040	0.00	0.00	65.53	0.00	44.75	0.00	110.28	22.69	32.37	379.78	75.37	201.96	147.95	-45.49
2041	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.71	39.30	410.45	73.49	266.79	143.74	-73.56
2042	0.00	0.00	102.50	0.00	0.00	0.00	102.50	23.23	39.30	396.48	71.70	288.56	149.41	-113.20
2043	0.00	0.00	147.49	0.00	0.00	0.00	147.49	23.96	39.30	386.20	70.39	304.80	153.90	-142.89
2044	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.29	41.04	370.45	69.89	302.37	155.24	-157.04
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	24.32	47.96	394.58	67.58	379.02	153.64	-205.66
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	47.96	399.93	67.77	377.09	151.89	-196.82
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	47.10	370.09	65.81	400.48	158.20	-254.40
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	24.32	49.14	388.20	67.05	385.53	154.58	-218.96
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2052	0.00	0.00	49.96	0.00	24.82	1.05	75.83	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2053	0.00	0.00	67.96	0.00	16.16	3.16	87.29	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2054	0.00	0.00	10.27	0.00	13.19	3.16	26.62	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2055	0.00	0.00	0.00	0.00	0.00	3.28	3.28	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2057	0.00	0.00	50.21	0.00	0.00	0.00	50.21	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2058	0.00	0.00	68.30	0.00	6.75	0.00	75.06	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2059	0.00	0.00	111.49	0.00	0.00	0.00	111.49	24.32	49.14	388.20	67.05	385.53	154.58	-218.96
2060	0.00	0.00	145.58	0.00	0.00	0.00	145.58	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2061	0.00	0.00	64.94	0.00	0.00	0.00	64.94	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2062	0.00	0.00	4.76	0.00	0.00	0.00	4.76	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2063	0.00	0.00	0.00	0.00	39.89	2.80	42.69	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2064	0.00	0.00	0.00	0.00	8.19	3.67	11.86	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2065	0.00	0.00	101.78	0.00	6.80	2.12	110.70	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2066	0.00	0.00	146.46	0.00	7.57	2.14	156.17	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2067	0.00	0.00	65.33	0.00	7.09	3.21	75.64	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2068	0.00	0.00	106.87	0.00	15.17	9.64	131.69	24.32	61.73	388.20	67.05	385.53	154.58	-218.96
2069	0.00	0.00	146.90	0.00	23.93	9.64	180.48	24.32	49.14	388.20	67.05	385.53	154.58	-218.96
2070	0.00	0.00	65.53	0.00	0.01	10.00	75.54	24.32	47.98	388.20	67.05	385.53	154.58	-218.96
2071	0.00	0.00	4.80	0.00	0.00	0.00	4.80	24.32	47.98	388.20	67.05	385.53	154.58	-218.96
2072	0.00	0.00	102.50	0.00	0.00	0.00	102.50	24.32	47.98	388.20	67.05	385.53	154.58	-218.96
2073	0.00	0.00	147.49	0.00	0.00	0.00	147.49	24.32	47.11	388.20	67.05	385.53	154.58	-218.96
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2075	0.00	0.00	4.82	0.00	33.56	0.00	38.38	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2078	0.00	0.00	0.00	0.00	13.30	0.00	13.30	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	49.14	388.20	67.05	385.53	154.58	-218.96
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2082	0.00	0.00	49.96	0.00	0.00	0.00	49.96	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2083	0.00	0.00	67.96	0.00	0.00	0.00	67.96	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2084	0.00	0.00	10.27	0.00	10.44	0.12	20.82	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2087	0.00	0.00	50.21	0.00	24.82	1.05	76.08	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2088	0.00	0.00	68.30	0.00	16.16	3.16	87.63	24.32	46.24	388.20	67.05	385.53	154.58	-218.96
2089	0.00	0.00	10.32	0.00	13.19	3.16	26.67	24.32	49.14	388.20	67.05	385.53	154.58	-218.96
2090	0.00	0.00	0.00	0.00	11.19	3.28	14.47	24.32	49.14	388.20	67.05	385.53	154.58	-218.96
Salvage Value	0.00	0.00	14.46	0.00	4.32	0.96	19.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	726.87	0.00	209.14	49.75	3598.20	343.78	445.49	8827.68	1779.44	2581.74	2607.54	1858.95

Net Present Value -2529

K19/C31/250MW | **TABLE 038** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	201.82	0.00	0.00	18.63	3.79	253.97	1.28	0.00	312.22	102.98	19.82	97.95	91.47
2015	37.44	447.43	0.00	0.00	16.99	2.35	504.20	3.80	0.00	343.08	101.10	23.52	102.07	116.39
2016	10.52	590.03	0.00	0.00	22.47	2.85	625.87	6.93	0.00	352.81	99.25	24.59	104.39	124.57
2017	10.55	712.98	0.00	0.00	31.91	4.27	759.71	10.73	0.00	368.02	97.30	26.28	107.35	137.08
2018	12.50	501.27	0.00	0.00	31.33	12.81	557.92	13.52	0.00	347.69	94.61	28.80	109.30	114.99
2019	12.54	357.48	0.00	0.00	37.12	12.81	419.95	15.62	13.01	371.77	94.25	28.94	109.45	139.13
2020	12.58	145.55	0.36	0.00	0.01	13.28	171.78	16.48	13.22	584.79	102.60	20.77	110.79	350.63
2021	15.86	50.36	0.00	0.00	0.00	0.00	66.22	16.81	12.98	651.09	103.18	21.26	117.30	409.35
2022	149.25	0.00	71.77	0.00	0.00	0.00	221.02	17.81	13.20	643.04	101.73	21.02	119.49	400.81
2023	229.26	0.00	89.77	0.00	6.75	0.00	325.78	19.33	13.02	635.31	100.62	17.83	122.08	394.77
2024	245.84	0.00	10.27	0.00	0.00	0.00	256.11	20.61	16.96	628.62	98.79	28.97	124.50	376.36
2025	248.58	0.00	0.00	0.00	2.54	0.00	251.12	21.86	16.74	516.28	96.54	21.88	118.32	279.54
2026	669.49	0.00	0.00	0.00	2.54	0.00	672.03	25.22	16.33	492.72	94.28	24.95	122.84	250.65
2027	1059.04	0.00	50.21	0.00	30.99	0.00	1140.24	30.92	16.35	458.19	92.23	27.27	125.05	213.64
2028	948.10	0.00	68.30	0.00	22.97	0.00	1039.37	36.12	16.42	440.37	90.35	31.94	129.82	188.26
2029	675.08	0.00	10.32	0.00	27.35	0.00	712.75	39.68	23.10	430.11	88.65	43.96	134.29	163.21
2030	466.18	0.00	0.00	0.00	47.55	0.00	513.73	42.25	19.16	449.76	89.71	38.34	129.97	191.74
2031	305.31	0.00	0.00	0.00	62.94	0.00	368.25	44.09	33.47	508.66	92.82	31.70	105.61	278.53
2032	112.12	0.00	0.00	0.00	73.72	0.00	185.84	45.02	33.68	671.87	99.86	31.02	101.12	439.87
2033	35.28	0.00	0.00	0.00	0.00	0.00	35.28	45.20	33.55	699.29	99.85	32.00	109.27	458.16
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	33.76	673.01	98.07	32.80	111.34	430.80
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.93	633.93	96.38	33.31	109.53	394.70
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.88	606.54	94.78	34.06	110.11	367.60
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.71	576.79	92.91	35.26	112.90	335.73
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.35	544.24	90.96	36.72	116.76	299.80
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	35.31	522.05	89.06	40.74	128.41	263.85
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.53	507.84	87.36	46.13	134.06	240.28
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	35.25	491.97	85.71	52.16	139.61	214.49
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	45.20	32.36	488.84	84.86	53.11	142.87	208.00
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.36	477.36	83.52	52.65	151.52	189.67
2044	0.00	0.00	51.07	0.00	0.00	0.00	51.07	45.46	34.10	461.76	81.98	66.83	152.90	160.04
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	46.07	34.10	447.17	80.56	73.59	159.00	134.02
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.12	38.09	438.68	79.19	83.58	167.97	107.94
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	36.57	424.39	77.80	84.57	180.84	81.17
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	35.70	436.75	79.18	80.58	169.27	107.71
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	46.12	38.59	436.75	79.18	80.58	169.27	107.71
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	46.12	35.70	436.75	79.18	80.58	169.27	107.71
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	46.12	38.60	436.75	79.18	80.58	169.27	107.71
2052	0.00	0.00	49.96	0.00	24.82	1.05	75.83	46.12	35.71	436.75	79.18	80.58	169.27	107.71
2053	0.00	0.00	67.96	0.00	16.16	3.16	87.29	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2054	0.00	0.00	10.27	0.00	13.19	3.16	26.62	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2055	0.00	0.00	0.00	0.00	0.00	3.28	3.28	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2057	0.00	0.00	50.21	0.00	0.00	0.00	50.21	46.12	37.46	436.75	79.18	80.58	169.27	107.71
2058	0.00	0.00	68.30	0.00	6.75	0.00	75.06	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2059	0.00	0.00	10.32	0.00	0.00	0.00	10.32	46.12	40.35	436.75	79.18	80.58	169.27	107.71
2060	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2061	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.12	38.62	436.75	79.18	80.58	169.27	107.71
2062	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2063	0.00	0.00	0.00	0.00	10.52	2.80	13.33	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2064	0.00	0.00	0.00	0.00	14.47	3.67	18.14	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2065	0.00	0.00	0.00	0.00	17.48	2.12	19.59	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2066	0.00	0.00	0.00	0.00	15.89	2.14	18.03	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2067	0.00	0.00	0.00	0.00	25.30	3.21	28.52	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2068	0.00	0.00	0.00	0.00	15.17	9.64	24.81	46.12	66.71	436.75	79.18	80.58	169.27	107.71
2069	0.00	0.00	0.00	0.00	23.93	9.64	33.58	46.12	38.62	436.75	79.18	80.58	169.27	107.71
2070	0.00	0.00	0.00	0.00	0.01	10.00	10.01	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	40.35	436.75	79.18	80.58	169.27	107.71
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	36.59	436.75	79.18	80.58	169.27	107.71
2074	0.00	0.00	51.07	0.00	0.00	0.00	51.07	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2075	0.00	0.00	69.47	0.00	1.91	0.00	71.39	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2076	0.00	0.00	10.50	0.00	1.91	0.00	12.41	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2077	0.00	0.00	0.00	0.00	23.45	0.00	23.45	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2078	0.00	0.00	0.00	0.00	12.45	0.00	12.45	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2079	0.00	0.00	0.00	0.00	21.07	0.00	21.07	46.12	38.62	436.75	79.18	80.58	169.27	107.71
2080	0.00	0.00	0.00	0.00	76.77	0.00	76.77	46.12	51.21	436.75	79.18	80.58	169.27	107.71
2081	0.00	0.00	0.00	0.00	47.87	0.00	47.87	46.12	38.62	436.75	79.18	80.58	169.27	107.71
2082	0.00	0.00	49.96	0.00	55.51	0.00	105.47	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2083	0.00	0.00	67.96	0.00	0.00	0.00	67.96	46.12	37.46	436.75	79.18	80.58	169.27	107.71
2084	0.00	0.00	10.27	0.00	10.44	0.12	20.82	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	46.12	37.46	436.75	79.18	80.58	169.27	107.71
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	46.12	52.95	436.75	79.18	80.58	169.27	107.71
2087	0.00	0.00	50.21	0.00	24.82	1.05	76.08	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2088	0.00	0.00	68.30	0.00	16.16	3.16	87.63	46.12	35.72	436.75	79.18	80.58	169.27	107.71
2089	0.00	0.00	10.32	0.00	13.19	3.16	26.67	46.12	38.62	436.75	79.18	80.58	169.27	107.71
2090	0.00	0.00	0.00	0.00	0.00	3.28	3.28	46.12	38.62	436.75	79.18	80.58	169.27	107.71
Salvage Value	15.21	0.00	7.17	0.00	8.66	0.96	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	2783.06	2612.45	248.80	0.00	305.75	49.75	5999.80	593.18	428.42	9759.29	1887.62	805.73	2573.15	4492.79

Net Present Value -2529

All Gas

TABLE 039
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	354.71	99.24	24.61	104.31	126.54
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	373.23	97.67	25.25	106.21	144.09
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	352.87	94.88	27.63	108.96	121.39
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	344.28	92.94	24.94	110.41	115.99
2020	0.00	0.00	71.67	0.00	0.00	0.00	71.67	0.76	0.00	379.02	92.87	19.68	120.21	146.26
2021	0.00	0.00	89.68	0.00	6.75	0.00	96.43	1.13	0.00	380.91	91.04	18.54	130.64	140.70
2022	0.00	0.00	10.25	0.00	0.00	0.00	10.25	1.19	3.98	368.47	88.82	34.56	132.86	112.23
2023	0.00	0.00	50.01	0.00	0.00	0.00	50.01	1.44	3.98	353.40	86.63	42.79	138.93	85.05
2024	0.00	0.00	70.11	0.00	53.19	0.00	123.29	2.04	3.98	345.07	85.17	48.98	144.05	66.87
2025	0.00	0.00	10.28	0.00	0.00	0.00	10.28	2.09	7.98	272.52	84.68	40.97	130.73	16.14
2026	0.00	0.00	50.16	0.00	0.00	0.00	50.16	2.34	7.98	254.50	83.39	42.05	133.00	-3.94
2027	0.00	0.00	68.23	0.00	0.00	0.00	68.23	2.69	7.98	237.62	81.53	42.23	144.53	-30.68
2028	0.00	0.00	111.38	0.00	0.00	0.00	111.38	3.24	11.97	220.74	79.62	64.98	143.50	-67.35
2029	0.00	0.00	145.44	0.00	0.00	0.00	145.44	3.97	11.97	205.27	78.17	73.98	147.85	-94.74
2030	0.00	0.00	64.88	0.00	6.75	0.00	71.63	4.33	11.98	218.15	79.09	68.55	144.04	-73.53
2031	0.00	0.00	4.75	0.00	0.00	0.00	4.75	4.35	18.90	235.26	76.69	121.48	136.86	-99.76
2032	0.00	0.00	50.46	0.00	0.00	0.00	50.46	4.60	18.90	215.25	74.79	134.42	143.44	-137.40
2033	0.00	0.00	68.64	0.00	44.75	0.00	113.39	5.17	18.90	195.29	73.05	147.50	148.95	-174.22
2034	0.00	0.00	112.05	0.00	0.00	0.00	112.05	5.73	22.90	181.44	71.65	165.86	152.52	-208.59
2035	0.00	0.00	146.31	0.00	0.00	0.00	146.31	6.46	22.90	170.46	70.76	175.58	155.46	-231.34
2036	0.00	0.00	65.27	0.00	0.00	0.00	65.27	6.79	22.90	168.61	70.71	170.95	161.51	-234.55
2037	0.00	0.00	106.77	0.00	0.00	0.00	106.77	7.32	29.82	175.62	68.71	226.64	147.59	-267.33
2038	0.00	0.00	146.75	0.00	0.00	0.00	146.75	8.06	29.82	160.56	67.51	240.37	153.80	-301.12
2039	0.00	0.00	65.46	0.00	0.00	0.00	65.46	8.38	29.83	155.51	67.44	243.76	160.62	-316.31
2040	0.00	0.00	4.79	0.00	0.00	0.00	4.79	8.41	36.75	165.41	65.53	295.35	154.33	-349.80
2041	0.00	0.00	102.39	0.00	0.00	0.00	102.39	8.92	36.76	155.40	63.76	325.47	162.60	-396.42
2042	0.00	0.00	147.34	0.00	0.00	0.00	147.34	9.66	36.76	149.69	62.71	347.32	168.67	-429.01
2043	0.00	0.00	65.73	0.00	44.75	0.00	110.47	10.21	36.76	150.95	62.68	352.31	169.86	-433.90
2044	0.00	0.00	4.81	0.00	0.00	0.00	4.81	10.23	43.68	159.35	61.13	402.15	161.82	-465.75
2045	0.00	0.00	22.49	0.00	0.00	0.00	22.49	10.34	43.68	150.63	59.60	434.69	169.02	-512.68
2046	0.00	0.00	30.59	0.00	0.00	0.00	30.59	10.50	43.68	144.88	58.50	461.23	174.74	-549.58
2047	0.00	0.00	4.62	0.00	0.00	0.00	4.62	10.52	45.13	135.81	57.64	480.80	179.61	-582.24
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.13	143.77	58.58	458.91	174.45	-548.17
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	10.52	45.14	143.77	58.58	458.91	174.45	-548.17
2050	0.00	0.00	49.86	0.00	9.87	0.00	59.72	10.52	45.14	143.77	58.58	458.91	174.45	-548.17
2051	0.00	0.00	67.83	0.00	9.87	0.00	77.69	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2052	0.00	0.00	10.25	0.00	9.87	0.00	20.11	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2053	0.00	0.00	50.01	0.00	0.00	0.00	50.01	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2054	0.00	0.00	68.03	0.00	0.00	0.00	68.03	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2055	0.00	0.00	10.28	0.00	0.00	0.00	10.28	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2056	0.00	0.00	50.16	0.00	6.75	0.00	56.91	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2057	0.00	0.00	68.23	0.00	0.00	0.00	68.23	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2058	0.00	0.00	111.38	0.00	0.00	0.00	111.38	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2059	0.00	0.00	145.44	0.00	39.89	0.00	185.33	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2060	0.00	0.00	64.88	0.00	0.00	0.00	64.88	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2061	0.00	0.00	4.75	0.00	0.00	0.00	4.75	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2062	0.00	0.00	50.46	0.00	0.00	0.00	50.46	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2063	0.00	0.00	68.64	0.00	0.00	0.00	68.64	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2064	0.00	0.00	112.05	0.00	0.00	0.00	112.05	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2065	0.00	0.00	146.31	0.00	6.75	0.00	153.06	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2066	0.00	0.00	65.27	0.00	0.00	0.00	65.27	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2067	0.00	0.00	106.77	0.00	0.00	0.00	106.77	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2068	0.00	0.00	146.75	0.00	33.56	0.00	180.31	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2069	0.00	0.00	65.46	0.00	0.00	0.00	65.46	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2070	0.00	0.00	4.79	0.00	0.00	0.00	4.79	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2071	0.00	0.00	102.39	0.00	0.00	0.00	102.39	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2072	0.00	0.00	147.34	0.00	0.00	0.00	147.34	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2073	0.00	0.00	65.73	0.00	0.00	0.00	65.73	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2074	0.00	0.00	4.81	0.00	13.30	0.00	18.11	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2075	0.00	0.00	22.49	0.00	0.00	0.00	22.49	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2076	0.00	0.00	30.59	0.00	0.00	0.00	30.59	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2077	0.00	0.00	4.62	0.00	0.00	0.00	4.62	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2078	0.00	0.00	0.00	0.00	33.56	0.00	33.56	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2080	0.00	0.00	49.86	0.00	0.00	0.00	49.86	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2081	0.00	0.00	67.83	0.00	0.00	0.00	67.83	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2082	0.00	0.00	10.25	0.00	0.00	0.00	10.25	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2083	0.00	0.00	50.01	0.00	11.19	0.00	61.20	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2084	0.00	0.00	68.03	0.00	9.87	0.00	77.89	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2085	0.00	0.00	10.28	0.00	9.87	0.00	20.14	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2086	0.00	0.00	50.16	0.00	9.87	0.00	60.02	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2087	0.00	0.00	68.23	0.00	9.87	0.00	78.10	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2088	0.00	0.00	10.31	0.00	0.00	0.00	10.31	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	143.77	58.58	458.91	174.45	-548.17
Salvage Value	0.00	0.00	32.44	0.00	2.22	0.00	34.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	933.02	0.00	121.40	0.00	1117.38	90.46	343.48	5197.15	1624.63	3260.17	2836.83	-2524.47

Net Present Value -4076

Wind/Gas

TABLE 040
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	354.71	99.24	24.61	104.31	126.54
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	373.23	97.67	25.25	106.21	144.09
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	352.86	94.88	27.63	108.96	121.38
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	344.28	92.93	24.94	110.41	116.00
2020	0.00	0.00	0.00	7.06	10.56	0.00	17.62	0.60	0.00	375.38	92.41	21.23	121.42	140.31
2021	0.00	0.00	0.36	215.62	17.59	0.00	233.57	1.77	0.00	376.76	90.58	20.62	131.14	134.41
2022	0.00	0.00	0.00	219.66	21.25	0.00	240.91	2.97	6.21	381.05	88.96	20.75	131.65	139.68
2023	0.00	0.00	121.83	212.59	11.12	0.00	345.54	4.59	12.42	377.95	86.49	23.89	135.51	132.06
2024	0.00	0.00	157.91	4.04	18.72	0.00	180.67	5.38	18.63	382.20	84.74	24.28	139.18	134.00
2025	0.00	0.00	20.56	3.53	3.39	0.00	27.48	5.52	26.60	319.93	84.79	28.21	122.46	84.47
2026	0.00	0.00	50.16	107.81	8.52	0.00	166.49	6.35	26.60	307.48	83.80	27.04	123.18	73.46
2027	0.00	0.00	70.31	109.83	66.72	0.00	246.86	7.58	29.70	292.82	81.47	33.04	127.29	51.02
2028	0.00	0.00	10.31	109.83	18.76	0.00	138.89	8.27	36.81	287.63	79.73	42.71	130.36	34.83
2029	0.00	0.00	50.31	109.83	18.83	0.00	178.96	9.17	39.91	279.80	78.15	46.21	134.01	21.42
2030	0.00	0.00	68.44	109.83	18.83	0.00	197.09	10.15	43.02	282.73	77.26	48.36	135.34	21.77
2031	0.00	0.00	60.75	109.83	18.83	0.00	189.41	11.10	50.10	284.67	76.04	57.53	137.30	13.79
2032	0.00	0.00	68.58	109.83	63.57	0.00	241.98	12.31	53.22	281.32	74.94	58.04	140.69	7.65
2033	0.00	0.00	10.36	109.83	18.83	0.00	139.02	13.00	60.32	286.64	74.29	61.33	143.11	7.91
2034	0.00	0.00	50.56	109.83	18.83	0.00	179.22	13.90	63.43	273.94	72.51	71.43	145.95	-15.96
2035	0.00	0.00	68.78	109.83	18.83	0.00	197.44	14.89	66.55	261.54	70.85	77.44	150.47	-37.22
2036	0.00	0.00	61.06	109.83	18.83	0.00	189.71	15.84	73.63	256.46	69.51	89.05	153.37	-55.46
2037	0.00	0.00	68.92	109.83	18.83	0.00	197.57	16.82	76.75	247.70	68.25	94.20	157.57	-72.32
2038	0.00	0.00	61.18	109.83	18.83	0.00	189.83	17.77	83.84	246.65	67.22	103.71	161.55	-85.83
2039	0.00	0.00	69.06	109.83	63.57	0.00	242.46	18.99	86.95	240.29	66.08	103.95	176.67	-106.40
2040	0.00	0.00	10.43	116.89	18.83	0.00	146.15	19.72	94.06	242.98	65.30	109.51	182.81	-114.63
2041	0.00	0.00	50.92	325.45	18.83	0.00	395.19	21.69	97.17	229.85	63.79	130.50	180.84	-145.29
2042	0.00	0.00	69.26	329.48	18.83	0.00	417.57	23.78	100.27	218.87	62.44	139.59	187.37	-170.52
2043	0.00	0.00	61.48	322.42	18.69	0.00	402.59	25.79	107.36	213.85	61.28	154.36	191.49	-193.28
2044	0.00	0.00	69.40	113.86	18.26	0.00	201.53	26.80	110.47	209.15	60.35	160.24	196.74	-208.19
2045	0.00	0.00	32.97	113.36	17.13	0.00	163.47	27.62	117.57	205.96	59.28	169.67	205.42	-228.42
2046	0.00	0.00	30.59	214.11	15.44	0.00	260.13	28.92	120.68	201.39	58.27	170.59	219.02	-246.48
2047	0.00	0.00	4.62	111.85	10.31	0.00	126.78	29.55	125.23	195.23	57.22	176.20	222.48	-260.67
2048	0.00	0.00	0.00	109.83	5.30	0.00	115.12	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2049	0.00	0.00	0.00	109.83	9.94	0.00	119.76	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2050	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2051	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2052	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2053	0.00	0.00	100.02	109.83	0.00	0.00	209.85	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2054	0.00	0.00	136.06	109.83	0.00	0.00	245.89	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2055	0.00	0.00	20.56	109.83	2.64	0.00	133.02	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2056	0.00	0.00	50.16	109.83	4.40	0.00	164.38	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2057	0.00	0.00	68.23	109.83	5.35	0.00	183.41	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2058	0.00	0.00	10.31	109.83	2.99	0.00	123.13	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2059	0.00	0.00	50.31	109.83	15.02	0.00	175.16	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2060	0.00	0.00	68.44	116.89	1.48	0.00	186.81	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2061	0.00	0.00	60.75	325.45	2.38	0.00	388.58	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2062	0.00	0.00	68.58	329.48	43.33	0.00	441.38	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2063	0.00	0.00	10.36	322.42	4.71	0.00	337.49	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2064	0.00	0.00	50.56	113.86	4.71	0.00	169.13	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2065	0.00	0.00	68.78	113.36	4.71	0.00	186.85	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2066	0.00	0.00	61.06	214.11	4.71	0.00	279.87	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2067	0.00	0.00	68.92	111.85	38.27	0.00	219.03	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2068	0.00	0.00	61.18	109.83	4.71	0.00	175.71	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2069	0.00	0.00	69.06	109.83	4.71	0.00	183.59	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2070	0.00	0.00	10.43	109.83	12.62	0.00	132.89	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2071	0.00	0.00	50.92	109.83	17.90	0.00	178.65	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2072	0.00	0.00	69.26	109.83	20.61	0.00	199.70	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2073	0.00	0.00	61.48	109.83	12.84	0.00	184.15	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2074	0.00	0.00	69.40	109.83	41.96	0.00	221.19	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2075	0.00	0.00	32.97	109.83	6.61	0.00	149.41	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2076	0.00	0.00	30.59	109.83	10.85	0.00	151.27	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2077	0.00	0.00	4.62	109.83	28.10	0.00	142.55	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2078	0.00	0.00	0.00	109.83	18.69	0.00	128.51	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2079	0.00	0.00	0.00	109.83	18.47	0.00	128.30	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2080	0.00	0.00	0.00	116.89	18.19	0.00	135.08	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2081	0.00	0.00	0.00	325.45	17.34	0.00	342.79	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2082	0.00	0.00	0.00	329.48	27.64	0.00	357.12	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2083	0.00	0.00	100.02	322.42	15.39	0.00	437.83	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2084	0.00	0.00	136.06	113.86	23.92	0.00	273.84	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2085	0.00	0.00	20.56	113.36	23.77	0.00	157.69	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2086	0.00	0.00	50.16	214.11	22.93	0.00	287.19	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2087	0.00	0.00	68.23	111.85	22.08	0.00	202.16	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2088	0.00	0.00	10.31	109.83	7.98	0.00	128.12	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2089	0.00	0.00	0.00	106.30	15.21	0.00	121.51	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
2090	0.00	0.00	0.00	2.02	0.07	0.00	2.09	29.55	125.23	200.86	58.26	172.16	215.64	-245.19
Salvage Value	0.00	0.00	14.26	38.84	8.17	0.00	61.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	696.56	1903.61	311.61	0.00	2974.73	232.04	974.12	5994.47	1620.82	1437.43	2992.92	-56.69

Net Present Value -4238

K22/Gas

TABLE 041
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	99.88	0.00	0.00	9.87	0.00	109.75	0.55	0.00	312.96	102.97	19.80	97.89	92.30
2015	0.00	29.84	0.00	0.00	10.59	0.00	40.42	0.75	0.00	344.96	101.09	23.52	102.04	118.31
2016	0.00	25.92	0.00	0.00	10.65	0.00	36.57	0.93	0.00	354.31	99.24	24.61	104.31	126.14
2017	0.00	192.79	0.00	0.00	23.47	0.00	216.26	2.01	0.00	372.21	97.67	25.27	106.24	143.03
2018	0.00	374.90	0.00	0.00	6.97	0.00	381.87	3.92	0.00	350.82	94.89	27.65	109.04	119.23
2019	0.00	609.71	0.00	0.00	12.14	0.00	621.85	7.03	0.00	342.16	92.94	24.95	110.49	113.77
2020	0.00	677.02	0.00	0.00	22.10	0.00	699.12	10.53	0.00	370.41	92.24	21.91	122.13	134.12
2021	0.00	551.85	0.00	0.00	31.34	0.00	583.20	13.45	0.00	374.32	90.53	21.04	132.54	130.21
2022	0.00	319.56	0.00	0.00	37.12	0.00	356.68	15.23	13.01	381.13	90.51	24.00	126.20	140.42
2023	0.00	148.13	0.00	0.00	0.01	0.00	148.14	15.97	13.22	499.77	96.18	23.80	115.03	264.76
2024	0.00	51.07	0.00	0.00	0.00	0.00	51.07	16.22	12.93	515.68	96.08	27.04	119.94	272.62
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	16.22	13.15	458.53	96.02	18.97	110.74	232.80
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.22	12.97	439.88	94.17	19.26	113.51	212.94
2027	0.00	0.00	72.02	0.00	0.00	0.00	72.02	16.48	12.93	397.98	92.34	18.43	112.77	174.44
2028	0.00	0.00	90.15	0.00	6.75	0.00	96.91	16.85	12.69	377.17	90.78	19.18	115.78	151.44
2029	0.00	0.00	10.32	0.00	0.00	0.00	10.32	16.90	16.24	370.63	89.95	24.01	116.20	140.47
2030	0.00	0.00	50.36	0.00	0.00	0.00	50.36	17.15	16.24	359.98	88.21	29.50	120.17	122.10
2031	0.00	0.00	171.96	0.00	53.19	0.00	225.15	18.27	16.28	348.62	86.56	34.46	124.96	102.65
2032	0.00	0.00	156.22	0.00	0.00	0.00	156.22	19.05	22.98	339.24	84.98	46.58	129.31	78.37
2033	0.00	0.00	65.07	0.00	6.75	0.00	71.83	19.41	19.04	345.87	85.15	40.69	130.04	89.99
2034	0.00	0.00	4.77	0.00	0.00	0.00	4.77	19.43	25.96	368.13	82.71	97.35	124.10	63.96
2035	0.00	0.00	101.78	0.00	0.00	0.00	101.78	19.94	25.96	351.15	80.68	109.35	130.19	30.94
2036	0.00	0.00	146.46	0.00	0.00	0.00	146.46	20.67	25.96	337.81	79.17	119.09	134.54	5.02
2037	0.00	0.00	65.33	0.00	0.00	0.00	65.33	21.00	25.97	346.57	79.61	113.46	132.27	21.24
2038	0.00	0.00	106.87	0.00	0.00	0.00	106.87	21.54	32.23	367.72	77.23	174.74	130.04	-14.29
2039	0.00	0.00	146.90	0.00	0.00	0.00	146.90	22.27	32.24	355.74	75.87	187.53	140.71	-48.37
2040	0.00	0.00	65.53	0.00	44.75	0.00	110.28	22.82	32.24	355.25	75.42	192.27	142.72	-55.16
2041	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.85	39.16	380.22	73.44	254.36	138.86	-86.43
2042	0.00	0.00	102.50	0.00	0.00	0.00	102.50	23.36	42.06	366.63	71.62	277.15	144.65	-126.79
2043	0.00	0.00	147.49	0.00	0.00	0.00	147.49	24.10	39.16	356.59	70.30	293.82	149.12	-156.65
2044	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.42	39.16	344.85	69.95	291.10	149.77	-165.97
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	24.45	46.09	371.95	68.34	353.70	146.04	-196.13
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.09	362.95	67.11	374.76	149.22	-228.16
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	47.84	340.43	65.75	388.84	153.48	-267.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	47.84	358.44	67.07	372.44	149.58	-230.64
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	47.84	358.44	67.07	372.44	149.58	-230.64
2050	0.00	0.00	0.00	0.00	10.18	0.00	10.18	24.45	46.97	358.44	67.07	372.44	149.58	-230.64
2051	0.00	0.00	0.00	0.00	10.23	0.00	10.23	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2052	0.00	0.00	0.00	0.00	10.24	0.00	10.24	24.45	49.00	358.44	67.07	372.44	149.58	-230.64
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2054	0.00	0.00	0.00	0.00	11.27	0.00	11.27	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2055	0.00	0.00	0.00	0.00	14.95	0.00	14.95	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2056	0.00	0.00	0.00	0.00	16.16	0.00	16.16	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2057	0.00	0.00	50.21	0.00	13.19	0.00	63.39	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2058	0.00	0.00	68.30	0.00	0.00	0.00	68.30	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2059	0.00	0.00	10.32	0.00	0.00	0.00	10.32	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2060	0.00	0.00	50.36	0.00	0.00	0.00	50.36	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2061	0.00	0.00	169.88	0.00	0.00	0.00	169.88	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2062	0.00	0.00	156.22	0.00	0.00	0.00	156.22	24.45	49.00	358.44	67.07	372.44	149.58	-230.64
2063	0.00	0.00	65.07	0.00	6.75	0.00	71.83	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2064	0.00	0.00	4.77	0.00	0.00	0.00	4.77	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2065	0.00	0.00	101.78	0.00	0.40	0.00	102.18	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2066	0.00	0.00	146.46	0.00	40.32	0.00	186.77	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2067	0.00	0.00	65.33	0.00	13.23	0.00	78.56	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2068	0.00	0.00	106.87	0.00	13.38	0.00	120.26	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2069	0.00	0.00	146.90	0.00	0.87	0.00	147.77	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2070	0.00	0.00	65.53	0.00	7.14	0.00	72.67	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2071	0.00	0.00	4.80	0.00	15.18	0.00	19.98	24.45	61.60	358.44	67.07	372.44	149.58	-230.64
2072	0.00	0.00	102.50	0.00	23.93	0.00	126.43	24.45	49.00	358.44	67.07	372.44	149.58	-230.64
2073	0.00	0.00	147.49	0.00	0.01	0.00	147.49	24.45	47.84	358.44	67.07	372.44	149.58	-230.64
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.45	47.84	358.44	67.07	372.44	149.58	-230.64
2075	0.00	0.00	4.82	0.00	33.56	0.00	38.38	24.45	47.84	358.44	67.07	372.44	149.58	-230.64
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.97	358.44	67.07	372.44	149.58	-230.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2081	0.00	0.00	0.00	0.00	13.30	0.00	13.30	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	49.00	358.44	67.07	372.44	149.58	-230.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2087	0.00	0.00	50.21	0.00	9.87	0.00	60.07	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2088	0.00	0.00	68.30	0.00	0.00	0.00	68.30	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2089	0.00	0.00	10.32	0.00	0.00	0.00	10.32	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
2090	0.00	0.00	0.00	0.00	11.19	0.00	11.19	24.45	46.10	358.44	67.07	372.44	149.58	-230.64
Salvage Value	0.00	0.00	12.64	0.00	3.33	0.00	15.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2338.90	668.65	0.00	192.87	0.00	3200.43	304.94	393.87	7560.42	1749.83	2418.61	2537.09	854.89

Net Present Value: -3044

K22/C29

TABLE 042
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	99.88	0.00	0.00	9.87	0.00	139.48	0.70	0.00	312.96	102.97	19.80	97.89	92.30
2015	37.96	29.84	0.00	0.00	10.59	0.00	78.38	1.09	0.00	344.96	101.09	23.52	102.04	118.31
2016	11.04	25.92	0.00	0.00	10.65	0.00	47.61	1.33	0.00	354.31	99.24	24.61	104.31	126.14
2017	11.73	192.79	0.00	0.00	23.47	0.00	227.98	2.47	0.00	372.21	97.67	25.27	106.24	143.03
2018	11.76	374.90	0.00	0.00	6.97	0.00	393.63	4.44	0.00	350.82	94.89	27.65	109.04	119.23
2019	14.03	609.71	0.00	0.00	12.14	0.00	635.88	7.61	0.00	342.16	92.94	24.95	110.49	113.77
2020	151.48	677.02	0.00	0.00	22.10	0.00	850.59	11.87	0.00	370.42	92.24	21.91	122.13	134.14
2021	231.02	551.85	0.00	0.00	31.34	0.00	814.22	15.94	0.00	374.08	90.53	21.05	132.68	129.82
2022	244.38	319.56	0.00	0.00	37.12	0.00	601.07	18.94	13.01	380.84	90.52	23.95	126.38	139.99
2023	247.11	148.13	0.00	0.00	2.55	0.00	397.78	20.93	13.22	498.84	96.18	23.85	115.15	263.65
2024	665.53	51.07	0.00	0.00	2.54	0.00	719.14	24.53	12.93	513.72	96.07	27.05	120.04	270.56
2025	1052.78	0.00	0.00	0.00	30.99	0.00	1083.77	29.95	13.15	456.14	96.05	19.00	110.92	230.18
2026	942.49	0.00	0.00	0.00	16.22	0.00	958.71	34.74	12.97	436.88	94.18	19.31	113.73	209.66
2027	671.09	0.00	0.00	0.00	27.35	0.00	698.44	38.23	12.93	396.05	92.57	17.68	112.68	173.12
2028	463.42	0.00	0.00	0.00	47.55	0.00	510.97	40.79	12.69	370.29	90.69	19.42	116.59	143.60
2029	303.50	0.00	0.00	0.00	62.94	0.00	366.44	42.62	26.56	479.01	94.49	22.19	100.26	262.07
2030	111.46	0.00	0.00	0.00	73.72	0.00	185.18	43.55	26.78	633.94	101.62	21.64	92.28	418.40
2031	35.07	0.00	0.00	0.00	0.00	0.00	35.07	43.72	26.68	653.42	101.40	22.12	95.97	433.92
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	29.59	632.63	99.72	21.85	97.48	413.58
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.48	609.97	98.10	21.80	98.82	391.25
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.44	590.28	96.51	22.24	101.01	370.52
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.27	569.35	94.98	22.36	102.29	349.73
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	43.72	24.90	545.15	93.44	22.30	103.59	325.82
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	24.97	520.74	91.91	22.38	105.51	300.94
2038	0.00	0.00	72.57	0.00	0.00	0.00	72.57	43.98	24.43	497.35	90.41	22.41	108.95	275.58
2039	0.00	0.00	90.86	0.00	6.75	0.00	97.62	44.35	27.15	489.88	89.05	21.93	123.40	255.51
2040	0.00	0.00	10.43	0.00	0.00	0.00	10.43	44.41	28.24	477.99	87.33	38.46	125.13	227.07
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	28.24	466.16	85.89	42.99	130.53	206.74
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	44.66	31.13	454.76	84.49	44.36	138.38	187.53
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	45.04	28.24	441.35	83.02	45.04	148.15	165.13
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	45.35	32.22	431.21	81.57	69.39	145.66	134.59
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	45.96	31.56	419.75	80.33	74.17	151.38	113.86
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.02	35.56	431.27	79.96	73.36	157.94	120.02
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.30	402.55	77.77	97.84	162.94	64.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.30	417.86	79.35	81.79	157.42	99.30
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	40.20	417.86	79.35	81.79	157.42	99.30
2050	0.00	0.00	0.00	0.00	10.18	0.00	10.18	46.02	36.44	417.86	79.35	81.79	157.42	99.30
2051	0.00	0.00	0.00	0.00	10.23	0.00	10.23	46.02	35.57	417.86	79.35	81.79	157.42	99.30
2052	0.00	0.00	0.00	0.00	10.24	0.00	10.24	46.02	38.48	417.86	79.35	81.79	157.42	99.30
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2054	0.00	0.00	0.00	0.00	11.27	0.00	11.27	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2055	0.00	0.00	0.00	0.00	14.95	0.00	14.95	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2056	0.00	0.00	0.00	0.00	16.16	0.00	16.16	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2057	0.00	0.00	0.00	0.00	13.19	0.00	13.19	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2058	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2059	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.02	53.98	417.86	79.35	81.79	157.42	99.30
2060	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2061	0.00	0.00	0.00	0.00	3.77	0.00	3.77	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2062	0.00	0.00	0.00	0.00	6.28	0.00	6.28	46.02	38.48	417.86	79.35	81.79	157.42	99.30
2063	0.00	0.00	0.00	0.00	10.68	0.00	10.68	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2064	0.00	0.00	0.00	0.00	15.07	0.00	15.07	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2065	0.00	0.00	0.00	0.00	18.61	0.00	18.61	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2066	0.00	0.00	0.00	0.00	0.43	0.00	0.43	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2067	0.00	0.00	0.00	0.00	13.23	0.00	13.23	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2068	0.00	0.00	50.76	0.00	6.63	0.00	57.40	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2069	0.00	0.00	69.06	0.00	0.87	0.00	69.93	46.02	53.98	417.86	79.35	81.79	157.42	99.30
2070	0.00	0.00	10.43	0.00	7.14	0.00	17.58	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2071	0.00	0.00	0.00	0.00	15.18	0.00	15.18	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2072	0.00	0.00	50.97	0.00	23.93	0.00	74.90	46.02	53.98	417.86	79.35	81.79	157.42	99.30
2073	0.00	0.00	69.33	0.00	1.92	0.00	71.25	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2074	0.00	0.00	61.55	0.00	8.67	0.00	70.21	46.02	52.82	417.86	79.35	81.79	157.42	99.30
2075	0.00	0.00	69.47	0.00	23.45	0.00	92.92	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2076	0.00	0.00	10.50	0.00	12.45	0.00	22.95	46.02	51.95	417.86	79.35	81.79	157.42	99.30
2077	0.00	0.00	0.00	0.00	21.07	0.00	21.07	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2078	0.00	0.00	0.00	0.00	43.63	0.00	43.63	46.02	51.08	417.86	79.35	81.79	157.42	99.30
2079	0.00	0.00	0.00	0.00	47.87	0.00	47.87	46.02	38.48	417.86	79.35	81.79	157.42	99.30
2080	0.00	0.00	0.00	0.00	95.40	0.00	95.40	46.02	52.82	417.86	79.35	81.79	157.42	99.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	55.71	417.86	79.35	81.79	157.42	99.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.32	417.86	79.35	81.79	157.42	99.30
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	52.82	417.86	79.35	81.79	157.42	99.30
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	35.59	417.86	79.35	81.79	157.42	99.30
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	38.48	417.86	79.35	81.79	157.42	99.30
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	35.59	417.86	79.35	81.79	157.42	99.30
Salvage Value	10.71	0.00	4.07	0.00	7.38	0.00	22.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3033.41	2338.90	131.57	0.00	304.30	0.00	5808.18	577.37	364.53	8808.39	1867.94	731.04	2452.56	3756.84

Net Present Value -2993

SCGT/C26

TABLE 043
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	312.96	102.97	19.80	97.89	92.30
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	344.96	101.09	23.52	102.04	118.31
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	354.71	99.24	24.61	104.31	126.54
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	373.23	97.67	25.25	106.21	144.09
2018	195.48	0.00	0.36	0.00	0.00	0.00	195.84	3.11	0.00	352.45	94.88	27.64	108.97	120.95
2019	233.41	0.00	0.00	0.00	0.00	0.00	233.41	4.28	0.00	343.62	92.94	24.95	110.43	115.30
2020	237.17	0.00	71.67	0.00	0.00	0.00	308.84	5.71	0.00	377.79	92.85	19.78	120.34	144.82
2021	651.87	0.00	89.63	0.00	6.75	0.00	748.25	9.35	0.00	379.86	91.01	18.79	131.08	138.98
2022	1043.45	0.00	10.25	0.00	0.48	0.00	1054.18	14.62	3.98	367.07	88.84	34.95	133.23	110.04
2023	934.14	0.00	0.00	0.00	0.96	0.00	935.10	19.29	3.98	350.33	86.49	44.24	139.70	79.90
2024	665.14	0.00	0.00	0.00	1.93	0.00	667.07	22.63	3.98	345.06	85.34	48.61	144.33	66.78
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	24.95	3.98	276.64	85.84	29.71	134.85	26.24
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	26.46	18.29	348.37	89.76	22.30	110.06	126.24
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	27.01	18.51	492.28	97.52	21.14	98.60	275.02
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	27.19	18.21	519.49	97.61	23.17	107.04	291.67
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.43	495.88	95.91	23.84	108.41	267.71
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.26	480.39	94.72	23.56	108.40	253.71
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.21	458.30	92.77	25.66	112.41	227.46
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.97	431.27	90.85	27.24	115.84	197.35
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.54	412.36	88.92	32.08	120.39	170.98
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.54	401.60	87.36	37.06	125.99	151.18
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.58	391.63	86.07	41.11	128.82	135.63
2036	0.00	0.00	50.66	0.00	0.00	0.00	50.66	27.44	20.30	384.46	85.01	41.58	133.46	124.42
2037	0.00	0.00	68.96	0.00	6.75	0.00	75.72	27.82	17.41	372.68	83.51	42.31	143.91	102.95
2038	0.00	0.00	10.41	0.00	0.00	0.00	10.41	27.87	21.39	362.84	82.04	65.11	142.70	72.99
2039	0.00	0.00	50.82	0.00	0.00	0.00	50.82	28.12	21.39	351.82	80.79	70.53	154.71	45.80
2040	0.00	0.00	71.20	0.00	53.19	0.00	124.39	28.73	21.39	342.26	79.45	70.05	167.78	24.97
2041	0.00	0.00	61.36	0.00	0.00	0.00	61.36	29.04	25.39	328.59	77.82	98.39	166.29	-13.90
2042	0.00	0.00	69.26	0.00	0.00	0.00	69.26	29.39	24.73	315.39	76.48	110.33	171.86	-43.28
2043	0.00	0.00	61.48	0.00	0.00	0.00	61.48	29.70	28.71	307.75	75.18	123.78	180.70	-71.91
2044	0.00	0.00	69.40	0.00	44.75	0.00	114.15	30.27	28.71	297.18	73.88	125.35	197.16	-99.21
2045	0.00	0.00	10.49	0.00	0.00	0.00	10.49	30.32	32.72	288.74	72.56	172.24	185.24	-141.29
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	35.62	279.27	71.39	189.93	189.91	-171.97
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.73	269.09	70.08	193.12	209.44	-203.55
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.73	279.03	71.34	185.09	194.86	-172.27
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.74	279.03	71.34	185.09	194.86	-172.27
2050	0.00	0.00	49.86	0.00	9.87	0.00	59.72	30.32	32.75	279.03	71.34	185.09	194.86	-172.27
2051	0.00	0.00	67.83	0.00	9.87	0.00	77.69	30.32	34.49	279.03	71.34	185.09	194.86	-172.27
2052	0.00	0.00	10.25	0.00	9.87	0.00	20.11	30.32	34.50	279.03	71.34	185.09	194.86	-172.27
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	279.03	71.34	185.09	194.86	-172.27
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	279.03	71.34	185.09	194.86	-172.27
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	279.03	71.34	185.09	194.86	-172.27
2056	0.00	0.00	0.00	0.00	6.75	0.00	6.75	30.32	35.65	279.03	71.34	185.09	194.86	-172.27
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2066	0.00	0.00	50.66	0.00	0.00	0.00	50.66	30.32	35.65	279.03	71.34	185.09	194.86	-172.27
2067	0.00	0.00	68.92	0.00	0.00	0.00	68.92	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2068	0.00	0.00	10.41	0.00	0.00	0.00	10.41	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2069	0.00	0.00	50.82	0.00	0.00	0.00	50.82	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2070	0.00	0.00	69.13	0.00	0.00	0.00	69.13	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2071	0.00	0.00	61.36	0.00	0.00	0.00	61.36	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2072	0.00	0.00	69.26	0.00	7.24	0.00	76.50	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2073	0.00	0.00	61.48	0.00	0.96	0.00	62.45	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2074	0.00	0.00	69.40	0.00	1.93	0.00	71.33	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2075	0.00	0.00	10.49	0.00	44.23	0.00	54.72	30.32	48.25	279.03	71.34	185.09	194.86	-172.27
2076	0.00	0.00	0.00	0.00	1.93	0.00	1.93	30.32	35.65	279.03	71.34	185.09	194.86	-172.27
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	49.99	279.03	71.34	185.09	194.86	-172.27
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	279.03	71.34	185.09	194.86	-172.27
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	30.32	49.99	279.03	71.34	185.09	194.86	-172.27
2080	0.00	0.00	49.86	0.00	0.00	0.00	49.86	30.32	34.50	279.03	71.34	185.09	194.86	-172.27
2081	0.00	0.00	67.83	0.00	0.00	0.00	67.83	30.32	49.99	279.03	71.34	185.09	194.86	-172.27
2082	0.00	0.00	10.25	0.00	0.00	0.00	10.25	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	35.65	279.03	71.34	185.09	194.86	-172.27
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
2090	0.00	0.00	0.00	0.00	13.30	0.00	13.30	30.32	32.76	279.03	71.34	185.09	194.86	-172.27
Salvage Value	4.24	0.00	6.98	0.00	2.49	0.00	13.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	319.10	0.00	84.96	0.00	3953.84	387.64	293.52	7228.68	1779.56	1324.86	2780.67	1343.59

Net Present Value -3291

CCGT/C26

TABLE 044
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	312.96	102.97	19.80	97.89	92.30
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	344.96	101.09	23.52	102.04	118.31
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	354.71	99.24	24.61	104.31	126.54
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	373.23	97.67	25.25	106.21	144.09
2018	195.48	0.00	0.36	0.00	0.00	0.00	195.84	3.11	0.00	352.45	94.88	27.64	108.97	120.95
2019	233.41	0.00	100.17	0.00	0.00	0.00	333.58	4.78	0.00	343.62	92.94	24.95	110.43	115.30
2020	237.17	0.00	165.94	0.00	0.00	0.00	403.11	6.69	0.00	377.79	92.85	19.78	120.34	144.82
2021	651.87	0.00	86.10	0.00	6.75	0.00	744.73	10.30	0.00	386.54	91.75	16.48	128.89	149.42
2022	1043.45	0.00	4.71	0.00	0.48	0.00	1048.64	15.54	6.91	406.60	89.34	68.47	115.32	133.47
2023	934.14	0.00	0.00	0.00	0.96	0.00	935.10	20.22	6.91	395.71	87.29	76.61	120.48	111.33
2024	665.14	0.00	0.00	0.00	1.93	0.00	667.07	23.55	6.91	393.90	86.30	82.05	123.19	102.36
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	25.87	6.91	321.75	85.97	68.25	118.26	49.27
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	27.39	21.22	380.89	89.68	56.52	100.67	134.02
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	27.94	21.44	514.16	97.50	41.82	92.86	281.99
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	28.11	21.14	542.72	97.74	42.27	100.66	302.05
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.36	521.81	96.03	46.46	101.02	278.29
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.19	496.03	93.93	49.92	103.82	248.36
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.14	499.65	93.87	46.40	101.57	257.80
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.90	464.34	91.02	53.65	107.16	212.52
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.47	450.17	89.34	58.52	111.11	191.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.47	434.91	87.33	64.67	117.95	164.96
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.51	426.39	85.89	70.17	122.04	148.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	23.23	413.58	84.27	79.81	125.06	124.44
2037	0.00	0.00	50.71	0.00	0.00	0.00	50.71	28.37	20.34	412.89	83.54	83.26	127.45	118.64
2038	0.00	0.00	69.03	0.00	6.75	0.00	75.79	28.74	20.34	406.14	82.37	86.69	134.05	103.03
2039	0.00	0.00	10.42	0.00	0.00	0.00	10.42	28.80	24.32	393.80	80.61	107.66	142.91	62.62
2040	0.00	0.00	50.87	0.00	0.00	0.00	50.87	29.05	24.32	382.02	79.20	117.57	147.71	37.54
2041	0.00	0.00	71.27	0.00	53.19	0.00	124.46	29.66	24.32	370.98	77.89	124.33	154.32	14.43
2042	0.00	0.00	61.42	0.00	0.00	0.00	61.42	29.97	27.66	362.76	76.56	136.62	162.24	-12.66
2043	0.00	0.00	69.33	0.00	0.00	0.00	69.33	30.32	27.66	349.85	75.18	157.75	161.30	-44.38
2044	0.00	0.00	10.48	0.00	0.00	0.00	10.48	30.37	31.64	338.91	73.87	175.07	165.93	-75.97
2045	0.00	0.00	51.12	0.00	0.00	0.00	51.12	30.62	31.64	327.68	72.56	181.77	177.51	-104.16
2046	0.00	0.00	69.54	0.00	44.75	0.00	114.29	31.20	34.55	323.38	71.66	181.96	189.65	-119.89
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	31.25	35.65	300.32	70.11	216.54	183.54	-169.87
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.66	317.13	71.44	193.42	183.57	-131.30
2049	0.00	0.00	100.17	0.00	9.87	0.00	110.03	31.25	35.66	317.13	71.44	193.42	183.57	-131.30
2050	0.00	0.00	144.13	0.00	9.87	0.00	154.00	31.25	35.66	317.13	71.44	193.42	183.57	-131.30
2051	0.00	0.00	64.30	0.00	9.87	0.00	74.16	31.25	37.41	317.13	71.44	193.42	183.57	-131.30
2052	0.00	0.00	4.71	0.00	9.87	0.00	14.57	31.25	37.41	317.13	71.44	193.42	183.57	-131.30
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.42	317.13	71.44	193.42	183.57	-131.30
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	317.13	71.44	193.42	183.57	-131.30
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	317.13	71.44	193.42	183.57	-131.30
2056	0.00	0.00	0.00	0.00	6.75	0.00	6.75	31.25	38.58	317.13	71.44	193.42	183.57	-131.30
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	38.58	317.13	71.44	193.42	183.57	-131.30
2067	0.00	0.00	50.71	0.00	0.00	0.00	50.71	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2068	0.00	0.00	68.99	0.00	0.00	0.00	68.99	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2069	0.00	0.00	10.42	0.00	0.00	0.00	10.42	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2070	0.00	0.00	50.87	0.00	0.00	0.00	50.87	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2071	0.00	0.00	69.19	0.00	0.00	0.00	69.19	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2072	0.00	0.00	61.42	0.00	0.48	0.00	61.90	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2073	0.00	0.00	69.33	0.00	7.72	0.00	77.05	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2074	0.00	0.00	10.48	0.00	1.93	0.00	12.40	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2075	0.00	0.00	51.12	0.00	4.34	0.00	55.46	31.25	51.18	317.13	71.44	193.42	183.57	-131.30
2076	0.00	0.00	69.54	0.00	41.82	0.00	111.36	31.25	38.58	317.13	71.44	193.42	183.57	-131.30
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	31.25	52.92	317.13	71.44	193.42	183.57	-131.30
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	317.13	71.44	193.42	183.57	-131.30
2079	0.00	0.00	100.17	0.00	0.00	0.00	100.17	31.25	52.92	317.13	71.44	193.42	183.57	-131.30
2080	0.00	0.00	144.13	0.00	0.00	0.00	144.13	31.25	37.43	317.13	71.44	193.42	183.57	-131.30
2081	0.00	0.00	64.30	0.00	33.56	0.00	97.86	31.25	52.92	317.13	71.44	193.42	183.57	-131.30
2082	0.00	0.00	4.71	0.00	0.00	0.00	4.71	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	38.58	317.13	71.44	193.42	183.57	-131.30
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	317.13	71.44	193.42	183.57	-131.30
Salvage Value	4.24	0.00	11.03	0.00	2.27	0.00	17.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	487.12	0.00	82.85	0.00	4119.75	400.97	328.31	7733.49	1782.11	1645.82	2615.05	1690.51

Net Present Value: -3159

Wind/C26

TABLE 045
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	312.96	102.97	19.80	97.89	92.30
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	344.96	101.09	23.52	102.04	118.31
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	354.71	99.24	24.61	104.31	126.54
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	373.23	97.67	25.25	106.20	144.10
2018	195.48	0.00	0.00	0.00	0.00	0.00	195.48	3.11	0.00	352.45	94.88	27.64	108.97	120.95
2019	233.41	0.00	0.00	0.00	0.00	0.00	233.41	4.28	0.00	343.62	92.94	24.95	110.43	115.30
2020	237.17	0.00	0.00	7.06	10.56	0.00	254.79	5.55	0.00	374.45	92.42	21.22	121.45	139.37
2021	651.87	0.00	0.00	215.62	17.59	0.00	885.08	9.98	0.00	375.97	90.58	20.70	131.56	133.13
2022	1043.45	0.00	0.00	219.66	21.59	0.00	1284.70	16.40	6.21	379.83	88.96	20.76	132.49	137.61
2023	934.14	0.00	0.00	212.59	11.52	0.00	1158.25	22.19	12.42	376.75	86.51	23.85	136.37	130.01
2024	665.14	0.00	0.00	4.04	5.45	0.00	674.63	25.57	18.63	379.16	84.64	24.57	141.21	128.74
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	27.88	18.63	306.90	84.53	16.18	156.84	49.36
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	29.40	32.93	404.17	88.56	19.25	108.52	187.84
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	29.95	33.15	548.88	96.29	17.35	96.93	338.30
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	30.12	32.86	571.33	96.18	18.99	104.82	351.34
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	33.07	548.16	94.53	19.29	105.98	328.35
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.90	535.45	93.47	18.80	105.56	317.63
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.85	521.60	92.04	19.42	108.13	302.01
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	30.12	32.61	502.02	90.61	19.36	110.34	281.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.18	476.09	89.10	19.23	111.90	255.86
2034	0.00	0.00	72.37	0.00	0.00	0.00	72.37	30.38	32.18	452.14	87.64	19.33	113.77	231.40
2035	0.00	0.00	90.59	0.00	6.75	0.00	97.34	30.75	32.22	443.96	86.64	17.85	117.25	222.23
2036	0.00	0.00	61.06	0.00	0.00	0.00	61.06	31.06	38.93	427.14	84.56	32.78	121.14	188.65
2037	0.00	0.00	68.96	0.00	6.75	0.00	75.72	31.44	36.03	413.52	83.12	37.04	126.23	167.13
2038	0.00	0.00	10.41	0.00	0.00	0.00	10.41	31.49	40.02	406.52	81.86	48.09	130.38	146.19
2039	0.00	0.00	50.82	0.00	0.00	0.00	50.82	31.74	40.02	396.72	80.70	47.33	144.65	124.03
2040	0.00	0.00	71.20	7.06	53.19	0.00	131.45	32.39	40.02	380.49	79.03	60.87	148.29	92.31
2041	0.00	0.00	61.36	215.62	0.00	0.00	276.98	33.78	44.02	370.05	77.64	74.51	153.34	64.56
2042	0.00	0.00	69.26	219.66	0.00	0.00	288.92	35.22	43.36	358.80	76.36	77.89	162.80	41.76
2043	0.00	0.00	61.48	212.59	0.00	0.00	274.08	36.59	47.34	351.38	75.07	86.98	173.83	15.49
2044	0.00	0.00	69.40	4.04	44.75	0.00	118.18	37.18	47.34	335.47	73.72	108.79	171.56	-18.60
2045	0.00	0.00	10.49	0.00	0.00	0.00	10.49	37.23	51.35	325.83	72.45	126.88	176.78	-50.28
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	54.25	314.34	71.19	129.49	191.37	-77.72
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.36	303.35	69.95	131.22	208.91	-106.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.36	314.51	71.20	129.20	192.36	-78.24
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.37	314.51	71.20	129.20	192.36	-78.24
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.38	314.51	71.20	129.20	192.36	-78.24
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	53.12	314.51	71.20	129.20	192.36	-78.24
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	53.13	314.51	71.20	129.20	192.36	-78.24
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	314.51	71.20	129.20	192.36	-78.24
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	314.51	71.20	129.20	192.36	-78.24
2055	0.00	0.00	0.00	0.00	2.64	0.00	2.64	37.23	53.13	314.51	71.20	129.20	192.36	-78.24
2056	0.00	0.00	0.00	0.00	4.40	0.00	4.40	37.23	54.28	314.51	71.20	129.20	192.36	-78.24
2057	0.00	0.00	0.00	0.00	5.28	0.00	5.28	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2058	0.00	0.00	0.00	0.00	2.64	0.00	2.64	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2059	0.00	0.00	0.00	0.00	0.88	0.00	0.88	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2060	0.00	0.00	0.00	7.06	0.00	0.00	7.06	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2061	0.00	0.00	0.00	215.62	0.00	0.00	215.62	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2062	0.00	0.00	0.00	219.66	0.00	0.00	219.66	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2063	0.00	0.00	0.00	212.59	0.00	0.00	212.59	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2064	0.00	0.00	50.56	4.04	0.00	0.00	54.60	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2065	0.00	0.00	68.78	0.00	0.00	0.00	68.78	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2066	0.00	0.00	61.06	0.00	0.00	0.00	61.06	37.23	54.28	314.51	71.20	129.20	192.36	-78.24
2067	0.00	0.00	68.92	0.00	0.00	0.00	68.92	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2068	0.00	0.00	10.41	0.00	0.00	0.00	10.41	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2069	0.00	0.00	50.82	0.00	0.00	0.00	50.82	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2070	0.00	0.00	69.13	0.00	14.67	0.00	83.80	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2071	0.00	0.00	61.36	0.00	13.19	0.00	74.56	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2072	0.00	0.00	69.26	0.00	23.07	0.00	92.33	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2073	0.00	0.00	61.48	0.00	8.88	0.00	70.37	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2074	0.00	0.00	69.40	0.00	4.57	0.00	73.97	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2075	0.00	0.00	10.49	0.00	44.23	0.00	54.72	37.23	66.88	314.51	71.20	129.20	192.36	-78.24
2076	0.00	0.00	0.00	0.00	1.93	0.00	1.93	37.23	54.28	314.51	71.20	129.20	192.36	-78.24
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	68.62	314.51	71.20	129.20	192.36	-78.24
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	314.51	71.20	129.20	192.36	-78.24
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	37.23	68.62	314.51	71.20	129.20	192.36	-78.24
2080	0.00	0.00	0.00	7.06	0.00	0.00	7.06	37.23	53.13	314.51	71.20	129.20	192.36	-78.24
2081	0.00	0.00	0.00	215.62	0.00	0.00	215.62	37.23	68.62	314.51	71.20	129.20	192.36	-78.24
2082	0.00	0.00	0.00	219.66	0.00	0.00	219.66	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2083	0.00	0.00	0.00	212.59	0.00	0.00	212.59	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2084	0.00	0.00	0.00	4.04	9.87	0.00	13.90	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	54.28	314.51	71.20	129.20	192.36	-78.24
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
2090	0.00	0.00	0.00	0.00	13.30	0.00	13.30	37.23	51.39	314.51	71.20	129.20	192.36	-78.24
Salvage Value	4.24	0.00	5.27	9.83	3.35	0.00	22.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	244.56	686.48	129.48	0.00	4610.30	447.54	505.89	7792.58	1773.33	973.66	2723.24	2322.35

Net Present Value -3241

K19/C25/750MW (WPS Sale &Inv)

TABLE 046
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	3.71	273.08	1.37	0.00	305.83	101.20	19.48	96.63	88.52
2015	85.96	477.40	0.00	0.00	18.59	6.63	588.59	4.31	0.00	335.18	99.35	23.08	100.34	112.41
2016	179.08	632.15	0.00	0.00	25.44	16.86	853.53	8.58	0.00	345.50	97.54	24.20	102.65	121.10
2017	208.35	766.12	0.00	0.00	37.23	24.52	1036.22	13.76	0.00	360.99	95.61	25.86	105.56	133.96
2018	250.44	540.20	0.00	0.00	39.13	101.55	931.32	18.41	0.00	345.80	93.56	26.47	106.70	119.07
2019	256.44	386.37	0.00	0.00	49.83	83.68	776.33	22.30	12.78	372.31	93.49	25.08	106.40	147.34
2020	706.88	157.77	0.00	0.00	3.48	155.11	1023.24	27.41	44.08	606.42	100.50	19.87	121.52	364.53
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	33.57	42.24	685.12	101.05	21.85	130.95	431.27
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	38.77	40.92	682.51	99.89	21.86	133.39	427.37
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	42.60	39.11	652.54	97.60	21.73	137.51	395.69
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	45.43	37.57	630.10	95.44	24.15	142.99	367.52
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	47.52	50.01	649.57	99.98	21.44	111.61	416.54
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	48.63	48.49	847.21	107.95	21.38	112.35	605.53
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	48.82	47.09	883.47	107.99	20.92	122.88	631.68
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	46.10	873.86	106.35	21.62	126.01	619.88
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	47.36	853.82	104.46	21.65	129.03	598.67
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	42.28	844.34	103.14	21.19	130.71	589.29
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	40.98	832.25	101.52	21.65	134.27	574.80
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	39.52	813.86	99.86	21.70	137.47	554.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	38.53	790.22	98.10	21.72	140.59	529.79
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	37.61	767.97	96.41	21.89	144.64	505.03
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	38.86	728.88	94.76	21.68	141.33	471.11
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	35.47	661.27	93.17	22.08	126.32	419.70
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	48.82	34.96	629.68	91.58	22.18	127.58	388.33
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	34.46	605.06	89.96	22.14	132.15	360.80
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	49.21	36.82	582.15	88.38	22.09	143.66	328.03
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	49.78	33.50	578.78	87.12	21.00	153.59	317.07
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	49.86	36.31	560.22	85.15	37.47	155.28	282.32
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	50.25	35.87	545.98	83.64	41.79	161.22	259.33
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	50.83	35.44	535.56	82.31	44.10	169.03	240.12
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	51.30	40.65	531.84	81.11	50.58	177.69	222.46
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	52.20	43.10	507.70	79.30	65.45	178.72	184.24
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	52.28	43.79	496.40	77.89	79.42	184.32	154.78
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	42.56	483.06	76.63	83.00	192.84	130.58
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	41.34	495.72	77.94	75.96	185.29	156.53
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	52.28	43.83	495.72	77.94	75.96	185.29	156.53
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	52.28	42.36	495.72	77.94	75.96	185.29	156.53
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	52.28	42.03	495.72	77.94	75.96	185.29	156.53
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	52.28	41.72	495.72	77.94	75.96	185.29	156.53
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	52.28	41.42	495.72	77.94	75.96	185.29	156.53
2054	0.00	0.00	0.00	0.00	17.32	18.17	35.50	52.28	41.12	495.72	77.94	75.96	185.29	156.53
2055	0.00	0.00	0.00	0.00	0.86	18.85	19.70	52.28	41.96	495.72	77.94	75.96	185.29	156.53
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	52.28	54.06	495.72	77.94	75.96	185.29	156.53
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	52.28	38.57	495.72	77.94	75.96	185.29	156.53
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	52.28	53.53	495.72	77.94	75.96	185.29	156.53
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	52.28	40.90	495.72	77.94	75.96	185.29	156.53
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	52.28	50.37	495.72	77.94	75.96	185.29	156.53
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	65.59	495.72	77.94	75.96	185.29	156.53
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	52.28	65.59	495.72	77.94	75.96	185.29	156.53
2065	0.00	0.00	0.00	0.00	8.50	4.10	12.60	52.28	37.99	495.72	77.94	75.96	185.29	156.53
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	52.28	65.59	495.72	77.94	75.96	185.29	156.53
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	52.28	65.59	495.72	77.94	75.96	185.29	156.53
2069	0.00	0.00	76.94	0.00	32.51	55.39	164.84	52.28	37.99	495.72	77.94	75.96	185.29	156.53
2070	0.00	0.00	105.09	0.00	2.62	57.44	165.15	52.28	52.08	495.72	77.94	75.96	185.29	156.53
2071	0.00	0.00	15.94	0.00	31.87	0.00	47.82	52.28	36.85	495.72	77.94	75.96	185.29	156.53
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	52.28	52.08	495.72	77.94	75.96	185.29	156.53
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	52.28	36.00	495.72	77.94	75.96	185.29	156.53
2074	0.00	0.00	95.07	0.00	49.15	0.00	144.22	52.28	50.37	495.72	77.94	75.96	185.29	156.53
2075	0.00	0.00	107.74	0.00	73.92	0.00	181.66	52.28	37.99	495.72	77.94	75.96	185.29	156.53
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	52.28	52.08	495.72	77.94	75.96	185.29	156.53
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	36.85	495.72	77.94	75.96	185.29	156.53
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	52.28	52.08	495.72	77.94	75.96	185.29	156.53
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	39.70	495.72	77.94	75.96	185.29	156.53
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	52.28	52.08	495.72	77.94	75.96	185.29	156.53
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	52.28	37.99	495.72	77.94	75.96	185.29	156.53
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	52.28	35.14	495.72	77.94	75.96	185.29	156.53
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	52.28	37.99	495.72	77.94	75.96	185.29	156.53
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	52.28	37.99	495.72	77.94	75.96	185.29	156.53
Salvage Value	7.48	0.00	21.73	0.00	34.06	15.84	79.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	322.69	0.00	545.81	377.72	8590.62	1165.64	974.39	16221.18	2594.75	1132.54	4096.71	8397.18

Net Present Value -2333

K19/C25/750MW

TABLE 047
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	5.19	274.56	1.37	0.00	306.80	101.20	19.48	96.25	89.88
2015	85.96	477.40	0.00	0.00	18.59	8.41	590.37	4.32	0.00	337.13	99.35	23.11	100.29	114.38
2016	179.08	632.15	0.00	0.00	25.44	17.62	854.30	8.60	0.00	346.69	97.53	24.16	102.58	122.41
2017	208.35	766.12	0.00	0.00	37.23	24.52	1036.22	13.78	0.00	361.24	95.61	25.83	105.49	134.31
2018	250.44	540.20	0.00	0.00	39.13	143.53	973.30	18.64	0.00	344.82	93.55	26.40	106.66	118.21
2019	256.44	386.37	0.00	0.00	49.83	98.87	791.51	22.60	12.78	371.04	93.48	25.05	106.40	146.10
2020	706.88	157.77	0.00	0.00	3.48	273.35	1141.47	28.31	47.15	609.69	100.50	19.84	121.14	368.21
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	34.47	45.41	688.50	101.06	21.99	130.87	434.58
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	39.67	44.12	685.89	99.89	21.86	133.13	431.01
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	43.49	42.17	656.55	97.60	21.73	137.34	399.87
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	46.33	40.51	634.30	95.42	24.20	142.84	371.84
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	48.41	52.82	653.74	99.97	21.47	111.33	420.98
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	49.53	51.19	831.50	107.94	21.47	109.03	593.06
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	49.72	49.67	846.10	108.00	20.77	114.30	603.04
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	48.57	835.00	106.36	21.58	116.78	590.28
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	49.73	817.34	104.46	21.65	120.01	571.21
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	44.54	810.43	103.13	21.21	121.78	564.30
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	43.14	801.25	101.51	21.76	125.38	552.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	41.59	786.08	99.85	21.76	129.00	535.48
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	40.50	765.90	98.11	21.66	132.62	513.50
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	39.49	747.22	96.42	21.79	137.33	491.69
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	40.66	679.55	94.82	21.90	121.74	441.10
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	37.19	650.15	93.17	22.11	123.24	411.63
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	49.72	36.60	627.57	91.56	22.12	126.90	386.99
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	36.04	603.86	89.96	22.10	131.35	360.44
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	50.10	38.33	581.75	88.38	22.13	142.81	328.43
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	50.67	34.95	578.23	87.12	21.00	152.75	317.36
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	50.75	37.70	559.82	85.15	37.47	154.67	282.53
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	51.14	37.20	545.75	83.64	41.79	160.70	259.63
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	51.72	36.72	535.10	82.31	44.10	168.40	240.29
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	52.20	41.87	531.55	81.11	50.58	177.17	222.69
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	53.10	44.26	507.50	79.30	65.45	178.32	184.43
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	53.18	44.90	496.07	77.89	79.42	183.79	154.97
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	43.62	482.75	76.63	83.00	192.34	130.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	42.35	495.44	77.94	75.96	184.82	156.73
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	53.18	44.80	495.44	77.94	75.96	184.82	156.73
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	53.18	43.28	495.44	77.94	75.96	184.82	156.73
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	53.18	42.91	495.44	77.94	75.96	184.82	156.73
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	53.18	42.55	495.44	77.94	75.96	184.82	156.73
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	53.18	42.21	495.44	77.94	75.96	184.82	156.73
2054	0.00	0.00	0.00	0.00	17.32	18.17	35.50	53.18	41.87	495.44	77.94	75.96	184.82	156.73
2055	0.00	0.00	0.00	0.00	0.86	18.85	19.70	53.18	42.68	495.44	77.94	75.96	184.82	156.73
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	53.18	54.74	495.44	77.94	75.96	184.82	156.73
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	53.18	39.21	495.44	77.94	75.96	184.82	156.73
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	53.18	54.14	495.44	77.94	75.96	184.82	156.73
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	53.18	41.48	495.44	77.94	75.96	184.82	156.73
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	53.18	50.37	495.44	77.94	75.96	184.82	156.73
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	65.59	495.44	77.94	75.96	184.82	156.73
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	53.18	65.59	495.44	77.94	75.96	184.82	156.73
2065	0.00	0.00	0.00	0.00	8.50	4.10	12.60	53.18	37.99	495.44	77.94	75.96	184.82	156.73
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	53.18	65.59	495.44	77.94	75.96	184.82	156.73
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	53.18	65.59	495.44	77.94	75.96	184.82	156.73
2069	0.00	0.00	76.94	0.00	32.51	55.39	164.84	53.18	37.99	495.44	77.94	75.96	184.82	156.73
2070	0.00	0.00	105.09	0.00	2.62	57.44	165.15	53.18	52.08	495.44	77.94	75.96	184.82	156.73
2071	0.00	0.00	15.94	0.00	31.87	0.00	47.82	53.18	36.85	495.44	77.94	75.96	184.82	156.73
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	53.18	52.08	495.44	77.94	75.96	184.82	156.73
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	53.18	36.00	495.44	77.94	75.96	184.82	156.73
2074	0.00	0.00	95.07	0.00	49.15	0.00	144.22	53.18	50.37	495.44	77.94	75.96	184.82	156.73
2075	0.00	0.00	107.74	0.00	73.92	0.00	181.66	53.18	37.99	495.44	77.94	75.96	184.82	156.73
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	53.18	52.08	495.44	77.94	75.96	184.82	156.73
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	36.85	495.44	77.94	75.96	184.82	156.73
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	53.18	52.08	495.44	77.94	75.96	184.82	156.73
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	39.70	495.44	77.94	75.96	184.82	156.73
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	53.18	52.08	495.44	77.94	75.96	184.82	156.73
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	53.18	37.99	495.44	77.94	75.96	184.82	156.73
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	53.18	35.14	495.44	77.94	75.96	184.82	156.73
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	53.18	37.99	495.44	77.94	75.96	184.82	156.73
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	53.18	37.99	495.44	77.94	75.96	184.82	156.73
Salvage Value	7.48	0.00	21.73	0.00	34.06	15.84	79.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	322.69	0.00	545.81	528.33	8741.23	1186.69	1010.79	16046.81	2594.73	1132.60	4035.15	8284.33

Net Present Value -2654

K19/Gas25/750MW (WPS Sale & INV)

TABLE 048
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	3.71	241.92	1.21	0.00	305.83	101.20	19.48	96.63	88.52
2015	0.00	477.40	0.00	0.00	18.59	6.63	502.63	3.72	0.00	335.20	99.36	23.07	100.34	112.43
2016	0.00	632.15	0.00	0.00	25.44	16.86	674.45	7.09	0.00	345.53	97.54	24.19	102.64	121.14
2017	0.00	766.12	0.00	0.00	37.23	24.52	827.87	11.23	0.00	361.29	95.61	25.84	105.52	134.32
2018	0.00	540.20	0.00	0.00	39.13	101.55	680.89	14.64	0.00	346.27	93.55	26.42	106.64	119.65
2019	0.00	386.37	0.00	0.00	46.36	83.68	516.41	17.22	12.78	373.18	93.49	25.06	106.38	148.25
2020	0.00	157.77	0.00	0.00	0.01	155.11	312.89	18.79	44.08	607.80	100.50	19.84	121.40	366.07
2021	0.00	54.75	0.35	0.00	0.00	0.00	55.10	19.06	42.24	687.60	101.05	21.84	130.72	434.00
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.06	40.92	685.21	99.89	21.82	133.11	430.39
2023	0.00	0.00	92.47	0.00	0.00	0.00	92.47	19.41	39.11	652.81	97.11	23.26	137.70	394.74
2024	0.00	0.00	189.86	0.00	9.12	0.00	198.97	20.30	37.57	634.15	95.12	25.52	143.12	370.38
2025	0.00	0.00	114.27	0.00	71.81	0.00	186.08	21.22	39.87	560.31	94.84	24.76	129.86	310.86
2026	0.00	0.00	86.91	0.00	0.00	0.00	86.91	21.66	42.07	573.08	93.55	29.65	136.13	313.74
2027	0.00	0.00	98.49	0.00	0.00	0.00	98.49	22.15	40.80	560.70	91.60	29.07	145.87	294.16
2028	0.00	0.00	14.94	0.00	0.00	0.00	14.94	22.22	43.51	543.79	89.32	43.47	150.33	260.68
2029	0.00	0.00	73.20	0.00	0.00	0.00	73.20	22.59	44.95	528.20	87.55	48.36	156.41	235.88
2030	0.00	0.00	99.98	0.00	60.41	0.00	160.39	23.39	39.91	525.60	86.49	53.28	160.75	225.08
2031	0.00	0.00	89.10	0.00	0.00	0.00	89.10	23.84	42.71	533.06	86.13	58.02	163.48	225.42
2032	0.00	0.00	100.98	0.00	0.00	0.00	100.98	24.34	41.62	512.56	83.80	69.68	172.22	186.86
2033	0.00	0.00	15.32	0.00	0.00	0.00	15.32	24.42	44.48	503.30	82.29	83.49	178.50	159.02
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	43.45	499.81	81.56	88.02	183.03	147.20
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	42.03	428.21	79.46	84.43	176.17	88.15
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	41.50	350.36	78.03	86.07	155.69	30.57
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	40.99	323.56	76.63	94.03	157.06	-4.17
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	40.49	319.92	75.92	92.55	166.70	-15.25
2039	0.00	0.00	158.62	0.00	0.00	0.00	158.62	25.21	42.85	294.58	74.00	113.56	174.03	-67.02
2040	0.00	0.00	229.15	0.00	0.00	0.00	229.15	26.36	39.54	280.25	72.68	125.62	179.72	-97.78
2041	0.00	0.00	102.63	0.00	9.12	0.00	111.75	26.92	39.08	291.90	72.96	124.83	179.53	-85.42
2042	0.00	0.00	7.55	0.00	0.00	0.00	7.55	26.95	45.44	336.23	70.73	192.83	181.46	-108.79
2043	0.00	0.00	78.50	0.00	0.00	0.00	78.50	27.35	45.01	314.25	69.02	209.18	188.71	-152.66
2044	0.00	0.00	107.21	0.00	60.41	0.00	167.62	28.18	46.30	291.02	67.43	223.76	196.09	-196.26
2045	0.00	0.00	51.14	0.00	0.00	0.00	51.14	28.44	49.83	280.22	66.13	246.38	201.89	-234.19
2046	0.00	0.00	47.63	0.00	0.00	0.00	47.63	28.68	49.44	268.06	64.96	265.19	208.05	-270.14
2047	0.00	0.00	7.23	0.00	0.00	0.00	7.23	28.71	49.62	262.19	64.16	272.82	218.47	-293.27
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	48.40	270.16	65.09	261.46	209.47	-265.86
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	28.71	50.90	270.16	65.09	261.46	209.47	-265.86
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	28.71	47.72	270.16	65.09	261.46	209.47	-265.86
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	28.71	47.40	270.16	65.09	261.46	209.47	-265.86
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	28.71	47.08	270.16	65.09	261.46	209.47	-265.86
2053	0.00	0.00	71.04	0.00	20.19	18.17	109.40	28.71	46.77	270.16	65.09	261.46	209.47	-265.86
2054	0.00	0.00	168.43	0.00	16.47	18.17	203.07	28.71	46.47	270.16	65.09	261.46	209.47	-265.86
2055	0.00	0.00	112.23	0.00	0.00	18.85	131.08	28.71	46.18	270.16	65.09	261.46	209.47	-265.86
2056	0.00	0.00	86.91	0.00	0.00	0.00	86.91	28.71	61.13	270.16	65.09	261.46	209.47	-265.86
2057	0.00	0.00	98.49	0.00	0.00	0.00	98.49	28.71	45.63	270.16	65.09	261.46	209.47	-265.86
2058	0.00	0.00	14.94	0.00	0.00	0.00	14.94	28.71	60.60	270.16	65.09	261.46	209.47	-265.86
2059	0.00	0.00	73.20	0.00	9.12	0.00	82.32	28.71	47.96	270.16	65.09	261.46	209.47	-265.86
2060	0.00	0.00	99.98	0.00	53.86	0.00	153.83	28.71	57.43	270.16	65.09	261.46	209.47	-265.86
2061	0.00	0.00	89.10	0.00	0.00	0.00	89.10	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2062	0.00	0.00	100.98	0.00	0.00	0.00	100.98	28.71	57.43	270.16	65.09	261.46	209.47	-265.86
2063	0.00	0.00	15.32	0.00	0.00	0.00	15.32	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	28.71	57.43	270.16	65.09	261.46	209.47	-265.86
2065	0.00	0.00	0.00	0.00	53.80	4.10	57.91	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	28.71	57.43	270.16	65.09	261.46	209.47	-265.86
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	28.71	57.43	270.16	65.09	261.46	209.47	-265.86
2069	0.00	0.00	158.62	0.00	29.89	55.39	243.90	28.71	45.05	270.16	65.09	261.46	209.47	-265.86
2070	0.00	0.00	229.15	0.00	0.01	57.44	286.60	28.71	43.92	270.16	65.09	261.46	209.47	-265.86
2071	0.00	0.00	102.63	0.00	0.00	0.00	102.63	28.71	43.92	270.16	65.09	261.46	209.47	-265.86
2072	0.00	0.00	7.55	0.00	0.00	0.00	7.55	28.71	43.92	270.16	65.09	261.46	209.47	-265.86
2073	0.00	0.00	78.50	0.00	0.00	0.00	78.50	28.71	43.06	270.16	65.09	261.46	209.47	-265.86
2074	0.00	0.00	107.21	0.00	0.00	0.00	107.21	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2075	0.00	0.00	51.14	0.00	17.95	0.00	69.09	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2076	0.00	0.00	47.63	0.00	9.12	0.00	56.75	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2077	0.00	0.00	7.23	0.00	0.00	0.00	7.23	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	28.71	45.05	270.16	65.09	261.46	209.47	-265.86
2080	0.00	0.00	0.00	0.00	15.10	0.00	15.10	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2083	0.00	0.00	71.04	0.00	0.00	0.00	71.04	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2084	0.00	0.00	168.43	0.00	10.41	0.67	179.51	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2085	0.00	0.00	112.23	0.00	10.09	1.35	123.67	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2086	0.00	0.00	86.91	0.00	24.42	4.04	115.36	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2087	0.00	0.00	98.49	0.00	28.37	6.06	132.92	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2088	0.00	0.00	14.94	0.00	20.19	18.17	53.30	28.71	42.21	270.16	65.09	261.46	209.47	-265.86
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	28.71	45.05	270.16	65.09	261.46	209.47	-265.86
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	28.71	45.05	270.16	65.09	261.46	209.47	-265.86
Salvage Value	0.00	0.00	69.00	0.00	18.88	15.84	103.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1282.78	0.00	357.34	377.72	4957.29	621.82	1020.30	11399.09	2332.94	3355.53	4593.38	1117.23

Net Present Value -5482

K19/C31/750MW | **TABLE 049** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	217.56	0.00	0.00	20.64	5.19	273.93	1.37	0.00	306.80	101.20	19.48	96.25	89.88
2015	38.54	477.40	0.00	0.00	18.59	8.41	542.95	4.08	0.00	337.13	99.35	23.11	100.29	114.38
2016	10.47	632.15	0.00	0.00	25.44	17.62	685.69	7.51	0.00	346.69	97.53	24.16	102.58	122.41
2017	10.54	766.12	0.00	0.00	37.23	24.52	838.40	11.70	0.00	361.64	95.61	25.83	105.49	134.71
2018	12.52	540.20	0.00	0.00	39.13	143.53	735.39	15.38	0.00	345.26	93.53	26.39	106.60	118.74
2019	12.59	386.37	0.00	0.00	46.36	98.87	544.19	18.10	12.78	371.83	93.47	25.09	106.37	146.90
2020	12.67	157.77	0.00	0.00	0.01	273.35	443.79	20.32	47.15	611.17	100.49	19.89	121.02	369.77
2021	16.02	54.75	0.00	0.00	0.00	0.00	70.77	20.68	45.41	690.58	101.04	21.95	130.57	437.02
2022	162.04	0.00	0.00	0.00	0.00	0.00	162.04	21.49	44.12	688.92	99.90	21.84	132.81	434.37
2023	247.17	0.00	0.00	0.00	0.00	0.00	247.17	22.72	42.17	655.36	97.01	23.51	137.78	397.06
2024	268.52	0.00	0.00	0.00	0.00	0.00	268.52	24.06	40.51	636.09	94.94	26.15	144.07	370.92
2025	273.67	0.00	0.00	0.00	3.47	0.00	277.14	25.45	38.77	561.17	94.86	18.85	136.96	310.50
2026	740.31	0.00	0.00	0.00	3.47	0.00	743.78	29.17	36.92	542.14	92.99	19.46	150.25	279.44
2027	1175.50	0.00	0.00	0.00	42.16	0.00	1217.66	35.26	35.54	497.04	91.09	18.32	148.74	238.89
2028	1055.42	0.00	0.00	0.00	21.87	0.00	1077.29	40.64	34.22	475.70	89.55	19.02	161.70	205.43
2029	753.68	0.00	0.00	0.00	36.80	0.00	790.48	44.60	35.55	460.10	87.96	19.58	178.18	174.38
2030	521.97	0.00	0.00	0.00	63.72	0.00	585.69	47.52	30.41	456.12	86.65	20.02	191.83	157.61
2031	342.84	0.00	0.00	0.00	85.37	0.00	428.22	49.67	43.23	535.56	90.62	23.13	120.00	301.80
2032	126.27	0.00	0.00	0.00	100.61	0.00	226.89	50.80	42.25	712.62	97.74	22.71	115.87	476.30
2033	39.85	0.00	0.00	0.00	0.00	0.00	39.85	51.00	40.96	769.49	98.20	22.21	132.97	516.11
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	40.05	747.38	96.43	21.78	137.24	491.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	38.37	678.47	94.82	21.76	121.66	440.23
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	37.71	650.08	93.17	22.24	123.23	411.44
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	51.00	36.95	627.99	91.57	22.17	126.93	387.31
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	36.03	603.92	89.96	22.09	131.35	360.52
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	51.38	38.39	581.83	88.39	22.12	142.81	328.51
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	51.95	35.12	578.23	87.12	21.00	152.76	317.35
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	52.03	41.20	559.82	85.15	37.47	154.66	282.54
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	52.43	37.85	545.75	83.64	41.79	160.71	259.62
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	53.00	37.36	535.10	82.31	44.10	168.41	240.28
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	53.48	42.52	531.55	81.11	50.58	177.16	222.70
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	54.38	42.06	507.50	79.30	65.45	178.32	184.43
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	54.46	45.55	496.07	77.89	79.42	183.80	154.96
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	43.62	482.75	76.63	83.00	192.34	130.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	42.35	495.44	77.94	75.96	184.82	156.72
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	54.46	44.80	495.44	77.94	75.96	184.82	156.72
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	54.46	41.57	495.44	77.94	75.96	184.82	156.72
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	54.46	44.05	495.44	77.94	75.96	184.82	156.72
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	54.46	40.84	495.44	77.94	75.96	184.82	156.72
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	54.46	40.50	495.44	77.94	75.96	184.82	156.72
2054	0.00	0.00	0.00	0.00	16.47	18.17	34.64	54.46	40.16	495.44	77.94	75.96	184.82	156.72
2055	0.00	0.00	0.00	0.00	0.00	18.85	18.85	54.46	39.83	495.44	77.94	75.96	184.82	156.72
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	56.45	495.44	77.94	75.96	184.82	156.72
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	40.92	495.44	77.94	75.96	184.82	156.72
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	55.85	495.44	77.94	75.96	184.82	156.72
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	43.18	495.44	77.94	75.96	184.82	156.72
2060	0.00	0.00	0.00	0.00	0.86	0.00	0.86	54.46	52.08	495.44	77.94	75.96	184.82	156.72
2061	0.00	0.00	0.00	0.00	0.86	0.00	0.86	54.46	37.99	495.44	77.94	75.96	184.82	156.72
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2063	0.00	0.00	0.00	0.00	5.14	0.00	5.14	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2064	0.00	0.00	0.00	0.00	18.81	2.05	20.86	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2065	0.00	0.00	0.00	0.00	23.07	4.10	27.17	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2066	0.00	0.00	0.00	0.00	21.59	12.31	33.90	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2067	0.00	0.00	0.00	0.00	33.71	18.46	52.18	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	54.46	65.59	495.44	77.94	75.96	184.82	156.72
2069	0.00	0.00	76.94	0.00	29.89	55.39	162.23	54.46	37.99	495.44	77.94	75.96	184.82	156.72
2070	0.00	0.00	105.09	0.00	0.01	57.44	162.54	54.46	52.08	495.44	77.94	75.96	184.82	156.72
2071	0.00	0.00	15.94	0.00	0.00	0.00	15.94	54.46	39.70	495.44	77.94	75.96	184.82	156.72
2072	0.00	0.00	78.10	0.00	0.00	0.00	78.10	54.46	52.08	495.44	77.94	75.96	184.82	156.72
2073	0.00	0.00	106.67	0.00	0.00	0.00	106.67	54.46	36.00	495.44	77.94	75.96	184.82	156.72
2074	0.00	0.00	95.07	0.00	0.00	0.00	95.07	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2075	0.00	0.00	107.74	0.00	11.73	0.00	119.47	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2076	0.00	0.00	16.34	0.00	2.61	0.00	18.96	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2077	0.00	0.00	0.00	0.00	31.87	0.00	31.87	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2078	0.00	0.00	0.00	0.00	25.85	0.00	25.85	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2079	0.00	0.00	0.00	0.00	28.23	0.00	28.23	54.46	37.99	495.44	77.94	75.96	184.82	156.72
2080	0.00	0.00	0.00	0.00	103.00	0.00	103.00	54.46	50.37	495.44	77.94	75.96	184.82	156.72
2081	0.00	0.00	0.00	0.00	64.80	0.00	64.80	54.46	37.99	495.44	77.94	75.96	184.82	156.72
2082	0.00	0.00	0.00	0.00	75.76	0.00	75.76	54.46	52.08	495.44	77.94	75.96	184.82	156.72
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	36.85	495.44	77.94	75.96	184.82	156.72
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	54.46	52.08	495.44	77.94	75.96	184.82	156.72
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	54.46	36.85	495.44	77.94	75.96	184.82	156.72
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	54.46	52.08	495.44	77.94	75.96	184.82	156.72
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	54.46	35.14	495.44	77.94	75.96	184.82	156.72
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	54.46	37.99	495.44	77.94	75.96	184.82	156.72
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	54.46	37.99	495.44	77.94	75.96	184.82	156.72
Salvage Value	55.10	0.00	21.73	0.00	38.18	15.84	130.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3753.27	2939.45	322.69	0.00	485.48	528.33	8029.23	1083.29	953.49	14722.87	2531.54	1128.60	4198.69	6864.04

Net Present Value -3202

K19/Gas31/750MW | **TABLE 050** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	5.19	243.40	1.22	0.00	306.80	101.20	19.48	96.25	89.88
2015	0.00	477.40	0.00	0.00	18.59	8.41	504.40	3.74	0.00	337.13	99.35	23.11	100.29	114.38
2016	0.00	632.15	0.00	0.00	25.44	17.62	675.22	7.12	0.00	346.69	97.53	24.16	102.58	122.41
2017	0.00	766.12	0.00	0.00	37.23	24.52	827.87	11.25	0.00	361.64	95.61	25.83	105.49	134.71
2018	0.00	540.20	0.00	0.00	39.13	143.53	722.87	14.87	0.00	345.26	93.53	26.39	106.60	118.74
2019	0.00	386.37	0.00	0.00	46.36	98.87	531.59	17.53	12.78	371.83	93.47	25.09	106.37	146.90
2020	0.00	157.77	0.00	0.00	0.01	273.35	431.12	19.68	47.15	611.17	100.49	19.89	121.02	369.77
2021	0.00	54.75	0.00	0.00	0.00	0.00	54.75	19.96	45.41	690.58	101.04	21.95	130.57	437.02
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	44.12	688.87	99.90	21.86	132.84	434.27
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	42.17	655.89	97.01	23.51	137.76	397.61
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	40.51	636.96	94.94	26.17	144.00	371.84
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	38.77	563.35	94.85	18.87	137.32	312.32
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	36.92	546.35	92.98	19.58	151.08	282.71
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	19.96	35.54	502.35	91.08	18.38	149.42	243.47
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.96	34.22	483.64	89.53	19.02	163.45	211.64
2029	0.00	0.00	167.83	0.00	0.00	0.00	167.83	20.69	35.55	466.54	88.02	19.29	178.02	181.21
2030	0.00	0.00	294.95	0.00	18.24	0.00	313.19	22.15	30.41	468.89	87.44	17.17	187.67	176.61
2031	0.00	0.00	132.85	0.00	71.81	0.00	204.66	23.16	37.01	457.62	85.32	39.56	152.25	180.49
2032	0.00	0.00	89.55	0.00	0.00	0.00	89.55	23.61	39.74	447.39	83.77	50.24	156.84	156.55
2033	0.00	0.00	101.48	0.00	0.00	0.00	101.48	24.12	38.59	433.40	82.35	55.23	162.33	133.50
2034	0.00	0.00	15.39	0.00	0.00	0.00	15.39	24.19	41.38	433.62	81.57	59.88	168.54	123.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.19	39.87	359.99	79.49	72.53	150.19	57.79
2036	0.00	0.00	156.26	0.00	0.00	0.00	156.26	24.97	39.26	334.64	78.08	79.24	151.74	25.58
2037	0.00	0.00	225.75	0.00	0.00	0.00	225.75	26.10	38.68	320.07	76.79	86.67	156.43	0.17
2038	0.00	0.00	101.11	0.00	60.41	0.00	161.52	26.91	38.12	327.53	76.66	80.14	166.02	4.69
2039	0.00	0.00	7.44	0.00	0.00	0.00	7.44	26.95	47.22	374.05	74.42	155.97	166.97	-23.32
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.95	43.85	351.55	72.57	168.84	174.45	-64.32
2041	0.00	0.00	77.72	0.00	0.00	0.00	77.72	27.34	43.33	334.56	71.13	180.96	180.42	-97.96
2042	0.00	0.00	267.15	0.00	0.00	0.00	267.15	28.67	42.83	318.92	69.81	194.57	186.25	-131.71
2043	0.00	0.00	248.71	0.00	0.00	0.00	248.71	29.91	46.26	314.04	68.96	206.79	191.70	-153.41
2044	0.00	0.00	104.18	0.00	60.41	0.00	164.59	30.74	47.51	312.58	68.65	198.23	201.99	-156.30
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.78	53.86	361.08	66.69	284.95	192.16	-182.73
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	53.43	346.91	65.52	298.56	197.68	-214.84
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	52.15	325.34	64.29	310.73	203.34	-253.01
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	50.88	344.44	65.50	298.08	197.72	-216.86
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	30.78	53.33	344.44	65.50	298.08	197.72	-216.86
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	30.78	50.10	344.44	65.50	298.08	197.72	-216.86
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	30.78	49.74	344.44	65.50	298.08	197.72	-216.86
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	30.78	49.38	344.44	65.50	298.08	197.72	-216.86
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	30.78	49.03	344.44	65.50	298.08	197.72	-216.86
2054	0.00	0.00	0.00	0.00	16.47	18.17	34.64	30.78	48.69	344.44	65.50	298.08	197.72	-216.86
2055	0.00	0.00	0.00	0.00	0.00	18.85	18.85	30.78	48.36	344.44	65.50	298.08	197.72	-216.86
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	63.27	344.44	65.50	298.08	197.72	-216.86
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	47.74	344.44	65.50	298.08	197.72	-216.86
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	62.67	344.44	65.50	298.08	197.72	-216.86
2059	0.00	0.00	146.40	0.00	0.00	0.00	146.40	30.78	50.00	344.44	65.50	298.08	197.72	-216.86
2060	0.00	0.00	273.52	0.00	0.00	0.00	273.52	30.78	58.90	344.44	65.50	298.08	197.72	-216.86
2061	0.00	0.00	130.81	0.00	0.00	0.00	130.81	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2062	0.00	0.00	89.55	0.00	0.00	0.00	89.55	30.78	58.90	344.44	65.50	298.08	197.72	-216.86
2063	0.00	0.00	101.48	0.00	0.00	0.00	101.48	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2064	0.00	0.00	15.39	0.00	10.23	2.05	27.68	30.78	58.90	344.44	65.50	298.08	197.72	-216.86
2065	0.00	0.00	0.00	0.00	26.73	4.10	30.84	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2066	0.00	0.00	156.26	0.00	54.88	12.31	223.45	30.78	58.90	344.44	65.50	298.08	197.72	-216.86
2067	0.00	0.00	225.75	0.00	8.86	18.46	253.07	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2068	0.00	0.00	101.11	0.00	18.95	55.39	175.44	30.78	58.90	344.44	65.50	298.08	197.72	-216.86
2069	0.00	0.00	7.44	0.00	29.89	55.39	92.72	30.78	46.52	344.44	65.50	298.08	197.72	-216.86
2070	0.00	0.00	0.00	0.00	0.01	57.44	57.45	30.78	45.38	344.44	65.50	298.08	197.72	-216.86
2071	0.00	0.00	77.72	0.00	0.00	0.00	77.72	30.78	45.38	344.44	65.50	298.08	197.72	-216.86
2072	0.00	0.00	267.15	0.00	0.00	0.00	267.15	30.78	45.38	344.44	65.50	298.08	197.72	-216.86
2073	0.00	0.00	248.71	0.00	45.31	0.00	294.01	30.78	44.53	344.44	65.50	298.08	197.72	-216.86
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2075	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	30.78	46.52	344.44	65.50	298.08	197.72	-216.86
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2081	0.00	0.00	0.00	0.00	17.95	0.00	17.95	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2088	0.00	0.00	0.00	0.00	35.29	18.17	53.46	30.78	43.67	344.44	65.50	298.08	197.72	-216.86
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	30.78	46.52	344.44	65.50	298.08	197.72	-216.86
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	30.78	46.52	344.44	65.50	298.08	197.72	-216.86
Salvage Value	0.00	0.00	41.11	0.00	20.74	15.84	77.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1280.02	0.00	333.95	528.33	5081.75	640.64	1017.33	11787.83	2335.99	3582.44	4499.69	1369.70

Net Present Value -5370

K19/C25/250MW | **TABLE 051** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	3.90	273.27	1.38	0.00	306.80	101.20	19.48	96.25	89.88
2015	85.96	477.40	0.00	0.00	18.59	2.67	584.63	4.30	0.00	337.13	99.35	23.11	100.29	114.38
2016	179.08	632.15	0.00	0.00	25.44	3.89	840.56	8.51	0.00	346.69	97.53	24.16	102.58	122.41
2017	208.35	766.12	0.00	0.00	37.23	5.84	1017.53	13.59	0.00	361.24	95.61	25.83	105.49	134.31
2018	250.44	540.20	0.00	0.00	39.13	17.51	847.28	17.83	0.00	341.12	92.97	28.34	107.46	112.35
2019	256.44	386.37	0.00	0.00	49.83	17.51	710.15	21.38	12.78	364.44	92.61	28.44	107.58	135.81
2020	706.88	157.77	0.00	0.00	3.48	18.16	886.28	25.81	12.99	573.14	100.82	20.40	108.94	342.98
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	31.97	12.75	637.37	101.41	20.88	115.44	399.64
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	37.17	12.97	625.61	99.54	21.84	118.95	385.28
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	41.00	12.80	609.95	97.39	21.87	126.98	363.71
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	43.83	12.75	598.52	95.11	24.28	137.28	341.85
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	45.92	26.59	604.75	99.78	21.63	98.88	384.46
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	47.03	26.40	760.78	107.31	21.21	94.96	537.29
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	47.22	26.29	757.93	106.74	20.06	97.92	533.21
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	26.56	744.08	105.03	20.87	100.25	517.94
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	29.04	724.99	103.29	21.04	101.56	499.10
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	25.13	715.79	102.03	20.80	102.01	490.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.96	702.24	100.44	21.23	103.92	476.65
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.60	684.77	98.84	21.40	106.22	458.32
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.67	662.77	97.20	21.49	108.04	436.05
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.78	641.51	95.58	21.66	110.49	413.77
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	26.81	604.04	94.00	21.83	108.11	380.10
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	47.22	23.97	576.57	92.45	22.14	109.51	352.46
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	23.97	552.04	90.92	22.09	111.69	327.34
2038	0.00	0.00	97.99	0.00	0.00	0.00	97.99	47.60	23.97	526.09	89.39	22.06	114.58	300.06
2039	0.00	0.00	125.99	0.00	9.12	0.00	135.11	48.17	26.81	517.85	88.23	20.85	126.71	282.08
2040	0.00	0.00	15.86	0.00	0.00	0.00	15.86	48.25	27.88	501.32	86.25	36.58	130.34	248.16
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	27.23	488.16	84.76	41.08	135.69	226.64
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	48.64	27.23	477.47	83.45	43.71	141.48	208.82
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	49.22	27.23	465.16	82.08	43.44	150.51	189.13
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	49.70	32.86	453.64	80.55	65.71	150.34	157.04
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	50.59	35.70	439.38	79.16	72.35	156.30	131.57
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	50.68	36.78	431.03	77.82	82.15	165.06	105.99
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.93	417.02	76.44	83.10	177.71	79.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.08	429.14	77.81	79.20	166.36	105.78
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	50.68	37.92	429.14	77.81	79.20	166.36	105.78
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	50.68	36.79	429.14	77.81	79.20	166.36	105.78
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	50.68	36.80	429.14	77.81	79.20	166.36	105.78
2052	0.00	0.00	0.00	0.00	28.37	1.44	29.81	50.68	36.80	429.14	77.81	79.20	166.36	105.78
2053	0.00	0.00	0.00	0.00	20.19	4.33	24.51	50.68	36.81	429.14	77.81	79.20	166.36	105.78
2054	0.00	0.00	0.00	0.00	17.32	4.33	21.65	50.68	36.81	429.14	77.81	79.20	166.36	105.78
2055	0.00	0.00	0.00	0.00	0.86	4.49	5.34	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	50.68	50.33	429.14	77.81	79.20	166.36	105.78
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	50.68	50.33	429.14	77.81	79.20	166.36	105.78
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	50.68	50.33	429.14	77.81	79.20	166.36	105.78
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	65.55	429.14	77.81	79.20	166.36	105.78
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2064	0.00	0.00	0.00	0.00	10.23	3.74	13.98	50.68	65.55	429.14	77.81	79.20	166.36	105.78
2065	0.00	0.00	0.00	0.00	8.50	2.35	10.85	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2066	0.00	0.00	0.00	0.00	1.02	2.93	3.95	50.68	65.55	429.14	77.81	79.20	166.36	105.78
2067	0.00	0.00	0.00	0.00	8.86	4.39	13.25	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2068	0.00	0.00	76.56	0.00	18.95	13.18	108.69	50.68	65.55	429.14	77.81	79.20	166.36	105.78
2069	0.00	0.00	104.57	0.00	32.51	13.18	150.26	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2070	0.00	0.00	15.86	0.00	2.62	13.67	32.16	50.68	52.03	429.14	77.81	79.20	166.36	105.78
2071	0.00	0.00	0.00	0.00	31.87	0.00	31.87	50.68	36.81	429.14	77.81	79.20	166.36	105.78
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	50.68	52.03	429.14	77.81	79.20	166.36	105.78
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	50.68	35.95	429.14	77.81	79.20	166.36	105.78
2074	0.00	0.00	95.07	0.00	58.27	0.00	153.34	50.68	50.33	429.14	77.81	79.20	166.36	105.78
2075	0.00	0.00	107.74	0.00	64.80	0.00	172.55	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	50.68	52.03	429.14	77.81	79.20	166.36	105.78
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	36.81	429.14	77.81	79.20	166.36	105.78
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	50.68	52.03	429.14	77.81	79.20	166.36	105.78
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	39.65	429.14	77.81	79.20	166.36	105.78
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	50.68	52.03	429.14	77.81	79.20	166.36	105.78
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2084	0.00	0.00	0.00	0.00	10.41	0.16	10.57	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2087	0.00	0.00	0.00	0.00	28.37	1.44	29.81	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2088	0.00	0.00	0.00	0.00	20.19	4.33	24.51	50.68	35.10	429.14	77.81	79.20	166.36	105.78
2089	0.00	0.00	0.00	0.00	16.47	4.33	20.79	50.68	37.95	429.14	77.81	79.20	166.36	105.78
2090	0.00	0.00	0.00	0.00	0.00	4.49	4.49	50.68	37.95	429.14	77.81	79.20	166.36	105.78
Salvage Value	7.48	0.00	21.14	0.00	34.04	4.20	66.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	327.21	0.00	546.00	74.45	8292.06	1127.99	692.55	14437.67	2584.24	1176.48	3640.78	7036.16

Net Present Value -3076

K19/Gas24/250MW | **TABLE 052** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	3.90	242.11	1.22	0.00	306.80	101.20	19.48	96.25	89.88
2015	0.00	477.40	0.00	0.00	18.59	2.67	498.67	3.72	0.00	337.13	99.35	23.11	100.30	114.37
2016	0.00	632.15	0.00	0.00	25.44	3.89	661.49	7.03	0.00	346.69	97.53	24.16	102.58	122.41
2017	0.00	766.12	0.00	0.00	37.23	5.84	809.18	11.07	0.00	361.64	95.61	25.83	105.49	134.71
2018	0.00	540.20	0.00	0.00	39.13	17.51	596.85	14.06	0.00	341.66	92.97	28.30	107.40	112.99
2019	0.00	386.37	0.00	0.00	46.36	17.51	450.24	16.31	12.78	365.32	92.61	28.44	107.55	136.72
2020	0.00	157.77	0.35	0.00	0.01	18.16	176.29	17.19	12.99	574.64	100.82	20.41	108.87	344.55
2021	0.00	54.75	0.00	0.00	0.00	0.00	54.75	17.46	12.75	639.79	101.39	20.89	115.27	402.25
2022	0.00	0.00	92.12	0.00	0.00	0.00	92.12	17.81	12.97	632.00	99.97	20.62	117.39	394.02
2023	0.00	0.00	117.97	0.00	9.12	0.00	127.09	18.34	12.80	624.87	98.91	17.38	119.77	388.81
2024	0.00	0.00	14.65	0.00	0.00	0.00	14.65	18.41	16.67	618.39	97.10	28.29	122.03	370.96
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.41	16.45	508.63	94.90	21.43	115.98	276.32
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.41	16.05	485.23	92.65	24.32	120.36	247.90
2027	0.00	0.00	72.47	0.00	0.00	0.00	72.47	18.78	16.07	451.92	90.63	26.43	122.57	212.29
2028	0.00	0.00	101.02	0.00	71.81	0.00	172.83	19.63	16.13	435.15	88.86	30.57	126.93	188.79
2029	0.00	0.00	165.92	0.00	0.00	0.00	165.92	20.46	22.71	425.84	87.15	42.28	131.30	165.11
2030	0.00	0.00	218.00	0.00	0.00	0.00	218.00	21.55	18.84	424.81	86.26	45.90	133.89	158.77
2031	0.00	0.00	97.64	0.00	9.12	0.00	106.76	22.08	18.84	438.70	86.83	39.32	133.36	179.20
2032	0.00	0.00	7.18	0.00	0.00	0.00	7.18	22.12	25.64	464.94	84.31	95.61	129.08	155.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.12	25.65	453.12	82.83	103.36	133.08	133.85
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.12	25.65	442.18	81.37	112.24	137.75	110.83
2035	0.00	0.00	155.48	0.00	0.00	0.00	155.48	22.90	25.01	378.91	79.40	112.38	135.81	51.33
2036	0.00	0.00	224.62	0.00	0.00	0.00	224.62	24.02	25.02	353.64	77.95	120.36	136.58	18.75
2037	0.00	0.00	100.61	0.00	0.00	0.00	100.61	24.52	25.02	362.94	78.38	115.91	134.05	34.60
2038	0.00	0.00	165.23	0.00	0.00	0.00	165.23	25.35	31.81	388.66	75.99	180.48	132.56	-0.38
2039	0.00	0.00	228.01	0.00	0.00	0.00	228.01	26.49	34.66	376.59	74.63	192.81	143.22	-34.07
2040	0.00	0.00	102.12	0.00	60.41	0.00	162.53	27.30	31.81	373.19	74.06	198.45	145.38	-44.70
2041	0.00	0.00	7.51	0.00	0.00	0.00	7.51	27.34	38.62	403.33	72.22	262.16	141.25	-72.29
2042	0.00	0.00	161.01	0.00	0.00	0.00	161.01	28.15	38.62	389.60	70.46	283.56	146.82	-111.24
2043	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.31	38.62	379.50	69.16	299.51	151.23	-140.41
2044	0.00	0.00	104.18	0.00	0.00	0.00	104.18	29.83	40.33	364.03	68.67	297.13	152.54	-154.32
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	29.87	47.13	387.73	66.41	372.44	150.97	-202.09
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	47.13	393.00	66.59	370.55	149.26	-193.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	46.28	363.67	64.66	393.54	155.45	-249.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	29.87	48.28	381.46	65.89	378.84	151.89	-215.16
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2052	0.00	0.00	70.69	0.00	28.37	1.44	100.50	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2053	0.00	0.00	96.55	0.00	20.19	4.33	121.06	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2054	0.00	0.00	14.65	0.00	16.47	4.33	35.44	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2055	0.00	0.00	0.00	0.00	0.00	4.49	4.49	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2057	0.00	0.00	72.47	0.00	0.00	0.00	72.47	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2058	0.00	0.00	98.98	0.00	9.12	0.00	108.10	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2059	0.00	0.00	165.92	0.00	0.00	0.00	165.92	29.87	48.28	381.46	65.89	378.84	151.89	-215.16
2060	0.00	0.00	218.00	0.00	0.00	0.00	218.00	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2061	0.00	0.00	97.64	0.00	0.00	0.00	97.64	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2062	0.00	0.00	7.18	0.00	0.00	0.00	7.18	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2063	0.00	0.00	0.00	0.00	53.86	2.76	56.61	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2064	0.00	0.00	0.00	0.00	10.23	3.74	13.98	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2065	0.00	0.00	155.48	0.00	8.50	2.35	166.33	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2066	0.00	0.00	224.62	0.00	10.14	2.93	237.69	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2067	0.00	0.00	100.61	0.00	8.86	4.39	113.86	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2068	0.00	0.00	165.23	0.00	18.95	13.18	197.36	29.87	60.66	381.46	65.89	378.84	151.89	-215.16
2069	0.00	0.00	228.01	0.00	29.89	13.18	271.09	29.87	48.28	381.46	65.89	378.84	151.89	-215.16
2070	0.00	0.00	102.12	0.00	0.01	13.67	115.80	29.87	47.14	381.46	65.89	378.84	151.89	-215.16
2071	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.87	47.14	381.46	65.89	378.84	151.89	-215.16
2072	0.00	0.00	161.01	0.00	0.00	0.00	161.01	29.87	47.14	381.46	65.89	378.84	151.89	-215.16
2073	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.87	46.29	381.46	65.89	378.84	151.89	-215.16
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2075	0.00	0.00	7.66	0.00	45.31	0.00	52.97	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2078	0.00	0.00	0.00	0.00	17.95	0.00	17.95	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	48.28	381.46	65.89	378.84	151.89	-215.16
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2082	0.00	0.00	70.69	0.00	0.00	0.00	70.69	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2083	0.00	0.00	96.55	0.00	0.00	0.00	96.55	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2084	0.00	0.00	14.65	0.00	10.41	0.16	25.21	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2087	0.00	0.00	72.47	0.00	28.37	1.44	102.28	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2088	0.00	0.00	98.98	0.00	20.19	4.33	123.50	29.87	45.44	381.46	65.89	378.84	151.89	-215.16
2089	0.00	0.00	15.02	0.00	16.47	4.33	35.81	29.87	48.28	381.46	65.89	378.84	151.89	-215.16
2090	0.00	0.00	0.00	0.00	15.10	4.49	19.59	29.87	48.28	381.46	65.89	378.84	151.89	-215.16
Salvage Value	0.00	0.00	73.23	0.00	17.91	4.20	95.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1623.51	0.00	313.82	74.45	4951.23	612.25	744.62	11947.31	2342.72	4677.91	3718.35	1208.33

Net Present Value -5100

K19/C31/250MW | **TABLE 053** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	217.56	0.00	0.00	20.64	3.90	272.65	1.38	0.00	306.80	101.20	19.48	96.25	89.88
2015	38.54	477.40	0.00	0.00	18.59	2.67	537.21	4.06	0.00	337.13	99.35	23.11	100.30	114.37
2016	10.47	632.15	0.00	0.00	25.44	3.89	671.96	7.42	0.00	346.69	97.53	24.16	102.58	122.41
2017	10.54	766.12	0.00	0.00	37.23	5.84	819.72	11.52	0.00	361.64	95.61	25.83	105.49	134.71
2018	12.52	540.20	0.00	0.00	39.13	17.51	609.37	14.57	0.00	341.66	92.97	28.30	107.40	112.99
2019	12.59	386.37	0.00	0.00	46.36	17.51	462.83	16.88	12.78	365.32	92.61	28.44	107.55	136.72
2020	12.67	157.77	0.35	0.00	0.01	18.16	188.96	17.83	12.99	574.64	100.82	20.41	108.87	344.55
2021	16.02	54.75	0.00	0.00	0.00	0.00	70.77	18.18	12.75	639.79	101.39	20.89	115.27	402.25
2022	162.04	0.00	92.12	0.00	0.00	0.00	254.16	19.34	12.97	631.89	99.96	20.65	117.42	393.85
2023	247.17	0.00	117.97	0.00	9.12	0.00	374.26	21.11	12.80	624.28	98.88	17.52	119.96	387.92
2024	268.52	0.00	14.65	0.00	0.00	0.00	283.17	22.52	16.67	617.71	97.07	28.47	122.34	369.83
2025	273.67	0.00	0.00	0.00	3.47	0.00	277.14	23.91	16.45	507.32	94.87	21.50	116.27	274.69
2026	740.31	0.00	0.00	0.00	3.47	0.00	743.78	27.63	16.05	484.17	92.64	24.52	120.71	246.30
2027	1175.50	0.00	72.47	0.00	42.16	0.00	1290.14	34.08	16.07	450.24	90.63	26.80	122.88	209.93
2028	1055.42	0.00	98.98	0.00	30.99	0.00	1185.39	40.01	16.13	432.73	88.79	31.39	127.56	184.99
2029	753.68	0.00	15.02	0.00	36.80	0.00	805.50	44.03	22.70	422.65	87.11	43.19	131.96	160.38
2030	521.97	0.00	0.00	0.00	63.72	0.00	585.69	46.96	18.83	441.96	88.15	37.67	127.72	188.41
2031	342.84	0.00	0.00	0.00	85.37	0.00	428.22	49.10	32.89	499.83	91.21	31.15	103.78	273.70
2032	126.27	0.00	0.00	0.00	100.61	0.00	226.89	50.24	33.10	660.21	98.12	30.48	99.37	432.24
2033	39.85	0.00	0.00	0.00	0.00	0.00	39.85	50.44	32.96	687.15	98.11	31.45	107.38	450.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	33.18	661.34	96.37	32.24	109.41	423.32
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.36	622.93	94.71	32.74	107.63	387.85
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.31	596.02	93.13	33.47	108.20	361.22
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.15	566.78	91.30	34.64	110.94	329.90
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.79	534.79	89.38	36.08	114.74	294.60
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	34.70	513.00	87.51	40.03	126.19	259.27
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.97	499.03	85.85	45.33	131.74	236.12
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	34.64	483.44	84.23	51.26	137.19	210.77
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	50.44	31.80	480.35	83.39	52.18	140.39	204.39
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.80	469.08	82.07	51.74	148.89	186.38
2044	0.00	0.00	78.89	0.00	0.00	0.00	78.89	50.83	33.50	453.75	80.56	65.67	150.25	157.27
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	51.73	33.50	439.41	79.16	72.32	156.24	131.70
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	51.81	37.43	431.07	77.82	82.13	165.05	106.06
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.93	417.03	76.45	83.10	177.71	79.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.08	429.17	77.81	79.18	166.33	105.84
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	51.81	37.92	429.17	77.81	79.18	166.33	105.84
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	51.81	35.08	429.17	77.81	79.18	166.33	105.84
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	51.81	37.94	429.17	77.81	79.18	166.33	105.84
2052	0.00	0.00	70.69	0.00	28.37	1.44	100.50	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2053	0.00	0.00	96.55	0.00	20.19	4.33	121.06	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2054	0.00	0.00	14.65	0.00	16.47	4.33	35.44	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2055	0.00	0.00	0.00	0.00	0.00	4.49	4.49	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2057	0.00	0.00	72.47	0.00	0.00	0.00	72.47	51.81	36.81	429.17	77.81	79.18	166.33	105.84
2058	0.00	0.00	98.98	0.00	9.12	0.00	108.10	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2059	0.00	0.00	15.02	0.00	0.00	0.00	15.02	51.81	39.65	429.17	77.81	79.18	166.33	105.84
2060	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2061	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.81	37.95	429.17	77.81	79.18	166.33	105.84
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2063	0.00	0.00	0.00	0.00	14.26	2.76	17.02	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2064	0.00	0.00	0.00	0.00	18.81	3.74	22.55	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2065	0.00	0.00	0.00	0.00	23.07	2.35	25.42	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2066	0.00	0.00	0.00	0.00	21.59	2.93	24.52	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2067	0.00	0.00	0.00	0.00	33.71	4.39	38.11	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2068	0.00	0.00	0.00	0.00	18.95	13.18	32.13	51.81	65.55	429.17	77.81	79.18	166.33	105.84
2069	0.00	0.00	0.00	0.00	29.89	13.18	43.08	51.81	37.95	429.17	77.81	79.18	166.33	105.84
2070	0.00	0.00	0.00	0.00	0.01	13.67	13.68	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	39.65	429.17	77.81	79.18	166.33	105.84
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.95	429.17	77.81	79.18	166.33	105.84
2074	0.00	0.00	78.89	0.00	0.00	0.00	78.89	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2075	0.00	0.00	107.74	0.00	2.61	0.00	110.35	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2076	0.00	0.00	16.34	0.00	2.61	0.00	18.96	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2077	0.00	0.00	0.00	0.00	31.87	0.00	31.87	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2078	0.00	0.00	0.00	0.00	16.73	0.00	16.73	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2079	0.00	0.00	0.00	0.00	28.23	0.00	28.23	51.81	37.95	429.17	77.81	79.18	166.33	105.84
2080	0.00	0.00	0.00	0.00	103.00	0.00	103.00	51.81	50.33	429.17	77.81	79.18	166.33	105.84
2081	0.00	0.00	0.00	0.00	64.80	0.00	64.80	51.81	37.95	429.17	77.81	79.18	166.33	105.84
2082	0.00	0.00	70.69	0.00	75.76	0.00	146.45	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2083	0.00	0.00	96.55	0.00	0.00	0.00	96.55	51.81	36.81	429.17	77.81	79.18	166.33	105.84
2084	0.00	0.00	14.65	0.00	10.41	0.16	25.21	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	51.81	36.81	429.17	77.81	79.18	166.33	105.84
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	51.81	52.03	429.17	77.81	79.18	166.33	105.84
2087	0.00	0.00	72.47	0.00	28.37	1.44	102.28	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2088	0.00	0.00	98.98	0.00	20.19	4.33	123.50	51.81	35.10	429.17	77.81	79.18	166.33	105.84
2089	0.00	0.00	15.02	0.00	16.47	4.33	35.81	51.81	37.95	429.17	77.81	79.18	166.33	105.84
2090	0.00	0.00	0.00	0.00	0.00	4.49	4.49	51.81	37.95	429.17	77.81	79.18	166.33	105.84
Salvage Value	55.10	0.00	35.42	0.00	37.50	4.20	132.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3753.27	2939.45	485.15	0.00	492.94	74.45	7745.25	1039.60	699.58	13396.52	2530.37	1279.33	3713.76	5873.05

Net Present Value -3611

All Gas

TABLE 054
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	348.56	97.52	24.18	102.50	124.35
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	366.75	95.97	24.82	104.37	141.59
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	346.75	93.24	27.15	107.07	119.29
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	338.31	91.33	24.51	108.49	113.98
2020	0.00	0.00	91.42	0.00	0.00	0.00	91.42	0.85	0.00	372.44	91.26	19.34	118.12	143.73
2021	0.00	0.00	117.06	0.00	9.12	0.00	126.18	1.38	0.00	374.30	89.46	18.21	128.37	138.26
2022	0.00	0.00	14.50	0.00	0.00	0.00	14.50	1.45	3.92	362.08	87.28	33.96	130.55	110.29
2023	0.00	0.00	71.04	0.00	0.00	0.00	71.04	1.80	3.92	347.27	85.12	42.05	136.52	83.57
2024	0.00	0.00	99.07	0.00	71.81	0.00	170.88	2.65	3.92	339.09	83.70	48.13	141.55	65.71
2025	0.00	0.00	14.72	0.00	0.00	0.00	14.72	2.72	7.84	267.79	83.22	40.26	128.46	15.86
2026	0.00	0.00	72.11	0.00	0.00	0.00	72.11	3.08	7.84	250.09	81.94	41.32	130.70	-3.87
2027	0.00	0.00	98.49	0.00	0.00	0.00	98.49	3.58	7.84	233.49	80.11	41.50	142.02	-30.14
2028	0.00	0.00	165.09	0.00	0.00	0.00	165.09	4.40	11.76	216.91	78.24	63.85	141.01	-66.18
2029	0.00	0.00	216.92	0.00	0.00	0.00	216.92	5.49	11.76	201.71	76.82	72.69	145.29	-93.09
2030	0.00	0.00	97.15	0.00	9.12	0.00	106.27	6.02	11.77	214.36	77.72	67.36	141.54	-72.26
2031	0.00	0.00	7.14	0.00	0.00	0.00	7.14	6.05	18.57	231.18	75.36	119.37	134.48	-98.03
2032	0.00	0.00	74.30	0.00	0.00	0.00	74.30	6.42	18.58	211.51	73.49	132.08	140.95	-135.01
2033	0.00	0.00	101.48	0.00	60.41	0.00	161.89	7.23	18.58	191.90	71.79	144.94	146.37	-171.20
2034	0.00	0.00	170.10	0.00	0.00	0.00	170.10	8.08	22.50	178.29	70.41	162.98	149.87	-204.97
2035	0.00	0.00	223.51	0.00	0.00	0.00	223.51	9.20	22.50	167.50	69.53	172.53	152.77	-227.33
2036	0.00	0.00	100.10	0.00	0.00	0.00	100.10	9.70	22.50	165.69	69.48	167.98	158.71	-230.48
2037	0.00	0.00	164.40	0.00	0.00	0.00	164.40	10.52	29.30	172.57	67.52	222.71	145.03	-262.69
2038	0.00	0.00	226.88	0.00	0.00	0.00	226.88	11.66	29.31	157.78	66.34	236.20	151.13	-295.89
2039	0.00	0.00	101.61	0.00	0.00	0.00	101.61	12.17	29.31	152.81	66.27	239.53	157.83	-310.82
2040	0.00	0.00	7.47	0.00	0.00	0.00	7.47	12.20	36.11	162.54	64.39	290.23	151.66	-343.73
2041	0.00	0.00	160.21	0.00	0.00	0.00	160.21	13.00	36.12	152.71	62.65	319.82	159.78	-389.55
2042	0.00	0.00	231.45	0.00	0.00	0.00	231.45	14.16	36.12	147.09	61.62	341.29	165.75	-421.57
2043	0.00	0.00	103.66	0.00	60.41	0.00	164.07	14.98	36.12	148.33	61.59	346.20	166.91	-426.37
2044	0.00	0.00	7.62	0.00	0.00	0.00	7.62	15.02	42.93	156.58	60.07	395.17	159.01	-457.67
2045	0.00	0.00	34.87	0.00	0.00	0.00	34.87	15.19	42.93	148.01	58.56	427.15	166.08	-503.78
2046	0.00	0.00	47.63	0.00	0.00	0.00	47.63	15.43	42.93	142.37	57.48	453.23	171.71	-540.05
2047	0.00	0.00	7.23	0.00	0.00	0.00	7.23	15.47	44.34	133.45	56.64	472.46	176.49	-572.14
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.35	141.28	57.56	450.95	171.43	-538.66
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	15.47	44.35	141.28	57.56	450.95	171.43	-538.66
2050	0.00	0.00	69.99	0.00	9.69	0.00	79.68	15.47	44.36	141.28	57.56	450.95	171.43	-538.66
2051	0.00	0.00	95.59	0.00	9.69	0.00	105.28	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2052	0.00	0.00	14.50	0.00	9.69	0.00	24.19	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2053	0.00	0.00	71.04	0.00	0.00	0.00	71.04	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2054	0.00	0.00	97.03	0.00	0.00	0.00	97.03	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2055	0.00	0.00	14.72	0.00	0.00	0.00	14.72	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2056	0.00	0.00	72.11	0.00	9.12	0.00	81.23	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2057	0.00	0.00	98.49	0.00	0.00	0.00	98.49	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2058	0.00	0.00	165.09	0.00	0.00	0.00	165.09	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2059	0.00	0.00	216.92	0.00	53.86	0.00	270.77	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2060	0.00	0.00	97.15	0.00	0.00	0.00	97.15	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2061	0.00	0.00	7.14	0.00	0.00	0.00	7.14	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2062	0.00	0.00	74.30	0.00	0.00	0.00	74.30	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2063	0.00	0.00	101.48	0.00	0.00	0.00	101.48	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2064	0.00	0.00	170.10	0.00	0.00	0.00	170.10	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2065	0.00	0.00	223.51	0.00	9.12	0.00	232.63	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2066	0.00	0.00	100.10	0.00	0.00	0.00	100.10	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2067	0.00	0.00	164.40	0.00	0.00	0.00	164.40	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2068	0.00	0.00	226.88	0.00	45.31	0.00	272.18	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2069	0.00	0.00	101.61	0.00	0.00	0.00	101.61	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2070	0.00	0.00	7.47	0.00	0.00	0.00	7.47	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2071	0.00	0.00	160.21	0.00	0.00	0.00	160.21	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2072	0.00	0.00	231.45	0.00	0.00	0.00	231.45	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2073	0.00	0.00	103.66	0.00	0.00	0.00	103.66	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2074	0.00	0.00	7.62	0.00	17.95	0.00	25.57	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2075	0.00	0.00	34.87	0.00	0.00	0.00	34.87	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2076	0.00	0.00	47.63	0.00	0.00	0.00	47.63	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2077	0.00	0.00	7.23	0.00	0.00	0.00	7.23	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2078	0.00	0.00	0.00	0.00	45.31	0.00	45.31	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2080	0.00	0.00	69.99	0.00	0.00	0.00	69.99	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2081	0.00	0.00	95.59	0.00	0.00	0.00	95.59	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2082	0.00	0.00	14.50	0.00	0.00	0.00	14.50	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2083	0.00	0.00	71.04	0.00	15.10	0.00	86.15	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2084	0.00	0.00	97.03	0.00	9.69	0.00	106.72	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2085	0.00	0.00	14.72	0.00	9.69	0.00	24.41	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2086	0.00	0.00	72.11	0.00	9.69	0.00	81.81	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2087	0.00	0.00	98.49	0.00	9.69	0.00	108.19	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2088	0.00	0.00	14.94	0.00	0.00	0.00	14.94	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	141.28	57.56	450.95	171.43	-538.66
Salvage Value	0.00	0.00	98.73	0.00	9.17	0.00	107.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2039.34	0.00	196.29	0.00	2297.49	226.03	608.54	6518.87	2118.84	5827.22	4077.80	-5504.98

Net Present Value: -8637

Wind/Gas

TABLE 055
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	348.56	97.52	24.18	102.50	124.35
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	366.75	95.97	24.82	104.37	141.59
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	346.74	93.24	27.15	107.07	119.28
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	338.31	91.32	24.51	108.49	113.99
2020	0.00	0.00	0.00	9.41	13.30	0.00	22.71	0.62	0.00	368.86	90.81	20.86	119.32	137.88
2021	0.00	0.00	0.35	287.40	22.16	0.00	309.92	2.16	0.00	370.22	89.01	20.27	128.87	132.07
2022	0.00	0.00	0.00	292.78	26.75	0.00	319.53	3.76	6.10	374.43	87.42	20.39	129.37	137.26
2023	0.00	0.00	163.52	283.36	13.93	0.00	460.81	5.96	12.20	371.39	84.99	23.48	133.15	129.77
2024	0.00	0.00	215.53	5.38	24.58	0.00	245.49	7.08	18.31	375.57	83.27	23.86	136.77	131.68
2025	0.00	0.00	29.44	4.71	3.82	0.00	37.97	7.27	26.14	314.38	83.32	27.72	120.34	83.00
2026	0.00	0.00	72.11	143.70	9.61	0.00	225.42	8.40	26.14	302.15	82.35	26.57	121.04	72.18
2027	0.00	0.00	100.53	146.39	87.07	0.00	333.99	10.06	29.19	287.74	80.05	32.47	125.08	50.13
2028	0.00	0.00	14.94	146.39	21.15	0.00	182.49	10.97	36.17	282.64	78.35	41.97	128.09	34.22
2029	0.00	0.00	73.20	146.39	21.23	0.00	240.83	12.17	39.22	274.94	76.80	45.41	131.69	21.05
2030	0.00	0.00	99.98	146.39	21.23	0.00	267.60	13.51	42.27	277.82	75.92	47.52	132.99	21.39
2031	0.00	0.00	89.10	146.39	21.23	0.00	256.73	14.79	49.24	279.73	74.73	56.53	134.92	13.55
2032	0.00	0.00	100.98	146.39	81.64	0.00	329.01	16.44	52.29	276.44	73.64	57.03	138.25	7.52
2033	0.00	0.00	15.32	146.39	21.23	0.00	182.94	17.35	59.28	281.67	73.00	60.27	140.62	7.78
2034	0.00	0.00	75.05	146.39	21.23	0.00	242.67	18.57	62.33	269.19	71.26	70.19	143.42	-15.68
2035	0.00	0.00	102.50	146.39	21.23	0.00	270.12	19.92	65.39	257.00	69.62	76.09	147.86	-36.57
2036	0.00	0.00	91.35	146.39	21.23	0.00	258.98	21.21	72.36	252.01	68.31	87.50	150.71	-54.50
2037	0.00	0.00	103.53	146.39	21.23	0.00	271.15	22.57	75.41	243.40	67.06	92.56	154.84	-71.06
2038	0.00	0.00	92.27	146.39	21.23	0.00	259.89	23.87	82.39	242.37	66.05	101.91	158.75	-84.34
2039	0.00	0.00	104.57	146.39	81.64	0.00	332.60	25.53	85.44	236.13	64.93	102.14	173.60	-104.55
2040	0.00	0.00	15.86	155.80	21.23	0.00	192.90	26.50	92.43	238.77	64.16	107.61	179.64	-112.64
2041	0.00	0.00	77.72	433.79	21.23	0.00	532.74	29.16	95.48	225.86	62.68	128.24	177.71	-142.77
2042	0.00	0.00	106.14	439.17	21.23	0.00	566.54	31.99	98.53	215.07	61.36	137.17	184.11	-167.56
2043	0.00	0.00	94.60	429.75	21.08	0.00	545.43	34.72	105.50	210.14	60.22	151.69	188.17	-189.93
2044	0.00	0.00	107.21	151.77	20.60	0.00	279.57	36.12	108.55	205.52	59.31	157.46	193.33	-204.57
2045	0.00	0.00	51.14	151.10	19.32	0.00	221.56	37.22	115.53	202.39	58.26	166.73	201.86	-224.45
2046	0.00	0.00	47.63	285.38	17.41	0.00	350.42	38.98	118.58	197.90	57.26	167.64	215.22	-242.21
2047	0.00	0.00	7.23	149.08	11.63	0.00	167.93	39.82	123.06	191.84	56.23	173.15	218.62	-256.15
2048	0.00	0.00	0.00	146.39	5.97	0.00	152.36	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2049	0.00	0.00	0.00	146.39	9.77	0.00	156.16	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2050	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2051	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2052	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2053	0.00	0.00	142.09	146.39	0.00	0.00	288.48	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2054	0.00	0.00	194.06	146.39	0.00	0.00	340.45	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2055	0.00	0.00	29.44	146.39	3.32	0.00	179.15	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2056	0.00	0.00	72.11	146.39	5.54	0.00	224.04	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2057	0.00	0.00	98.49	146.39	6.73	0.00	251.61	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2058	0.00	0.00	14.94	146.39	3.72	0.00	165.05	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2059	0.00	0.00	73.20	146.39	20.06	0.00	239.65	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2060	0.00	0.00	99.98	155.80	1.67	0.00	257.45	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2061	0.00	0.00	89.10	433.79	2.68	0.00	525.57	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2062	0.00	0.00	100.98	439.17	57.73	0.00	597.88	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2063	0.00	0.00	15.32	429.75	5.31	0.00	450.38	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2064	0.00	0.00	75.05	151.77	5.31	0.00	232.13	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2065	0.00	0.00	102.50	151.10	5.31	0.00	258.91	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2066	0.00	0.00	91.35	285.38	5.31	0.00	382.04	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2067	0.00	0.00	103.53	149.08	50.62	0.00	303.22	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2068	0.00	0.00	92.27	146.39	5.31	0.00	243.97	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2069	0.00	0.00	104.57	146.39	5.31	0.00	256.26	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2070	0.00	0.00	15.86	146.39	15.28	0.00	177.53	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2071	0.00	0.00	77.72	146.39	21.93	0.00	246.04	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2072	0.00	0.00	106.14	146.39	25.33	0.00	277.87	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2073	0.00	0.00	94.60	146.39	15.52	0.00	256.51	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2074	0.00	0.00	107.21	146.39	55.14	0.00	308.73	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2075	0.00	0.00	51.14	146.39	7.46	0.00	204.99	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2076	0.00	0.00	47.63	146.39	12.24	0.00	206.26	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2077	0.00	0.00	7.23	146.39	34.65	0.00	188.26	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2078	0.00	0.00	0.00	146.39	21.08	0.00	167.46	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2079	0.00	0.00	0.00	146.39	20.84	0.00	167.23	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2080	0.00	0.00	0.00	155.80	20.52	0.00	176.32	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2081	0.00	0.00	0.00	433.79	19.56	0.00	453.35	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2082	0.00	0.00	0.00	439.17	33.66	0.00	472.82	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2083	0.00	0.00	142.09	429.75	17.36	0.00	589.20	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2084	0.00	0.00	194.06	151.77	25.54	0.00	371.37	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2085	0.00	0.00	29.44	151.10	25.38	0.00	205.92	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2086	0.00	0.00	72.11	285.38	24.43	0.00	381.92	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2087	0.00	0.00	98.49	149.08	23.47	0.00	271.04	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2088	0.00	0.00	14.94	146.39	9.00	0.00	170.33	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2089	0.00	0.00	0.00	141.68	19.64	0.00	161.32	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
2090	0.00	0.00	0.00	2.69	0.08	0.00	2.77	39.82	123.06	197.38	57.25	169.17	211.90	-240.94
Salvage Value	0.00	0.00	70.93	177.50	32.63	0.00	281.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1486.10	3886.04	504.24	0.00	5938.24	552.63	1713.36	7763.76	2112.72	2438.95	4426.85	-1214.75

Net Present Value -9419

K22/Gas

TABLE 056
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	103.08	0.00	0.00	9.69	0.00	112.78	0.56	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	31.29	0.00	0.00	10.60	0.00	41.88	0.77	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	27.76	0.00	0.00	10.68	0.00	38.43	0.97	0.00	348.16	97.52	24.18	102.50	123.95
2017	0.00	207.16	0.00	0.00	26.68	0.00	233.84	2.13	0.00	365.75	95.97	24.83	104.40	140.55
2018	0.00	404.01	0.00	0.00	8.71	0.00	412.72	4.20	0.00	344.73	93.25	27.17	107.14	117.16
2019	0.00	658.97	0.00	0.00	15.17	0.00	674.13	7.57	0.00	336.22	91.33	24.52	108.57	111.80
2020	0.00	733.85	0.00	0.00	27.60	0.00	761.45	11.38	0.00	363.98	90.64	21.53	120.01	131.80
2021	0.00	599.92	0.00	0.00	39.15	0.00	639.07	14.57	0.00	367.82	88.96	20.67	130.24	127.95
2022	0.00	348.41	0.00	0.00	46.36	0.00	394.77	16.55	12.78	374.52	88.94	23.58	124.01	137.98
2023	0.00	161.97	0.00	0.00	0.01	0.00	161.98	17.36	12.99	491.10	94.51	23.39	113.03	260.17
2024	0.00	56.00	0.00	0.00	0.00	0.00	56.00	17.64	12.71	506.73	94.41	26.57	117.86	267.89
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.64	12.92	450.58	94.36	18.64	108.82	228.76
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.64	12.75	432.25	92.53	18.93	111.54	209.25
2027	0.00	0.00	93.90	0.00	0.00	0.00	93.90	18.00	12.70	391.08	90.74	18.11	110.82	171.41
2028	0.00	0.00	120.46	0.00	9.12	0.00	129.58	18.54	12.47	370.63	89.21	18.85	113.77	148.81
2029	0.00	0.00	15.02	0.00	0.00	0.00	15.02	18.61	15.96	364.20	88.39	23.59	114.19	138.03
2030	0.00	0.00	73.57	0.00	0.00	0.00	73.57	18.98	15.96	353.73	86.67	28.99	118.08	119.98
2031	0.00	0.00	254.93	0.00	71.81	0.00	326.74	20.60	16.00	342.58	85.06	33.86	122.79	100.87
2032	0.00	0.00	235.43	0.00	0.00	0.00	235.43	21.78	22.58	333.35	83.50	45.78	127.06	77.01
2033	0.00	0.00	98.62	0.00	9.12	0.00	107.74	22.32	18.71	339.87	83.67	39.98	127.79	88.43
2034	0.00	0.00	7.25	0.00	0.00	0.00	7.25	22.36	25.51	361.74	81.28	95.66	121.95	62.85
2035	0.00	0.00	155.48	0.00	0.00	0.00	155.48	23.13	25.51	345.06	79.28	107.45	127.93	30.40
2036	0.00	0.00	224.62	0.00	0.00	0.00	224.62	24.26	25.51	331.95	77.80	117.02	132.21	4.93
2037	0.00	0.00	100.61	0.00	0.00	0.00	100.61	24.76	25.52	340.56	78.23	111.49	129.97	20.87
2038	0.00	0.00	165.23	0.00	0.00	0.00	165.23	25.59	31.67	361.34	75.89	171.71	127.79	-14.04
2039	0.00	0.00	228.01	0.00	0.00	0.00	228.01	26.73	31.68	349.57	74.55	184.28	138.27	-47.53
2040	0.00	0.00	102.12	0.00	60.41	0.00	162.53	27.54	31.68	349.09	74.11	188.93	140.25	-54.20
2041	0.00	0.00	7.51	0.00	0.00	0.00	7.51	27.58	38.49	373.63	72.16	249.94	136.45	-84.93
2042	0.00	0.00	161.01	0.00	0.00	0.00	161.01	28.38	41.33	360.27	70.38	272.34	142.14	-124.59
2043	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.54	38.49	350.40	69.08	288.72	146.53	-153.93
2044	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.07	38.49	338.86	68.74	286.04	147.18	-163.09
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.10	45.29	365.49	67.15	347.57	143.50	-192.73
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.29	356.65	65.95	368.26	146.63	-224.20
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	47.01	334.53	64.61	382.10	150.82	-263.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	47.01	352.22	65.91	365.97	146.99	-226.64
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	47.01	352.22	65.91	365.97	146.99	-226.64
2050	0.00	0.00	0.00	0.00	10.09	0.00	10.09	30.10	46.16	352.22	65.91	365.97	146.99	-226.64
2051	0.00	0.00	0.00	0.00	10.15	0.00	10.15	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2052	0.00	0.00	0.00	0.00	10.16	0.00	10.16	30.10	48.15	352.22	65.91	365.97	146.99	-226.64
2053	0.00	0.00	0.00	0.00	0.43	0.00	0.43	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2054	0.00	0.00	0.00	0.00	14.08	0.00	14.08	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2055	0.00	0.00	0.00	0.00	18.67	0.00	18.67	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2056	0.00	0.00	0.00	0.00	20.19	0.00	20.19	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2057	0.00	0.00	72.47	0.00	16.47	0.00	88.94	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2058	0.00	0.00	98.98	0.00	0.00	0.00	98.98	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2059	0.00	0.00	15.02	0.00	0.00	0.00	15.02	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2060	0.00	0.00	73.57	0.00	0.00	0.00	73.57	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2061	0.00	0.00	252.89	0.00	0.00	0.00	252.89	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2062	0.00	0.00	235.43	0.00	0.00	0.00	235.43	30.10	48.15	352.22	65.91	365.97	146.99	-226.64
2063	0.00	0.00	98.62	0.00	9.12	0.00	107.74	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2064	0.00	0.00	7.25	0.00	0.00	0.00	7.25	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2065	0.00	0.00	155.48	0.00	0.50	0.00	155.99	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2066	0.00	0.00	224.62	0.00	54.39	0.00	279.01	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2067	0.00	0.00	100.61	0.00	16.52	0.00	117.13	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2068	0.00	0.00	165.23	0.00	17.40	0.00	182.63	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2069	0.00	0.00	228.01	0.00	1.09	0.00	229.10	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2070	0.00	0.00	102.12	0.00	8.92	0.00	111.04	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2071	0.00	0.00	7.51	0.00	18.96	0.00	26.47	30.10	60.53	352.22	65.91	365.97	146.99	-226.64
2072	0.00	0.00	161.01	0.00	29.89	0.00	190.90	30.10	48.15	352.22	65.91	365.97	146.99	-226.64
2073	0.00	0.00	232.61	0.00	0.01	0.00	232.61	30.10	47.01	352.22	65.91	365.97	146.99	-226.64
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.10	47.01	352.22	65.91	365.97	146.99	-226.64
2075	0.00	0.00	7.66	0.00	45.31	0.00	52.98	30.10	47.01	352.22	65.91	365.97	146.99	-226.64
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	46.16	352.22	65.91	365.97	146.99	-226.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2081	0.00	0.00	0.00	0.00	17.95	0.00	17.95	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	48.15	352.22	65.91	365.97	146.99	-226.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2087	0.00	0.00	72.47	0.00	9.69	0.00	82.17	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2088	0.00	0.00	98.98	0.00	0.00	0.00	98.98	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2089	0.00	0.00	15.02	0.00	0.00	0.00	15.02	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
2090	0.00	0.00	0.00	0.00	15.10	0.00	15.10	30.10	45.30	352.22	65.91	365.97	146.99	-226.64
Salvage Value	0.00	0.00	64.67	0.00	13.77	0.00	78.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2766.90	1549.56	0.00	296.69	0.00	4613.15	566.94	684.05	10330.59	2309.88	4418.71	3606.44	-4.44

Net Present Value: -5869

K22/C29

TABLE 057
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	103.08	0.00	0.00	9.69	0.00	143.31	0.72	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.06	31.29	0.00	0.00	10.60	0.00	80.94	1.12	0.00	338.97	99.34	23.11	100.27	116.26
2016	10.99	27.76	0.00	0.00	10.68	0.00	49.42	1.37	0.00	348.16	97.52	24.18	102.50	123.95
2017	11.71	207.16	0.00	0.00	26.68	0.00	245.55	2.60	0.00	365.75	95.97	24.83	104.40	140.55
2018	11.78	404.01	0.00	0.00	8.71	0.00	424.50	4.72	0.00	344.73	93.25	27.17	107.14	117.16
2019	14.08	658.97	0.00	0.00	15.17	0.00	688.22	8.16	0.00	336.22	91.33	24.52	108.57	111.80
2020	163.28	733.85	0.00	0.00	27.60	0.00	924.72	12.78	0.00	363.99	90.64	21.53	120.01	131.81
2021	247.43	599.92	0.00	0.00	39.15	0.00	886.50	17.22	0.00	367.59	88.96	20.68	130.38	127.56
2022	265.39	348.41	0.00	0.00	46.36	0.00	660.16	20.52	12.78	374.23	88.95	23.53	124.19	137.56
2023	270.48	161.97	0.00	0.00	3.48	0.00	435.92	22.70	12.99	490.18	94.51	23.44	113.15	259.08
2024	731.67	56.00	0.00	0.00	3.47	0.00	791.14	26.65	12.71	504.80	94.40	26.58	117.96	265.86
2025	1161.78	0.00	0.00	0.00	42.16	0.00	1203.94	32.67	12.92	448.23	94.38	18.67	108.99	226.19
2026	1043.10	0.00	0.00	0.00	21.87	0.00	1064.97	38.00	12.75	429.30	92.54	18.98	111.76	206.02
2027	744.89	0.00	0.00	0.00	36.80	0.00	781.69	41.90	12.70	389.18	90.96	17.38	110.73	170.11
2028	515.88	0.00	0.00	0.00	63.72	0.00	579.60	44.80	12.47	363.86	89.11	19.08	114.56	141.10
2029	338.84	0.00	0.00	0.00	85.37	0.00	424.21	46.92	26.10	470.70	92.85	21.81	98.52	257.52
2030	124.80	0.00	0.00	0.00	100.61	0.00	225.41	48.05	26.31	622.94	99.86	21.27	90.67	411.14
2031	39.38	0.00	0.00	0.00	0.00	0.00	39.38	48.25	26.22	642.08	99.64	21.73	94.31	426.39
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	29.08	621.65	97.99	21.47	95.79	406.40
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	25.04	599.39	96.40	21.42	97.10	384.46
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	25.00	580.04	94.84	21.86	99.26	364.09
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	24.83	559.47	93.33	21.97	100.51	343.66
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	48.25	24.47	535.69	91.82	21.91	101.80	320.17
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	24.54	511.70	90.32	21.99	103.67	295.72
2038	0.00	0.00	97.99	0.00	0.00	0.00	97.99	48.63	24.00	488.72	88.84	22.02	107.06	270.80
2039	0.00	0.00	125.99	0.00	9.12	0.00	135.11	49.20	26.68	481.38	87.50	21.55	121.26	251.07
2040	0.00	0.00	15.86	0.00	0.00	0.00	15.86	49.28	27.75	469.70	85.82	37.80	122.96	223.13
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	27.75	458.07	84.40	42.25	128.27	203.16
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	49.67	30.59	446.87	83.02	43.59	135.98	184.28
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	50.25	27.75	433.69	81.58	44.26	145.58	162.27
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	50.72	31.66	423.73	80.15	68.18	143.13	132.26
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	51.62	31.02	412.46	78.94	72.88	148.76	111.89
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	51.70	34.94	423.79	78.57	72.08	155.20	117.94
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.65	395.57	76.42	96.14	160.11	62.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.65	410.61	77.98	80.37	154.69	97.57
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	39.50	410.61	77.98	80.37	154.69	97.57
2050	0.00	0.00	0.00	0.00	10.09	0.00	10.09	51.70	35.80	410.61	77.98	80.37	154.69	97.57
2051	0.00	0.00	0.00	0.00	10.15	0.00	10.15	51.70	34.96	410.61	77.98	80.37	154.69	97.57
2052	0.00	0.00	0.00	0.00	10.16	0.00	10.16	51.70	37.81	410.61	77.98	80.37	154.69	97.57
2053	0.00	0.00	0.00	0.00	0.43	0.00	0.43	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2054	0.00	0.00	0.00	0.00	14.08	0.00	14.08	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2055	0.00	0.00	0.00	0.00	18.67	0.00	18.67	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2056	0.00	0.00	0.00	0.00	20.19	0.00	20.19	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2057	0.00	0.00	0.00	0.00	16.47	0.00	16.47	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2058	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2059	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.70	53.04	410.61	77.98	80.37	154.69	97.57
2060	0.00	0.00	0.00	0.00	10.28	0.00	10.28	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2061	0.00	0.00	0.00	0.00	5.14	0.00	5.14	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2062	0.00	0.00	0.00	0.00	8.57	0.00	8.57	51.70	37.81	410.61	77.98	80.37	154.69	97.57
2063	0.00	0.00	0.00	0.00	14.57	0.00	14.57	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2064	0.00	0.00	0.00	0.00	20.57	0.00	20.57	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2065	0.00	0.00	0.00	0.00	25.36	0.00	25.36	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2066	0.00	0.00	0.00	0.00	0.53	0.00	0.53	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2067	0.00	0.00	0.00	0.00	16.52	0.00	16.52	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2068	0.00	0.00	76.56	0.00	8.28	0.00	84.84	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2069	0.00	0.00	104.57	0.00	1.09	0.00	105.65	51.70	53.04	410.61	77.98	80.37	154.69	97.57
2070	0.00	0.00	15.86	0.00	8.92	0.00	24.79	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2071	0.00	0.00	0.00	0.00	18.96	0.00	18.96	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2072	0.00	0.00	78.10	0.00	29.89	0.00	108.00	51.70	53.04	410.61	77.98	80.37	154.69	97.57
2073	0.00	0.00	106.67	0.00	2.62	0.00	109.29	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2074	0.00	0.00	95.07	0.00	11.73	0.00	106.80	51.70	51.90	410.61	77.98	80.37	154.69	97.57
2075	0.00	0.00	107.74	0.00	31.87	0.00	139.62	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2076	0.00	0.00	16.34	0.00	16.73	0.00	33.07	51.70	51.05	410.61	77.98	80.37	154.69	97.57
2077	0.00	0.00	0.00	0.00	28.23	0.00	28.23	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2078	0.00	0.00	0.00	0.00	58.27	0.00	58.27	51.70	50.19	410.61	77.98	80.37	154.69	97.57
2079	0.00	0.00	0.00	0.00	64.80	0.00	64.80	51.70	37.81	410.61	77.98	80.37	154.69	97.57
2080	0.00	0.00	0.00	0.00	129.62	0.00	129.62	51.70	51.90	410.61	77.98	80.37	154.69	97.57
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	54.75	410.61	77.98	80.37	154.69	97.57
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.68	410.61	77.98	80.37	154.69	97.57
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	51.90	410.61	77.98	80.37	154.69	97.57
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	34.97	410.61	77.98	80.37	154.69	97.57
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	37.81	410.61	77.98	80.37	154.69	97.57
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	34.97	410.61	77.98	80.37	154.69	97.57
Salvage Value	38.68	0.00	21.14	0.00	32.03	0.00	91.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3958.91	2766.90	327.21	0.00	495.32	0.00	7548.33	1019.32	620.27	12216.62	2510.40	1183.17	3514.21	5008.83

Net Present Value: -4179

SCGT/C26

TABLE 058
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	338.97	99.34	23.11	100.27	116.26
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	348.56	97.52	24.18	102.50	124.35
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	366.75	95.97	24.82	104.37	141.59
2018	209.58	0.00	0.35	0.00	0.00	0.00	209.93	3.23	0.00	346.33	93.24	27.16	107.08	118.85
2019	251.91	0.00	0.00	0.00	0.00	0.00	251.91	4.49	0.00	337.66	91.33	24.52	108.51	113.30
2020	257.96	0.00	91.42	0.00	0.00	0.00	349.37	6.13	0.00	371.24	91.24	19.44	118.26	142.31
2021	711.05	0.00	117.02	0.00	9.12	0.00	837.18	10.21	0.00	373.27	89.43	18.46	128.81	136.57
2022	1141.50	0.00	14.50	0.00	0.53	0.00	1156.53	15.99	3.92	360.70	87.30	34.35	130.92	108.13
2023	1024.89	0.00	0.00	0.00	1.05	0.00	1025.94	21.12	3.92	344.25	84.99	43.47	137.28	78.51
2024	731.88	0.00	0.00	0.00	2.11	0.00	733.99	24.79	3.92	339.08	83.86	47.77	141.83	65.62
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	27.35	3.92	271.84	84.35	29.19	132.51	25.79
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	29.02	17.97	342.32	88.21	21.91	108.15	124.05
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	29.64	18.18	483.74	95.83	20.78	96.89	270.25
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	29.83	17.90	510.48	95.92	22.77	105.19	286.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	18.11	487.27	94.25	23.43	106.53	263.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.94	472.06	93.07	23.15	106.52	249.31
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.89	450.35	91.16	25.21	110.46	223.51
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.66	423.79	89.28	26.77	113.83	193.92
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.23	405.21	87.38	31.52	118.30	168.01
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.23	394.63	85.85	36.42	123.81	148.55
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.27	384.83	84.57	40.40	126.58	133.28
2036	0.00	0.00	75.80	0.00	0.00	0.00	75.80	30.21	19.95	377.79	83.53	40.86	131.14	122.26
2037	0.00	0.00	103.57	0.00	9.12	0.00	112.69	30.77	17.10	366.21	82.06	41.57	141.41	101.16
2038	0.00	0.00	15.71	0.00	0.00	0.00	15.71	30.85	21.02	356.55	80.61	63.98	140.23	71.73
2039	0.00	0.00	76.94	0.00	0.00	0.00	76.94	31.24	21.02	345.72	79.39	69.31	152.02	45.00
2040	0.00	0.00	107.13	0.00	71.81	0.00	178.94	32.12	21.02	336.32	78.07	68.84	164.87	24.54
2041	0.00	0.00	93.66	0.00	0.00	0.00	93.66	32.59	24.95	322.89	76.47	96.69	163.40	-13.66
2042	0.00	0.00	106.14	0.00	0.00	0.00	106.14	33.12	24.30	309.92	75.15	108.42	168.88	-42.53
2043	0.00	0.00	94.60	0.00	0.00	0.00	94.60	33.59	28.21	302.41	73.88	121.63	177.56	-70.66
2044	0.00	0.00	107.21	0.00	60.41	0.00	167.62	34.43	28.21	292.02	72.60	123.18	193.74	-97.49
2045	0.00	0.00	16.26	0.00	0.00	0.00	16.26	34.51	32.15	283.73	71.30	169.25	182.02	-138.84
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	35.00	274.42	70.15	186.64	186.61	-168.98
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.16	264.42	68.87	189.77	205.81	-200.02
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.17	274.19	70.11	181.88	191.48	-169.28
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.17	274.19	70.11	181.88	191.48	-169.28
2050	0.00	0.00	69.99	0.00	9.69	0.00	79.68	34.51	32.18	274.19	70.11	181.88	191.48	-169.28
2051	0.00	0.00	95.59	0.00	9.69	0.00	105.28	34.51	33.89	274.19	70.11	181.88	191.48	-169.28
2052	0.00	0.00	14.50	0.00	9.69	0.00	24.19	34.51	33.90	274.19	70.11	181.88	191.48	-169.28
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	274.19	70.11	181.88	191.48	-169.28
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	274.19	70.11	181.88	191.48	-169.28
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	274.19	70.11	181.88	191.48	-169.28
2056	0.00	0.00	0.00	0.00	9.12	0.00	9.12	34.51	35.04	274.19	70.11	181.88	191.48	-169.28
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2066	0.00	0.00	75.80	0.00	0.00	0.00	75.80	34.51	35.04	274.19	70.11	181.88	191.48	-169.28
2067	0.00	0.00	103.53	0.00	0.00	0.00	103.53	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2068	0.00	0.00	15.71	0.00	0.00	0.00	15.71	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2069	0.00	0.00	76.94	0.00	0.00	0.00	76.94	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2070	0.00	0.00	105.09	0.00	0.00	0.00	105.09	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2071	0.00	0.00	93.66	0.00	0.00	0.00	93.66	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2072	0.00	0.00	106.14	0.00	9.64	0.00	115.79	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2073	0.00	0.00	94.60	0.00	1.05	0.00	95.65	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2074	0.00	0.00	107.21	0.00	2.11	0.00	109.31	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2075	0.00	0.00	16.26	0.00	58.59	0.00	74.86	34.51	47.41	274.19	70.11	181.88	191.48	-169.28
2076	0.00	0.00	0.00	0.00	2.11	0.00	2.11	34.51	35.04	274.19	70.11	181.88	191.48	-169.28
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	49.12	274.19	70.11	181.88	191.48	-169.28
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	274.19	70.11	181.88	191.48	-169.28
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	34.51	49.12	274.19	70.11	181.88	191.48	-169.28
2080	0.00	0.00	69.99	0.00	0.00	0.00	69.99	34.51	33.90	274.19	70.11	181.88	191.48	-169.28
2081	0.00	0.00	95.59	0.00	0.00	0.00	95.59	34.51	49.12	274.19	70.11	181.88	191.48	-169.28
2082	0.00	0.00	14.50	0.00	0.00	0.00	14.50	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	35.04	274.19	70.11	181.88	191.48	-169.28
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
2090	0.00	0.00	0.00	0.00	17.95	0.00	17.95	34.51	32.19	274.19	70.11	181.88	191.48	-169.28
Salvage Value	15.19	0.00	35.15	0.00	10.26	0.00	60.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	676.53	0.00	132.97	0.00	5188.63	684.15	509.81	9667.97	2367.37	2310.98	4076.86	912.76

Net Present Value -5470

CCGT/C26

TABLE 059
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	338.97	99.34	23.11	100.27	116.26
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	348.56	97.52	24.18	102.50	124.35
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	366.75	95.97	24.82	104.37	141.59
2018	209.58	0.00	0.35	0.00	0.00	0.00	209.93	3.23	0.00	346.33	93.24	27.16	107.08	118.85
2019	251.91	0.00	143.56	0.00	0.00	0.00	395.47	5.21	0.00	337.66	91.33	24.52	108.51	113.30
2020	257.96	0.00	228.83	0.00	0.00	0.00	486.78	7.54	0.00	371.24	91.24	19.44	118.26	142.31
2021	711.05	0.00	114.32	0.00	9.12	0.00	834.49	11.60	0.00	379.83	90.15	16.19	126.65	146.83
2022	1141.50	0.00	6.83	0.00	0.53	0.00	1148.86	17.35	6.79	399.55	87.79	67.29	113.32	131.15
2023	1024.89	0.00	0.00	0.00	1.05	0.00	1025.94	22.47	6.79	388.84	85.78	75.28	118.39	109.40
2024	731.88	0.00	0.00	0.00	2.11	0.00	733.99	26.14	6.79	387.07	84.81	80.62	121.05	100.58
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	28.70	6.79	316.17	84.48	67.06	116.21	48.42
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	30.38	20.85	374.28	88.12	55.54	98.92	131.70
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	30.99	21.06	505.24	95.81	41.09	91.25	277.10
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	31.18	20.78	533.30	96.04	41.54	98.91	296.81
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.99	512.75	94.37	45.65	99.27	273.46
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.82	487.43	92.30	49.05	102.02	244.05
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.77	490.98	92.25	45.59	99.81	253.33
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.54	456.28	89.44	52.72	105.30	208.83
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.11	442.36	87.79	57.50	109.19	187.89
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.11	427.36	85.82	63.55	115.90	162.09
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.15	419.00	84.40	68.95	119.92	145.73
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	22.83	406.40	82.81	78.43	122.89	122.28
2037	0.00	0.00	76.18	0.00	0.00	0.00	76.18	31.57	19.98	405.73	82.09	81.82	125.24	116.58
2038	0.00	0.00	104.09	0.00	9.12	0.00	113.21	32.13	19.98	399.10	80.94	85.18	131.73	101.25
2039	0.00	0.00	15.78	0.00	0.00	0.00	15.78	32.21	23.90	386.96	79.22	105.79	140.43	61.53
2040	0.00	0.00	77.33	0.00	0.00	0.00	77.33	32.60	23.90	375.39	77.83	115.53	145.14	36.89
2041	0.00	0.00	107.66	0.00	71.81	0.00	179.46	33.48	23.90	364.55	76.54	122.18	151.64	14.18
2042	0.00	0.00	94.13	0.00	0.00	0.00	94.13	33.95	27.18	356.46	75.24	134.25	159.42	-12.44
2043	0.00	0.00	106.67	0.00	0.00	0.00	106.67	34.49	27.18	343.78	73.88	155.01	158.50	-43.61
2044	0.00	0.00	16.18	0.00	0.00	0.00	16.18	34.57	31.09	333.03	72.59	172.03	163.05	-74.65
2045	0.00	0.00	79.28	0.00	0.00	0.00	79.28	34.97	31.09	321.99	71.30	178.61	174.43	-102.35
2046	0.00	0.00	108.28	0.00	60.41	0.00	168.69	35.81	33.95	317.77	70.42	178.80	186.36	-117.81
2047	0.00	0.00	16.43	0.00	0.00	0.00	16.43	35.89	35.03	295.11	68.89	212.78	180.36	-166.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.04	311.62	70.20	190.06	180.38	-129.03
2049	0.00	0.00	143.56	0.00	9.69	0.00	153.25	35.89	35.05	311.62	70.20	190.06	180.38	-129.03
2050	0.00	0.00	207.40	0.00	9.69	0.00	217.09	35.89	35.05	311.62	70.20	190.06	180.38	-129.03
2051	0.00	0.00	92.89	0.00	9.69	0.00	102.58	35.89	36.76	311.62	70.20	190.06	180.38	-129.03
2052	0.00	0.00	6.83	0.00	9.69	0.00	16.52	35.89	36.77	311.62	70.20	190.06	180.38	-129.03
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.77	311.62	70.20	190.06	180.38	-129.03
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	311.62	70.20	190.06	180.38	-129.03
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	311.62	70.20	190.06	180.38	-129.03
2056	0.00	0.00	0.00	0.00	9.12	0.00	9.12	35.89	37.92	311.62	70.20	190.06	180.38	-129.03
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	37.92	311.62	70.20	190.06	180.38	-129.03
2067	0.00	0.00	76.18	0.00	0.00	0.00	76.18	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2068	0.00	0.00	104.05	0.00	0.00	0.00	104.05	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2069	0.00	0.00	15.78	0.00	0.00	0.00	15.78	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2070	0.00	0.00	77.33	0.00	0.00	0.00	77.33	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2071	0.00	0.00	105.61	0.00	0.00	0.00	105.61	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2072	0.00	0.00	94.13	0.00	0.53	0.00	94.65	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2073	0.00	0.00	106.67	0.00	10.17	0.00	116.84	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2074	0.00	0.00	16.18	0.00	2.11	0.00	18.29	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2075	0.00	0.00	79.28	0.00	4.74	0.00	84.02	35.89	50.29	311.62	70.20	190.06	180.38	-129.03
2076	0.00	0.00	108.28	0.00	55.96	0.00	164.24	35.89	37.92	311.62	70.20	190.06	180.38	-129.03
2077	0.00	0.00	16.43	0.00	0.00	0.00	16.43	35.89	52.00	311.62	70.20	190.06	180.38	-129.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	311.62	70.20	190.06	180.38	-129.03
2079	0.00	0.00	143.56	0.00	0.00	0.00	143.56	35.89	52.00	311.62	70.20	190.06	180.38	-129.03
2080	0.00	0.00	207.40	0.00	0.00	0.00	207.40	35.89	36.78	311.62	70.20	190.06	180.38	-129.03
2081	0.00	0.00	92.89	0.00	45.31	0.00	138.20	35.89	52.00	311.62	70.20	190.06	180.38	-129.03
2082	0.00	0.00	6.83	0.00	0.00	0.00	6.83	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	37.92	311.62	70.20	190.06	180.38	-129.03
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	311.62	70.20	190.06	180.38	-129.03
Salvage Value	15.19	0.00	55.03	0.00	9.23	0.00	79.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	983.31	0.00	129.36	0.00	5491.80	713.60	563.34	10448.84	2370.65	2757.90	3825.02	1495.27

Net Present Value: -5273

Wind/C26 | **TABLE 060** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	338.97	99.34	23.11	100.27	116.26
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	348.56	97.52	24.18	102.50	124.35
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	366.75	95.97	24.82	104.36	141.60
2018	209.58	0.00	0.00	0.00	0.00	0.00	209.58	3.23	0.00	346.33	93.24	27.16	107.08	118.85
2019	251.91	0.00	0.00	0.00	0.00	0.00	251.91	4.49	0.00	337.66	91.33	24.52	108.51	113.30
2020	257.96	0.00	0.00	9.41	13.30	0.00	280.67	5.89	0.00	367.95	90.82	20.85	119.34	136.95
2021	711.05	0.00	0.00	287.40	22.16	0.00	1020.61	11.00	0.00	369.44	89.01	20.34	129.28	130.82
2022	1141.50	0.00	0.00	292.78	27.12	0.00	1461.40	18.30	6.10	373.24	87.42	20.40	130.20	135.23
2023	1024.89	0.00	0.00	283.36	14.35	0.00	1322.60	24.92	12.20	370.21	85.01	23.44	134.00	127.76
2024	731.88	0.00	0.00	5.38	6.54	0.00	743.80	28.64	18.31	372.58	83.17	24.14	138.76	126.50
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	31.19	18.31	301.58	83.06	15.90	154.11	48.50
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	32.87	32.36	397.16	87.02	18.92	106.63	184.58
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	33.48	32.58	539.35	94.62	17.05	95.25	332.43
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	33.68	32.29	561.42	94.51	18.66	103.00	345.24
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.50	538.65	92.89	18.96	104.14	322.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.33	526.16	91.85	18.47	103.73	312.12
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.28	512.55	90.44	19.08	106.26	296.77
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	33.68	32.05	493.31	89.04	19.02	108.43	276.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	31.62	467.83	87.55	18.90	109.96	251.42
2034	0.00	0.00	96.48	0.00	0.00	0.00	96.48	34.05	31.62	444.29	86.12	18.99	111.80	227.38
2035	0.00	0.00	123.93	0.00	9.12	0.00	133.05	34.61	31.66	436.26	85.13	17.54	115.22	218.37
2036	0.00	0.00	91.35	0.00	0.00	0.00	91.35	35.07	38.26	419.73	83.09	32.21	119.04	185.38
2037	0.00	0.00	103.57	0.00	9.12	0.00	112.69	35.63	35.41	406.34	81.67	36.40	124.04	164.23
2038	0.00	0.00	15.71	0.00	0.00	0.00	15.71	35.71	39.32	399.46	80.44	47.26	128.11	143.66
2039	0.00	0.00	76.94	0.00	0.00	0.00	76.94	36.09	39.32	389.83	79.30	46.51	142.14	121.88
2040	0.00	0.00	107.13	9.41	71.81	0.00	188.35	37.02	39.32	373.89	77.65	59.82	145.72	90.71
2041	0.00	0.00	93.66	287.40	0.00	0.00	381.06	38.93	43.25	363.63	76.30	73.22	150.68	63.44
2042	0.00	0.00	106.14	292.78	0.00	0.00	398.92	40.92	42.61	352.58	75.03	76.54	159.97	41.03
2043	0.00	0.00	94.60	283.36	0.00	0.00	377.96	42.81	46.52	345.28	73.77	85.47	170.82	15.22
2044	0.00	0.00	107.21	5.38	60.41	0.00	173.00	43.68	46.52	329.65	72.44	106.90	168.58	-18.28
2045	0.00	0.00	16.26	0.00	0.00	0.00	16.26	43.76	50.45	320.18	71.19	124.68	173.72	-49.41
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	53.31	308.88	69.95	127.25	188.05	-76.37
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.47	298.09	68.74	128.94	205.29	-104.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.47	309.05	69.96	126.95	189.02	-76.89
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.48	309.05	69.96	126.95	189.02	-76.89
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.48	309.05	69.96	126.95	189.02	-76.89
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2055	0.00	0.00	0.00	0.00	3.32	0.00	3.32	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2056	0.00	0.00	0.00	0.00	5.54	0.00	5.54	43.76	53.34	309.05	69.96	126.95	189.02	-76.89
2057	0.00	0.00	0.00	0.00	6.65	0.00	6.65	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2058	0.00	0.00	0.00	0.00	3.32	0.00	3.32	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2059	0.00	0.00	0.00	0.00	1.11	0.00	1.11	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2060	0.00	0.00	0.00	9.41	0.00	0.00	9.41	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2061	0.00	0.00	0.00	287.40	0.00	0.00	287.40	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2062	0.00	0.00	0.00	292.78	0.00	0.00	292.78	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2063	0.00	0.00	0.00	283.36	0.00	0.00	283.36	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2064	0.00	0.00	75.05	5.38	0.00	0.00	80.43	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2065	0.00	0.00	102.50	0.00	0.00	0.00	102.50	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2066	0.00	0.00	91.35	0.00	0.00	0.00	91.35	43.76	53.34	309.05	69.96	126.95	189.02	-76.89
2067	0.00	0.00	103.53	0.00	0.00	0.00	103.53	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2068	0.00	0.00	15.71	0.00	0.00	0.00	15.71	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2069	0.00	0.00	76.94	0.00	0.00	0.00	76.94	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2070	0.00	0.00	105.09	0.00	19.09	0.00	124.18	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2071	0.00	0.00	93.66	0.00	16.62	0.00	110.28	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2072	0.00	0.00	106.14	0.00	29.59	0.00	135.73	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2073	0.00	0.00	94.60	0.00	11.03	0.00	105.62	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2074	0.00	0.00	107.21	0.00	5.43	0.00	112.64	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2075	0.00	0.00	16.26	0.00	58.59	0.00	74.86	43.76	65.72	309.05	69.96	126.95	189.02	-76.89
2076	0.00	0.00	0.00	0.00	2.11	0.00	2.11	43.76	53.34	309.05	69.96	126.95	189.02	-76.89
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	67.43	309.05	69.96	126.95	189.02	-76.89
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	43.76	67.43	309.05	69.96	126.95	189.02	-76.89
2080	0.00	0.00	0.00	9.41	0.00	0.00	9.41	43.76	52.20	309.05	69.96	126.95	189.02	-76.89
2081	0.00	0.00	0.00	287.40	0.00	0.00	287.40	43.76	67.43	309.05	69.96	126.95	189.02	-76.89
2082	0.00	0.00	0.00	292.78	0.00	0.00	292.78	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2083	0.00	0.00	0.00	283.36	0.00	0.00	283.36	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2084	0.00	0.00	0.00	5.38	9.69	0.00	15.07	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	53.34	309.05	69.96	126.95	189.02	-76.89
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
2090	0.00	0.00	0.00	0.00	17.95	0.00	17.95	43.76	50.50	309.05	69.96	126.95	189.02	-76.89
Salvage Value	15.19	0.00	27.13	44.54	13.92	0.00	100.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	587.41	1254.53	201.65	0.00	6422.72	821.60	850.83	10523.63	2359.19	1668.01	3985.50	2510.94

Net Present Value -5584

K19/C25/750MW (WPS Sale &Inv)

TABLE 061
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	4.77	308.38	1.54	0.00	305.83	101.20	19.48	96.63	88.52
2015	86.56	537.27	0.00	0.00	21.36	8.59	653.78	4.81	0.00	335.18	99.35	23.08	100.34	112.41
2016	195.77	714.27	0.00	0.00	30.34	22.12	962.50	9.62	0.00	345.50	97.54	24.20	102.65	121.10
2017	231.66	866.06	0.00	0.00	45.80	32.26	1175.77	15.50	0.00	360.99	95.61	25.86	105.56	133.96
2018	278.90	617.26	0.00	0.00	51.31	130.38	1077.85	20.89	0.00	345.80	93.56	26.47	106.70	119.07
2019	286.07	433.17	0.00	0.00	64.96	108.94	893.13	25.36	12.78	372.31	93.49	25.08	106.40	147.34
2020	789.91	179.32	0.00	0.00	4.17	194.97	1168.37	31.20	44.08	606.42	100.50	19.87	121.52	364.53
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	38.12	42.24	685.12	101.05	21.85	130.95	431.27
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	43.96	40.92	682.51	99.89	21.86	133.39	427.37
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	48.27	39.11	652.54	97.60	21.73	137.51	395.69
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	51.50	37.57	630.10	95.44	24.15	142.99	367.52
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	53.88	50.01	649.57	99.98	21.44	111.61	416.54
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	55.17	48.49	847.21	107.95	21.38	112.35	605.53
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	55.39	47.09	883.47	107.99	20.92	122.88	631.68
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	46.10	873.86	106.35	21.62	126.01	619.88
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	47.36	853.82	104.46	21.65	129.03	598.67
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	42.28	844.34	103.14	21.19	130.71	589.29
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	40.98	832.25	101.52	21.65	134.27	574.80
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	39.52	813.86	99.86	21.70	137.47	554.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	38.53	790.22	98.10	21.72	140.59	529.79
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	37.61	767.97	96.41	21.89	144.64	505.03
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	38.86	728.88	94.76	21.68	141.33	471.11
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	35.47	661.27	93.17	22.08	126.32	419.70
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	55.39	34.96	629.68	91.58	22.18	127.58	388.33
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	34.46	605.06	89.96	22.14	132.15	360.80
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	55.94	36.82	582.15	88.38	22.09	143.66	328.03
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	56.75	33.50	578.78	87.12	21.00	153.59	317.07
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	56.87	36.31	560.22	85.15	37.47	155.28	282.32
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	57.43	35.87	545.98	83.64	41.79	161.22	259.33
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	58.26	35.44	535.56	82.31	44.10	169.03	240.12
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	58.94	40.65	531.84	81.11	50.58	177.69	222.46
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	60.19	43.10	507.70	79.30	65.45	178.72	184.24
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	60.31	43.79	496.40	77.89	79.42	184.32	154.78
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	42.56	483.06	76.63	83.00	192.84	130.58
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	41.34	495.72	77.94	75.96	185.29	156.53
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	60.31	43.83	495.72	77.94	75.96	185.29	156.53
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	60.31	42.36	495.72	77.94	75.96	185.29	156.53
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	60.31	42.03	495.72	77.94	75.96	185.29	156.53
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	60.31	41.72	495.72	77.94	75.96	185.29	156.53
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	60.31	41.42	495.72	77.94	75.96	185.29	156.53
2054	0.00	0.00	0.00	0.00	22.62	23.91	46.53	60.31	41.12	495.72	77.94	75.96	185.29	156.53
2055	0.00	0.00	0.00	0.00	1.03	24.80	25.82	60.31	41.96	495.72	77.94	75.96	185.29	156.53
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	60.31	54.06	495.72	77.94	75.96	185.29	156.53
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	60.31	38.57	495.72	77.94	75.96	185.29	156.53
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	60.31	53.53	495.72	77.94	75.96	185.29	156.53
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	60.31	40.90	495.72	77.94	75.96	185.29	156.53
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	60.31	50.37	495.72	77.94	75.96	185.29	156.53
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	65.59	495.72	77.94	75.96	185.29	156.53
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	60.31	65.59	495.72	77.94	75.96	185.29	156.53
2065	0.00	0.00	0.00	0.00	11.14	5.40	16.54	60.31	37.99	495.72	77.94	75.96	185.29	156.53
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	60.31	65.59	495.72	77.94	75.96	185.29	156.53
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	60.31	65.59	495.72	77.94	75.96	185.29	156.53
2069	0.00	0.00	110.19	0.00	42.33	72.88	225.41	60.31	37.99	495.72	77.94	75.96	185.29	156.53
2070	0.00	0.00	150.79	0.00	3.15	75.58	229.52	60.31	52.08	495.72	77.94	75.96	185.29	156.53
2071	0.00	0.00	22.92	0.00	38.41	0.00	61.33	60.31	36.85	495.72	77.94	75.96	185.29	156.53
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	60.31	52.08	495.72	77.94	75.96	185.29	156.53
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	60.31	36.00	495.72	77.94	75.96	185.29	156.53
2074	0.00	0.00	137.51	0.00	60.40	0.00	197.91	60.31	50.37	495.72	77.94	75.96	185.29	156.53
2075	0.00	0.00	156.15	0.00	90.26	0.00	246.41	60.31	37.99	495.72	77.94	75.96	185.29	156.53
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	60.31	52.08	495.72	77.94	75.96	185.29	156.53
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	36.85	495.72	77.94	75.96	185.29	156.53
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	60.31	52.08	495.72	77.94	75.96	185.29	156.53
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	39.70	495.72	77.94	75.96	185.29	156.53
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	60.31	52.08	495.72	77.94	75.96	185.29	156.53
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	60.31	37.99	495.72	77.94	75.96	185.29	156.53
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	60.31	35.14	495.72	77.94	75.96	185.29	156.53
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	60.31	37.99	495.72	77.94	75.96	185.29	156.53
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	60.31	37.99	495.72	77.94	75.96	185.29	156.53
Salvage Value	8.35	0.00	31.34	0.00	41.94	20.84	102.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	456.50	0.00	669.64	485.37	9855.57	1331.82	974.39	16221.18	2594.75	1132.54	4096.71	8397.18

Net Present Value -3765

K19/C25/750MW

TABLE 062
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	6.54	310.15	1.55	0.00	306.80	101.20	19.48	96.25	89.88
2015	86.56	537.27	0.00	0.00	21.36	10.72	655.91	4.83	0.00	337.13	99.35	23.11	100.29	114.38
2016	195.77	714.27	0.00	0.00	30.34	23.04	963.42	9.65	0.00	346.69	97.53	24.16	102.58	122.41
2017	231.66	866.06	0.00	0.00	45.80	32.26	1175.77	15.53	0.00	361.24	95.61	25.83	105.49	134.31
2018	278.90	617.26	0.00	0.00	51.31	180.76	1128.23	21.17	0.00	344.82	93.55	26.40	106.66	118.21
2019	286.07	433.17	0.00	0.00	64.96	127.16	911.35	25.72	12.78	371.04	93.48	25.05	106.40	146.10
2020	789.91	179.32	0.00	0.00	4.17	336.85	1310.26	32.28	47.15	609.69	100.50	19.84	121.14	368.21
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	39.19	45.41	688.50	101.06	21.99	130.87	434.58
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	45.04	44.12	685.89	99.89	21.86	133.13	431.01
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	49.35	42.17	656.55	97.60	21.73	137.34	399.87
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	52.57	40.51	634.30	95.42	24.20	142.84	371.84
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	54.95	52.82	653.74	99.97	21.47	111.33	420.98
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	56.25	51.19	831.50	107.94	21.47	109.03	593.06
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	56.46	49.67	846.10	108.00	20.77	114.30	603.04
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	48.57	835.00	106.36	21.58	116.78	590.28
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	49.73	817.34	104.46	21.65	120.01	571.21
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	44.54	810.43	103.13	21.21	121.78	564.30
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	43.14	801.25	101.51	21.76	125.38	552.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	41.59	786.08	99.85	21.76	129.00	535.48
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	40.50	765.90	98.11	21.66	132.62	513.50
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	39.49	747.22	96.42	21.79	137.33	491.69
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	40.66	679.55	94.82	21.90	121.74	441.10
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	37.19	650.15	93.17	22.11	123.24	411.63
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	56.46	36.60	627.57	91.56	22.12	126.90	386.99
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	36.04	603.86	89.96	22.10	131.35	360.44
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	57.01	38.33	581.75	88.38	22.13	142.81	328.43
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	57.83	34.95	578.23	87.12	21.00	152.75	317.36
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	57.94	37.70	559.82	85.15	37.47	154.67	282.53
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	58.50	37.20	545.75	83.64	41.79	160.70	259.63
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	59.33	36.72	535.10	82.31	44.10	168.40	240.29
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	60.02	41.87	531.55	81.11	50.58	177.17	222.69
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	61.27	44.26	507.50	79.30	65.45	178.32	184.43
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	61.39	44.90	496.07	77.89	79.42	183.79	154.97
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	43.62	482.75	76.63	83.00	192.34	130.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	42.35	495.44	77.94	75.96	184.82	156.73
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	61.39	44.80	495.44	77.94	75.96	184.82	156.73
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	61.39	43.28	495.44	77.94	75.96	184.82	156.73
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	61.39	42.91	495.44	77.94	75.96	184.82	156.73
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	61.39	42.55	495.44	77.94	75.96	184.82	156.73
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	61.39	42.21	495.44	77.94	75.96	184.82	156.73
2054	0.00	0.00	0.00	0.00	22.62	23.91	46.53	61.39	41.87	495.44	77.94	75.96	184.82	156.73
2055	0.00	0.00	0.00	0.00	1.03	24.80	25.82	61.39	42.68	495.44	77.94	75.96	184.82	156.73
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	61.39	54.74	495.44	77.94	75.96	184.82	156.73
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	61.39	39.21	495.44	77.94	75.96	184.82	156.73
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	61.39	54.14	495.44	77.94	75.96	184.82	156.73
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	61.39	41.48	495.44	77.94	75.96	184.82	156.73
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	61.39	50.37	495.44	77.94	75.96	184.82	156.73
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	65.59	495.44	77.94	75.96	184.82	156.73
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	61.39	65.59	495.44	77.94	75.96	184.82	156.73
2065	0.00	0.00	0.00	0.00	11.14	5.40	16.54	61.39	37.99	495.44	77.94	75.96	184.82	156.73
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	61.39	65.59	495.44	77.94	75.96	184.82	156.73
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	61.39	65.59	495.44	77.94	75.96	184.82	156.73
2069	0.00	0.00	110.19	0.00	42.33	72.88	225.41	61.39	37.99	495.44	77.94	75.96	184.82	156.73
2070	0.00	0.00	150.79	0.00	3.15	75.58	229.52	61.39	52.08	495.44	77.94	75.96	184.82	156.73
2071	0.00	0.00	22.92	0.00	38.41	0.00	61.33	61.39	36.85	495.44	77.94	75.96	184.82	156.73
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	61.39	52.08	495.44	77.94	75.96	184.82	156.73
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	61.39	36.00	495.44	77.94	75.96	184.82	156.73
2074	0.00	0.00	137.51	0.00	60.40	0.00	197.91	61.39	50.37	495.44	77.94	75.96	184.82	156.73
2075	0.00	0.00	156.15	0.00	90.26	0.00	246.41	61.39	37.99	495.44	77.94	75.96	184.82	156.73
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	61.39	52.08	495.44	77.94	75.96	184.82	156.73
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	36.85	495.44	77.94	75.96	184.82	156.73
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	61.39	52.08	495.44	77.94	75.96	184.82	156.73
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	39.70	495.44	77.94	75.96	184.82	156.73
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	61.39	52.08	495.44	77.94	75.96	184.82	156.73
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	61.39	37.99	495.44	77.94	75.96	184.82	156.73
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	61.39	35.14	495.44	77.94	75.96	184.82	156.73
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	61.39	37.99	495.44	77.94	75.96	184.82	156.73
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	61.39	37.99	495.44	77.94	75.96	184.82	156.73
Salvage Value	8.35	0.00	31.34	0.00	41.94	20.84	102.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	456.50	0.00	669.64	666.11	10036.31	1357.07	1010.79	16046.81	2594.73	1132.60	4035.15	8284.33

Net Present Value -4120

K19/Gas25/750MW (WPS Sale & INV)

TABLE 063
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	4.77	277.01	1.39	0.00	305.83	101.20	19.48	96.63	88.52
2015	0.00	537.27	0.00	0.00	21.36	8.59	567.22	4.22	0.00	335.20	99.36	23.07	100.34	112.43
2016	0.00	714.27	0.00	0.00	30.34	22.12	766.73	8.05	0.00	345.53	97.54	24.19	102.64	121.14
2017	0.00	866.06	0.00	0.00	45.80	32.26	944.12	12.78	0.00	361.29	95.61	25.84	105.52	134.32
2018	0.00	617.26	0.00	0.00	51.31	130.38	798.95	16.77	0.00	346.27	93.55	26.42	106.64	119.65
2019	0.00	433.17	0.00	0.00	60.79	108.94	602.90	19.78	12.78	373.18	93.49	25.06	106.38	148.25
2020	0.00	179.32	0.00	0.00	0.01	194.97	374.30	21.66	44.08	607.80	100.50	19.84	121.40	366.07
2021	0.00	62.33	0.35	0.00	0.00	0.00	62.68	21.97	42.24	687.60	101.05	21.84	130.72	434.00
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.97	40.92	685.21	99.89	21.82	133.11	430.39
2023	0.00	0.00	119.98	0.00	0.00	0.00	119.98	22.46	39.11	652.81	97.11	23.26	137.70	394.74
2024	0.00	0.00	255.54	0.00	11.87	0.00	267.41	23.69	37.57	634.15	95.12	25.52	143.12	370.38
2025	0.00	0.00	158.35	0.00	93.47	0.00	251.83	24.94	39.87	560.31	94.84	24.76	129.86	310.86
2026	0.00	0.00	121.28	0.00	0.00	0.00	121.28	25.55	42.07	573.08	93.55	29.65	136.13	313.74
2027	0.00	0.00	137.72	0.00	0.00	0.00	137.72	26.23	40.80	560.70	91.60	29.07	145.87	294.16
2028	0.00	0.00	20.93	0.00	0.00	0.00	20.93	26.34	43.51	543.79	89.32	43.47	150.33	260.68
2029	0.00	0.00	102.77	0.00	0.00	0.00	102.77	26.85	44.95	528.20	87.55	48.36	156.41	235.88
2030	0.00	0.00	140.63	0.00	78.64	0.00	219.27	27.95	39.91	525.60	86.49	53.28	160.75	225.08
2031	0.00	0.00	125.59	0.00	0.00	0.00	125.59	28.58	42.71	533.06	86.13	58.02	163.48	225.42
2032	0.00	0.00	142.61	0.00	0.00	0.00	142.61	29.29	41.62	512.56	83.80	69.68	172.22	186.86
2033	0.00	0.00	21.68	0.00	0.00	0.00	21.68	29.40	44.48	503.30	82.29	83.49	178.50	159.02
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	43.45	499.81	81.56	88.02	183.03	147.20
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	42.03	428.21	79.46	84.43	176.17	88.15
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	41.50	350.36	78.03	86.07	155.69	30.57
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	40.99	323.56	76.63	94.03	157.06	-4.17
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	40.49	319.92	75.92	92.55	166.70	-15.25
2039	0.00	0.00	230.85	0.00	0.00	0.00	230.85	30.55	42.85	294.58	74.00	113.56	174.03	-67.02
2040	0.00	0.00	334.17	0.00	0.00	0.00	334.17	32.22	39.54	280.25	72.68	125.62	179.72	-97.78
2041	0.00	0.00	149.96	0.00	11.87	0.00	161.83	33.03	39.08	291.90	72.96	124.83	179.53	-85.42
2042	0.00	0.00	11.05	0.00	0.00	0.00	11.05	33.09	45.44	336.23	70.73	192.83	181.46	-108.79
2043	0.00	0.00	113.31	0.00	0.00	0.00	113.31	33.65	45.01	314.25	69.02	209.18	188.71	-152.66
2044	0.00	0.00	155.06	0.00	78.64	0.00	233.70	34.82	46.30	291.02	67.43	223.76	196.09	-196.26
2045	0.00	0.00	74.11	0.00	0.00	0.00	74.11	35.19	49.83	280.22	66.13	246.38	201.89	-234.19
2046	0.00	0.00	69.17	0.00	0.00	0.00	69.17	35.54	49.44	268.06	64.96	265.19	208.05	-270.14
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	35.59	49.62	262.19	64.16	272.82	218.47	-293.27
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	48.40	270.16	65.09	261.46	209.47	-265.86
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	35.59	50.90	270.16	65.09	261.46	209.47	-265.86
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	35.59	47.72	270.16	65.09	261.46	209.47	-265.86
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	35.59	47.40	270.16	65.09	261.46	209.47	-265.86
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	35.59	47.08	270.16	65.09	261.46	209.47	-265.86
2053	0.00	0.00	98.55	0.00	26.47	23.91	148.93	35.59	46.77	270.16	65.09	261.46	209.47	-265.86
2054	0.00	0.00	234.11	0.00	21.59	23.91	279.62	35.59	46.47	270.16	65.09	261.46	209.47	-265.86
2055	0.00	0.00	156.31	0.00	0.00	24.80	181.11	35.59	46.18	270.16	65.09	261.46	209.47	-265.86
2056	0.00	0.00	121.28	0.00	0.00	0.00	121.28	35.59	61.13	270.16	65.09	261.46	209.47	-265.86
2057	0.00	0.00	137.72	0.00	0.00	0.00	137.72	35.59	45.63	270.16	65.09	261.46	209.47	-265.86
2058	0.00	0.00	20.93	0.00	0.00	0.00	20.93	35.59	60.60	270.16	65.09	261.46	209.47	-265.86
2059	0.00	0.00	102.77	0.00	11.87	0.00	114.64	35.59	47.96	270.16	65.09	261.46	209.47	-265.86
2060	0.00	0.00	140.63	0.00	70.10	0.00	210.74	35.59	57.43	270.16	65.09	261.46	209.47	-265.86
2061	0.00	0.00	125.59	0.00	0.00	0.00	125.59	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2062	0.00	0.00	142.61	0.00	0.00	0.00	142.61	35.59	57.43	270.16	65.09	261.46	209.47	-265.86
2063	0.00	0.00	21.68	0.00	0.00	0.00	21.68	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	35.59	57.43	270.16	65.09	261.46	209.47	-265.86
2065	0.00	0.00	0.00	0.00	70.12	5.40	75.51	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	35.59	57.43	270.16	65.09	261.46	209.47	-265.86
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	35.59	57.43	270.16	65.09	261.46	209.47	-265.86
2069	0.00	0.00	230.85	0.00	39.20	72.88	342.93	35.59	45.05	270.16	65.09	261.46	209.47	-265.86
2070	0.00	0.00	334.17	0.00	0.01	75.58	409.76	35.59	43.92	270.16	65.09	261.46	209.47	-265.86
2071	0.00	0.00	149.96	0.00	0.00	0.00	149.96	35.59	43.92	270.16	65.09	261.46	209.47	-265.86
2072	0.00	0.00	11.05	0.00	0.00	0.00	11.05	35.59	43.92	270.16	65.09	261.46	209.47	-265.86
2073	0.00	0.00	113.31	0.00	0.00	0.00	113.31	35.59	43.06	270.16	65.09	261.46	209.47	-265.86
2074	0.00	0.00	155.06	0.00	0.00	0.00	155.06	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2075	0.00	0.00	74.11	0.00	23.37	0.00	97.48	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2076	0.00	0.00	69.17	0.00	11.87	0.00	81.04	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	35.59	45.05	270.16	65.09	261.46	209.47	-265.86
2080	0.00	0.00	0.00	0.00	19.66	0.00	19.66	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2083	0.00	0.00	98.55	0.00	0.00	0.00	98.55	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2084	0.00	0.00	234.11	0.00	10.63	0.89	245.63	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2085	0.00	0.00	156.31	0.00	10.22	1.77	168.30	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2086	0.00	0.00	121.28	0.00	29.00	5.31	155.60	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2087	0.00	0.00	137.72	0.00	34.18	7.97	179.87	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2088	0.00	0.00	20.93	0.00	26.47	23.91	71.31	35.59	42.21	270.16	65.09	261.46	209.47	-265.86
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	35.59	45.05	270.16	65.09	261.46	209.47	-265.86
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	35.59	45.05	270.16	65.09	261.46	209.47	-265.86
Salvage Value	0.00	0.00	97.84	0.00	23.77	20.84	142.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	1803.55	0.00	451.84	485.37	6067.10	750.60	1020.30	11399.09	2332.94	3355.53	4593.38	1117.23

Net Present Value -6721

K19/C31/750MW

TABLE 064
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	248.19	0.00	0.00	24.05	6.54	309.50	1.55	0.00	306.80	101.20	19.48	96.25	89.88
2015	38.79	537.27	0.00	0.00	21.36	10.72	608.15	4.59	0.00	337.13	99.35	23.11	100.29	114.38
2016	10.56	714.27	0.00	0.00	30.34	23.04	778.21	8.48	0.00	346.69	97.53	24.16	102.58	122.41
2017	10.64	866.06	0.00	0.00	45.80	32.26	954.76	13.25	0.00	361.64	95.61	25.83	105.49	134.71
2018	12.67	617.26	0.00	0.00	51.31	180.76	862.00	17.56	0.00	345.26	93.53	26.39	106.60	118.74
2019	12.77	433.17	0.00	0.00	60.79	127.16	633.89	20.73	12.78	371.83	93.47	25.09	106.37	146.90
2020	12.87	179.32	0.00	0.00	0.01	336.85	529.05	23.38	47.15	611.17	100.49	19.89	121.02	369.77
2021	16.31	62.33	0.00	0.00	0.00	0.00	78.63	23.77	45.41	690.58	101.04	21.95	130.57	437.02
2022	181.28	0.00	0.00	0.00	0.00	0.00	181.28	24.68	44.12	688.92	99.90	21.84	132.81	434.37
2023	274.96	0.00	0.00	0.00	0.00	0.00	274.96	26.05	42.17	655.36	97.01	23.51	137.78	397.06
2024	301.80	0.00	0.00	0.00	0.00	0.00	301.80	27.56	40.51	636.09	94.94	26.15	144.07	370.92
2025	308.20	0.00	0.00	0.00	4.16	0.00	312.36	29.12	38.77	561.17	94.86	18.85	136.96	310.50
2026	836.68	0.00	0.00	0.00	4.16	0.00	840.85	33.33	36.92	542.14	92.99	19.46	150.25	279.44
2027	1332.35	0.00	0.00	0.00	50.75	0.00	1383.10	40.24	35.54	497.04	91.09	18.32	148.74	238.89
2028	1198.48	0.00	0.00	0.00	26.56	0.00	1225.03	46.37	34.22	475.70	89.55	19.02	161.70	205.43
2029	857.44	0.00	0.00	0.00	44.79	0.00	902.23	50.88	35.55	460.10	87.96	19.58	178.18	174.38
2030	594.94	0.00	0.00	0.00	77.88	0.00	672.82	54.24	30.41	456.12	86.65	20.02	191.83	157.61
2031	391.50	0.00	0.00	0.00	103.08	0.00	494.58	56.72	43.23	535.56	90.62	23.13	120.00	301.80
2032	144.46	0.00	0.00	0.00	120.74	0.00	265.20	58.04	42.25	712.62	97.74	22.71	115.87	476.30
2033	45.67	0.00	0.00	0.00	0.00	0.00	45.67	58.27	40.96	769.49	98.20	22.21	132.97	516.11
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	40.05	747.38	96.43	21.78	137.24	491.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	38.37	678.47	94.82	21.76	121.66	440.23
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	37.71	650.08	93.17	22.24	123.23	411.44
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	58.27	36.95	627.99	91.57	22.17	126.93	387.31
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	36.03	603.92	89.96	22.09	131.35	360.52
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	58.82	38.39	581.83	88.39	22.12	142.81	328.51
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	59.63	35.12	578.23	87.12	21.00	152.76	317.35
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	59.75	41.20	559.82	85.15	37.47	154.66	282.54
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	60.31	37.85	545.75	83.64	41.79	160.71	259.62
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	61.14	37.36	535.10	82.31	44.10	168.41	240.28
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	61.83	42.52	531.55	81.11	50.58	177.16	222.70
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	63.08	42.06	507.50	79.30	65.45	178.32	184.43
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	63.20	45.55	496.07	77.89	79.42	183.80	154.96
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	43.62	482.75	76.63	83.00	192.34	130.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	42.35	495.44	77.94	75.96	184.82	156.72
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	63.20	44.80	495.44	77.94	75.96	184.82	156.72
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	63.20	41.57	495.44	77.94	75.96	184.82	156.72
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	63.20	44.05	495.44	77.94	75.96	184.82	156.72
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	63.20	40.84	495.44	77.94	75.96	184.82	156.72
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	63.20	40.50	495.44	77.94	75.96	184.82	156.72
2054	0.00	0.00	0.00	0.00	21.59	23.91	45.50	63.20	40.16	495.44	77.94	75.96	184.82	156.72
2055	0.00	0.00	0.00	0.00	0.00	24.80	24.80	63.20	39.83	495.44	77.94	75.96	184.82	156.72
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	56.45	495.44	77.94	75.96	184.82	156.72
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	40.92	495.44	77.94	75.96	184.82	156.72
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	55.85	495.44	77.94	75.96	184.82	156.72
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	43.18	495.44	77.94	75.96	184.82	156.72
2060	0.00	0.00	0.00	0.00	1.03	0.00	1.03	63.20	52.08	495.44	77.94	75.96	184.82	156.72
2061	0.00	0.00	0.00	0.00	1.03	0.00	1.03	63.20	37.99	495.44	77.94	75.96	184.82	156.72
2062	0.00	0.00	0.00	0.00	12.34	0.00	12.34	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2063	0.00	0.00	0.00	0.00	6.17	0.00	6.17	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2064	0.00	0.00	0.00	0.00	23.70	2.70	26.40	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2065	0.00	0.00	0.00	0.00	28.62	5.40	34.02	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2066	0.00	0.00	0.00	0.00	26.02	16.20	42.22	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2067	0.00	0.00	0.00	0.00	41.44	24.29	65.73	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	63.20	65.59	495.44	77.94	75.96	184.82	156.72
2069	0.00	0.00	110.19	0.00	39.20	72.88	222.27	63.20	37.99	495.44	77.94	75.96	184.82	156.72
2070	0.00	0.00	150.79	0.00	0.01	75.58	226.39	63.20	52.08	495.44	77.94	75.96	184.82	156.72
2071	0.00	0.00	22.92	0.00	0.00	0.00	22.92	63.20	39.70	495.44	77.94	75.96	184.82	156.72
2072	0.00	0.00	112.52	0.00	0.00	0.00	112.52	63.20	52.08	495.44	77.94	75.96	184.82	156.72
2073	0.00	0.00	153.98	0.00	0.00	0.00	153.98	63.20	36.00	495.44	77.94	75.96	184.82	156.72
2074	0.00	0.00	137.51	0.00	0.00	0.00	137.51	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2075	0.00	0.00	156.15	0.00	15.00	0.00	171.15	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2076	0.00	0.00	23.73	0.00	3.13	0.00	26.87	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2077	0.00	0.00	0.00	0.00	38.41	0.00	38.41	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2078	0.00	0.00	0.00	0.00	32.26	0.00	32.26	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2079	0.00	0.00	0.00	0.00	34.51	0.00	34.51	63.20	37.99	495.44	77.94	75.96	184.82	156.72
2080	0.00	0.00	0.00	0.00	130.50	0.00	130.50	63.20	50.37	495.44	77.94	75.96	184.82	156.72
2081	0.00	0.00	0.00	0.00	78.40	0.00	78.40	63.20	37.99	495.44	77.94	75.96	184.82	156.72
2082	0.00	0.00	0.00	0.00	90.91	0.00	90.91	63.20	52.08	495.44	77.94	75.96	184.82	156.72
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	36.85	495.44	77.94	75.96	184.82	156.72
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	63.20	52.08	495.44	77.94	75.96	184.82	156.72
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	63.20	36.85	495.44	77.94	75.96	184.82	156.72
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	63.20	52.08	495.44	77.94	75.96	184.82	156.72
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	63.20	35.14	495.44	77.94	75.96	184.82	156.72
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	63.20	37.99	495.44	77.94	75.96	184.82	156.72
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	63.20	37.99	495.44	77.94	75.96	184.82	156.72
Salvage Value	62.18	0.00	31.34	0.00	46.91	20.84	161.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4235.48	3326.34	456.50	0.00	596.73	666.11	9281.15	1247.15	953.49	14722.87	2531.54	1128.60	4198.69	6864.04

Net Present Value -4618

K19/Gas31/750MW

TABLE 065
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	6.54	278.78	1.39	0.00	306.80	101.20	19.48	96.25	89.88
2015	0.00	537.27	0.00	0.00	21.36	10.72	569.35	4.24	0.00	337.13	99.35	23.11	100.29	114.38
2016	0.00	714.27	0.00	0.00	30.34	23.04	767.65	8.08	0.00	346.69	97.53	24.16	102.58	122.41
2017	0.00	866.06	0.00	0.00	45.80	32.26	944.12	12.80	0.00	361.64	95.61	25.83	105.49	134.71
2018	0.00	617.26	0.00	0.00	51.31	180.76	849.33	17.05	0.00	345.26	93.53	26.39	106.60	118.74
2019	0.00	433.17	0.00	0.00	60.79	127.16	621.12	20.15	12.78	371.83	93.47	25.09	106.37	146.90
2020	0.00	179.32	0.00	0.00	0.01	336.85	516.18	22.73	47.15	611.17	100.49	19.89	121.02	369.77
2021	0.00	62.33	0.00	0.00	0.00	0.00	62.33	23.04	45.41	690.58	101.04	21.95	130.57	437.02
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	44.12	688.87	99.90	21.86	132.84	434.27
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	42.17	655.89	97.01	23.51	137.76	397.61
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	40.51	636.96	94.94	26.17	144.00	371.84
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	38.77	563.35	94.85	18.87	137.32	312.32
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	36.92	546.35	92.98	19.58	151.08	282.71
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	23.04	35.54	502.35	91.08	18.38	149.42	243.47
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	23.04	34.22	483.64	89.53	19.02	163.45	211.64
2029	0.00	0.00	226.96	0.00	0.00	0.00	226.96	24.07	35.55	466.54	88.02	19.29	178.02	181.21
2030	0.00	0.00	406.18	0.00	23.74	0.00	429.92	26.11	30.41	468.89	87.44	17.17	187.67	176.61
2031	0.00	0.00	186.41	0.00	93.47	0.00	279.88	27.50	37.01	457.62	85.32	39.56	152.25	180.49
2032	0.00	0.00	126.47	0.00	0.00	0.00	126.47	28.14	39.74	447.39	83.77	50.24	156.84	156.55
2033	0.00	0.00	143.61	0.00	0.00	0.00	143.61	28.85	38.59	433.40	82.35	55.23	162.33	133.50
2034	0.00	0.00	21.83	0.00	0.00	0.00	21.83	28.96	41.38	433.62	81.57	59.88	168.54	123.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.96	39.87	359.99	79.49	72.53	150.19	57.79
2036	0.00	0.00	226.07	0.00	0.00	0.00	226.07	30.09	39.26	334.64	78.08	79.24	151.74	25.58
2037	0.00	0.00	327.25	0.00	0.00	0.00	327.25	31.73	38.68	320.07	76.79	86.67	156.43	0.17
2038	0.00	0.00	146.86	0.00	78.64	0.00	225.49	32.86	38.12	327.53	76.66	80.14	166.02	4.69
2039	0.00	0.00	10.82	0.00	0.00	0.00	10.82	32.91	47.22	374.05	74.42	155.97	166.97	-23.32
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.91	43.85	351.55	72.57	168.84	174.45	-64.32
2041	0.00	0.00	111.74	0.00	0.00	0.00	111.74	33.47	43.33	334.56	71.13	180.96	180.42	-97.96
2042	0.00	0.00	388.64	0.00	0.00	0.00	388.64	35.41	42.83	318.92	69.81	194.57	186.25	-131.71
2043	0.00	0.00	364.48	0.00	0.00	0.00	364.48	37.24	46.26	314.04	68.96	206.79	191.70	-153.41
2044	0.00	0.00	153.14	0.00	78.64	0.00	231.77	38.39	47.51	312.58	68.65	198.23	201.99	-156.30
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.45	53.86	361.08	66.69	284.95	192.16	-182.73
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	53.43	346.91	65.52	298.56	197.68	-214.84
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	52.15	325.34	64.29	310.73	203.34	-253.01
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	50.88	344.44	65.50	298.08	197.72	-216.86
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	38.45	53.33	344.44	65.50	298.08	197.72	-216.86
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	38.45	50.10	344.44	65.50	298.08	197.72	-216.86
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	38.45	49.74	344.44	65.50	298.08	197.72	-216.86
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	38.45	49.38	344.44	65.50	298.08	197.72	-216.86
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	38.45	49.03	344.44	65.50	298.08	197.72	-216.86
2054	0.00	0.00	0.00	0.00	21.59	23.91	45.50	38.45	48.69	344.44	65.50	298.08	197.72	-216.86
2055	0.00	0.00	0.00	0.00	0.00	24.80	24.80	38.45	48.36	344.44	65.50	298.08	197.72	-216.86
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	63.27	344.44	65.50	298.08	197.72	-216.86
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	47.74	344.44	65.50	298.08	197.72	-216.86
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	62.67	344.44	65.50	298.08	197.72	-216.86
2059	0.00	0.00	205.53	0.00	0.00	0.00	205.53	38.45	50.00	344.44	65.50	298.08	197.72	-216.86
2060	0.00	0.00	384.75	0.00	0.00	0.00	384.75	38.45	58.90	344.44	65.50	298.08	197.72	-216.86
2061	0.00	0.00	184.37	0.00	0.00	0.00	184.37	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2062	0.00	0.00	126.47	0.00	0.00	0.00	126.47	38.45	58.90	344.44	65.50	298.08	197.72	-216.86
2063	0.00	0.00	143.61	0.00	0.00	0.00	143.61	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2064	0.00	0.00	21.83	0.00	13.42	2.70	37.95	38.45	58.90	344.44	65.50	298.08	197.72	-216.86
2065	0.00	0.00	0.00	0.00	34.88	5.40	40.28	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2066	0.00	0.00	226.07	0.00	71.44	16.20	313.71	38.45	58.90	344.44	65.50	298.08	197.72	-216.86
2067	0.00	0.00	327.25	0.00	11.62	24.29	363.15	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2068	0.00	0.00	146.86	0.00	24.84	72.88	244.58	38.45	58.90	344.44	65.50	298.08	197.72	-216.86
2069	0.00	0.00	10.82	0.00	39.20	72.88	122.90	38.45	46.52	344.44	65.50	298.08	197.72	-216.86
2070	0.00	0.00	0.00	0.00	0.01	75.58	75.59	38.45	45.38	344.44	65.50	298.08	197.72	-216.86
2071	0.00	0.00	111.74	0.00	0.00	0.00	111.74	38.45	45.38	344.44	65.50	298.08	197.72	-216.86
2072	0.00	0.00	388.64	0.00	0.00	0.00	388.64	38.45	45.38	344.44	65.50	298.08	197.72	-216.86
2073	0.00	0.00	364.48	0.00	58.98	0.00	423.45	38.45	44.53	344.44	65.50	298.08	197.72	-216.86
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2075	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	38.45	46.52	344.44	65.50	298.08	197.72	-216.86
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2081	0.00	0.00	0.00	0.00	23.37	0.00	23.37	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2088	0.00	0.00	0.00	0.00	46.13	23.91	70.04	38.45	43.67	344.44	65.50	298.08	197.72	-216.86
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	38.45	46.52	344.44	65.50	298.08	197.72	-216.86
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	38.45	46.52	344.44	65.50	298.08	197.72	-216.86
Salvage Value	0.00	0.00	59.79	0.00	26.20	20.84	106.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	1821.83	0.00	421.38	666.11	6235.66	774.91	1017.33	11787.83	2335.99	3582.44	4499.69	1369.70

Net Present Value -6658

K19/C25/250MW

TABLE 066
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	4.11	307.71	1.55	0.00	306.80	101.20	19.48	96.25	89.88
2015	86.56	537.27	0.00	0.00	21.36	3.08	648.27	4.79	0.00	337.13	99.35	23.11	100.29	114.38
2016	195.77	714.27	0.00	0.00	30.34	5.11	945.49	9.52	0.00	346.69	97.53	24.16	102.58	122.41
2017	231.66	866.06	0.00	0.00	45.80	7.66	1151.17	15.28	0.00	361.24	95.61	25.83	105.49	134.31
2018	278.90	617.26	0.00	0.00	51.31	22.98	970.46	20.13	0.00	341.12	92.97	28.34	107.46	112.35
2019	286.07	433.17	0.00	0.00	64.96	22.98	807.18	24.17	12.78	364.44	92.61	28.44	107.58	135.81
2020	789.91	179.32	0.00	0.00	4.17	23.83	997.24	29.15	12.99	573.14	100.82	20.40	108.94	342.98
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	36.07	12.75	637.37	101.41	20.88	115.44	399.64
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	41.91	12.97	625.61	99.54	21.84	118.95	385.28
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	46.22	12.80	609.95	97.39	21.87	126.98	363.71
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	49.45	12.75	598.52	95.11	24.28	137.28	341.85
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	51.83	26.59	604.75	99.78	21.63	98.88	384.46
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	53.12	26.40	760.78	107.31	21.21	94.96	537.29
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	53.34	26.29	757.93	106.74	20.06	97.92	533.21
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	26.56	744.08	105.03	20.87	100.25	517.94
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	29.04	724.99	103.29	21.04	101.56	499.10
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	25.13	715.79	102.03	20.80	102.01	490.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.96	702.24	100.44	21.23	103.92	476.65
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.60	684.77	98.84	21.40	106.22	458.32
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.67	662.77	97.20	21.49	108.04	436.05
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.78	641.51	95.58	21.66	110.49	413.77
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	26.81	604.04	94.00	21.83	108.11	380.10
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	53.34	23.97	576.57	92.45	22.14	109.51	352.46
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	23.97	552.04	90.92	22.09	111.69	327.34
2038	0.00	0.00	130.85	0.00	0.00	0.00	130.85	53.89	23.97	526.09	89.39	22.06	114.58	300.06
2039	0.00	0.00	171.17	0.00	11.87	0.00	183.04	54.69	26.81	517.85	88.23	20.85	126.71	282.08
2040	0.00	0.00	22.76	0.00	0.00	0.00	22.76	54.81	27.88	501.32	86.25	36.58	130.34	248.16
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.81	27.23	488.16	84.76	41.08	135.69	226.64
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	55.37	27.23	477.47	83.45	43.71	141.48	208.82
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	56.20	27.23	465.16	82.08	43.44	150.51	189.13
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	56.89	32.86	453.64	80.55	65.71	150.34	157.04
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	58.14	35.70	439.38	79.16	72.35	156.30	131.57
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	58.25	36.78	431.03	77.82	82.15	165.06	105.99
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.93	417.02	76.44	83.10	177.71	79.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.08	429.14	77.81	79.20	166.36	105.78
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	58.25	37.92	429.14	77.81	79.20	166.36	105.78
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	58.25	36.79	429.14	77.81	79.20	166.36	105.78
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	58.25	36.80	429.14	77.81	79.20	166.36	105.78
2052	0.00	0.00	0.00	0.00	34.18	1.89	36.07	58.25	36.80	429.14	77.81	79.20	166.36	105.78
2053	0.00	0.00	0.00	0.00	26.47	5.68	32.15	58.25	36.81	429.14	77.81	79.20	166.36	105.78
2054	0.00	0.00	0.00	0.00	22.62	5.68	28.30	58.25	36.81	429.14	77.81	79.20	166.36	105.78
2055	0.00	0.00	0.00	0.00	1.03	5.89	6.92	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	58.25	50.33	429.14	77.81	79.20	166.36	105.78
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	58.25	50.33	429.14	77.81	79.20	166.36	105.78
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	58.25	50.33	429.14	77.81	79.20	166.36	105.78
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	65.55	429.14	77.81	79.20	166.36	105.78
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2064	0.00	0.00	0.00	0.00	13.42	3.90	17.32	58.25	65.55	429.14	77.81	79.20	166.36	105.78
2065	0.00	0.00	0.00	0.00	11.14	2.66	13.80	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2066	0.00	0.00	0.00	0.00	1.34	3.85	5.19	58.25	65.55	429.14	77.81	79.20	166.36	105.78
2067	0.00	0.00	0.00	0.00	11.62	5.77	17.38	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2068	0.00	0.00	109.42	0.00	24.84	17.30	151.57	58.25	65.55	429.14	77.81	79.20	166.36	105.78
2069	0.00	0.00	149.75	0.00	42.33	17.30	209.39	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2070	0.00	0.00	22.76	0.00	3.15	17.95	43.85	58.25	52.03	429.14	77.81	79.20	166.36	105.78
2071	0.00	0.00	0.00	0.00	38.41	0.00	38.41	58.25	36.81	429.14	77.81	79.20	166.36	105.78
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	58.25	52.03	429.14	77.81	79.20	166.36	105.78
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	58.25	35.95	429.14	77.81	79.20	166.36	105.78
2074	0.00	0.00	137.51	0.00	72.27	0.00	209.78	58.25	50.33	429.14	77.81	79.20	166.36	105.78
2075	0.00	0.00	156.15	0.00	78.40	0.00	234.54	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	58.25	52.03	429.14	77.81	79.20	166.36	105.78
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	36.81	429.14	77.81	79.20	166.36	105.78
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	58.25	52.03	429.14	77.81	79.20	166.36	105.78
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	39.65	429.14	77.81	79.20	166.36	105.78
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	58.25	52.03	429.14	77.81	79.20	166.36	105.78
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2084	0.00	0.00	0.00	0.00	10.63	0.21	10.84	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2087	0.00	0.00	0.00	0.00	34.18	1.89	36.07	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2088	0.00	0.00	0.00	0.00	26.47	5.68	32.15	58.25	35.10	429.14	77.81	79.20	166.36	105.78
2089	0.00	0.00	0.00	0.00	21.59	5.68	27.27	58.25	37.95	429.14	77.81	79.20	166.36	105.78
2090	0.00	0.00	0.00	0.00	0.00	5.89	5.89	58.25	37.95	429.14	77.81	79.20	166.36	105.78
Salvage Value	8.35	0.00	30.49	0.00	41.91	5.38	86.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	462.38	0.00	669.89	95.07	9471.40	1283.55	692.55	14437.67	2584.24	1176.48	3640.78	7036.16

Net Present Value -4411

K19/Gas24/250MW

TABLE 067
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	4.11	276.34	1.40	0.00	306.80	101.20	19.48	96.25	89.88
2015	0.00	537.27	0.00	0.00	21.36	3.08	561.71	4.20	0.00	337.13	99.35	23.11	100.30	114.37
2016	0.00	714.27	0.00	0.00	30.34	5.11	749.72	7.95	0.00	346.69	97.53	24.16	102.58	122.41
2017	0.00	866.06	0.00	0.00	45.80	7.66	919.51	12.55	0.00	361.64	95.61	25.83	105.49	134.71
2018	0.00	617.26	0.00	0.00	51.31	22.98	691.55	16.01	0.00	341.66	92.97	28.30	107.40	112.99
2019	0.00	433.17	0.00	0.00	60.79	22.98	516.94	18.59	12.78	365.32	92.61	28.44	107.55	136.72
2020	0.00	179.32	0.35	0.00	0.01	23.83	203.52	19.61	12.99	574.64	100.82	20.41	108.87	344.55
2021	0.00	62.33	0.00	0.00	0.00	0.00	62.33	19.92	12.75	639.79	101.39	20.89	115.27	402.25
2022	0.00	0.00	119.30	0.00	0.00	0.00	119.30	20.41	12.97	632.00	99.97	20.62	117.39	394.02
2023	0.00	0.00	155.36	0.00	11.87	0.00	167.23	21.14	12.80	624.87	98.91	17.38	119.77	388.81
2024	0.00	0.00	20.36	0.00	0.00	0.00	20.36	21.24	16.67	618.39	97.10	28.29	122.03	370.96
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.24	16.45	508.63	94.90	21.43	115.98	276.32
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.24	16.05	485.23	92.65	24.32	120.36	247.90
2027	0.00	0.00	101.34	0.00	0.00	0.00	101.34	21.75	16.07	451.92	90.63	26.43	122.57	212.29
2028	0.00	0.00	140.73	0.00	93.47	0.00	234.20	22.91	16.13	435.15	88.86	30.57	126.93	188.79
2029	0.00	0.00	236.37	0.00	0.00	0.00	236.37	24.09	22.71	425.84	87.15	42.28	131.30	165.11
2030	0.00	0.00	311.65	0.00	0.00	0.00	311.65	25.65	18.84	424.81	86.26	45.90	133.89	158.77
2031	0.00	0.00	139.86	0.00	11.87	0.00	151.73	26.41	18.84	438.70	86.83	39.32	133.36	179.20
2032	0.00	0.00	10.31	0.00	0.00	0.00	10.31	26.46	25.64	464.94	84.31	95.61	129.08	155.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.46	25.65	453.12	82.83	103.36	133.08	133.85
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.46	25.65	442.18	81.37	112.24	137.75	110.83
2035	0.00	0.00	224.49	0.00	0.00	0.00	224.49	27.58	25.01	378.91	79.40	112.38	135.81	51.33
2036	0.00	0.00	324.97	0.00	0.00	0.00	324.97	29.21	25.02	353.64	77.95	120.36	136.58	18.75
2037	0.00	0.00	145.84	0.00	0.00	0.00	145.84	29.93	25.02	362.94	78.38	115.91	134.05	34.60
2038	0.00	0.00	239.99	0.00	0.00	0.00	239.99	31.13	31.81	388.66	75.99	180.48	132.56	-0.38
2039	0.00	0.00	331.84	0.00	0.00	0.00	331.84	32.79	34.66	376.59	74.63	192.81	143.22	-34.07
2040	0.00	0.00	148.92	0.00	78.64	0.00	227.56	33.93	31.81	373.19	74.06	198.45	145.38	-44.70
2041	0.00	0.00	10.97	0.00	0.00	0.00	10.97	33.99	38.62	403.33	72.22	262.16	141.25	-72.29
2042	0.00	0.00	235.73	0.00	0.00	0.00	235.73	35.17	38.62	389.60	70.46	283.56	146.82	-111.24
2043	0.00	0.00	341.23	0.00	0.00	0.00	341.23	36.87	38.62	379.50	69.16	299.51	151.23	-140.41
2044	0.00	0.00	153.14	0.00	0.00	0.00	153.14	37.64	40.33	364.03	68.67	297.13	152.54	-154.32
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	37.69	47.13	387.73	66.41	372.44	150.97	-202.09
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	47.13	393.00	66.59	370.55	149.26	-193.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	46.28	363.67	64.66	393.54	155.45	-249.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	37.69	48.28	381.46	65.89	378.84	151.89	-215.16
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2052	0.00	0.00	97.87	0.00	34.18	1.89	133.94	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2053	0.00	0.00	133.93	0.00	26.47	5.68	166.08	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2054	0.00	0.00	20.36	0.00	21.59	5.68	47.63	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2055	0.00	0.00	0.00	0.00	0.00	5.89	5.89	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2057	0.00	0.00	101.34	0.00	0.00	0.00	101.34	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2058	0.00	0.00	138.69	0.00	11.87	0.00	150.56	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2059	0.00	0.00	236.37	0.00	0.00	0.00	236.37	37.69	48.28	381.46	65.89	378.84	151.89	-215.16
2060	0.00	0.00	311.65	0.00	0.00	0.00	311.65	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2061	0.00	0.00	139.86	0.00	0.00	0.00	139.86	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2062	0.00	0.00	10.31	0.00	0.00	0.00	10.31	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2063	0.00	0.00	0.00	0.00	70.10	2.76	72.86	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2064	0.00	0.00	0.00	0.00	13.42	3.90	17.32	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2065	0.00	0.00	224.49	0.00	11.14	2.66	238.29	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2066	0.00	0.00	324.97	0.00	13.21	3.85	342.03	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2067	0.00	0.00	145.84	0.00	11.62	5.77	163.22	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2068	0.00	0.00	239.99	0.00	24.84	17.30	282.14	37.69	60.66	381.46	65.89	378.84	151.89	-215.16
2069	0.00	0.00	331.84	0.00	39.20	17.30	388.35	37.69	48.28	381.46	65.89	378.84	151.89	-215.16
2070	0.00	0.00	148.92	0.00	0.01	17.95	166.88	37.69	47.14	381.46	65.89	378.84	151.89	-215.16
2071	0.00	0.00	10.97	0.00	0.00	0.00	10.97	37.69	47.14	381.46	65.89	378.84	151.89	-215.16
2072	0.00	0.00	235.73	0.00	0.00	0.00	235.73	37.69	47.14	381.46	65.89	378.84	151.89	-215.16
2073	0.00	0.00	341.23	0.00	0.00	0.00	341.23	37.69	46.29	381.46	65.89	378.84	151.89	-215.16
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2075	0.00	0.00	11.28	0.00	58.98	0.00	70.26	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2078	0.00	0.00	0.00	0.00	23.37	0.00	23.37	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	48.28	381.46	65.89	378.84	151.89	-215.16
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2082	0.00	0.00	97.87	0.00	0.00	0.00	97.87	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2083	0.00	0.00	133.93	0.00	0.00	0.00	133.93	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2084	0.00	0.00	20.36	0.00	10.63	0.21	31.20	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2087	0.00	0.00	101.34	0.00	34.18	1.89	137.41	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2088	0.00	0.00	138.69	0.00	26.47	5.68	170.83	37.69	45.44	381.46	65.89	378.84	151.89	-215.16
2089	0.00	0.00	21.08	0.00	21.59	5.68	48.35	37.69	48.28	381.46	65.89	378.84	151.89	-215.16
2090	0.00	0.00	0.00	0.00	19.66	5.89	25.55	37.69	48.28	381.46	65.89	378.84	151.89	-215.16
Salvage Value	0.00	0.00	105.04	0.00	22.51	5.38	132.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	2314.73	0.00	395.19	95.07	6131.33	745.49	744.62	11947.31	2342.72	4677.91	3718.35	1208.33

Net Present Value -6413

K19/C31/250MW

TABLE 068
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	248.19	0.00	0.00	24.05	4.11	307.07	1.55	0.00	306.80	101.20	19.48	96.25	89.88
2015	38.79	537.27	0.00	0.00	21.36	3.08	600.50	4.55	0.00	337.13	99.35	23.11	100.30	114.37
2016	10.56	714.27	0.00	0.00	30.34	5.11	760.28	8.35	0.00	346.69	97.53	24.16	102.58	122.41
2017	10.64	866.06	0.00	0.00	45.80	7.66	930.16	13.00	0.00	361.64	95.61	25.83	105.49	134.71
2018	12.67	617.26	0.00	0.00	51.31	22.98	704.22	16.52	0.00	341.66	92.97	28.30	107.40	112.99
2019	12.77	433.17	0.00	0.00	60.79	22.98	529.71	19.17	12.78	365.32	92.61	28.44	107.55	136.72
2020	12.87	179.32	0.35	0.00	0.01	23.83	216.39	20.25	12.99	574.64	100.82	20.41	108.87	344.55
2021	16.31	62.33	0.00	0.00	0.00	0.00	78.63	20.65	12.75	639.79	101.39	20.89	115.27	402.25
2022	181.28	0.00	119.30	0.00	0.00	0.00	300.57	22.04	12.97	631.89	99.96	20.65	117.42	393.85
2023	274.96	0.00	155.36	0.00	11.87	0.00	442.19	24.15	12.80	624.28	98.88	17.52	119.96	387.92
2024	301.80	0.00	20.36	0.00	0.00	0.00	322.16	25.76	16.67	617.71	97.07	28.47	122.34	369.83
2025	308.20	0.00	0.00	0.00	4.16	0.00	312.36	27.32	16.45	507.32	94.87	21.50	116.27	274.69
2026	836.68	0.00	0.00	0.00	4.16	0.00	840.85	31.52	16.05	484.17	92.64	24.52	120.71	246.30
2027	1332.35	0.00	101.34	0.00	50.75	0.00	1484.44	38.95	16.07	450.24	90.63	26.80	122.88	209.93
2028	1198.48	0.00	138.69	0.00	38.43	0.00	1375.59	45.82	16.13	432.73	88.79	31.39	127.56	184.99
2029	857.44	0.00	21.08	0.00	44.79	0.00	923.31	50.44	22.70	422.65	87.11	43.19	131.96	160.38
2030	594.94	0.00	0.00	0.00	77.88	0.00	672.82	53.80	18.83	441.96	88.15	37.67	127.72	188.41
2031	391.50	0.00	0.00	0.00	103.08	0.00	494.58	56.28	32.89	499.83	91.21	31.15	103.78	273.70
2032	144.46	0.00	0.00	0.00	120.74	0.00	265.20	57.60	33.10	660.21	98.12	30.48	99.37	432.24
2033	45.67	0.00	0.00	0.00	0.00	0.00	45.67	57.83	32.96	687.15	98.11	31.45	107.38	450.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	33.18	661.34	96.37	32.24	109.41	423.32
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.36	622.93	94.71	32.74	107.63	387.85
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.31	596.02	93.13	33.47	108.20	361.22
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.15	566.78	91.30	34.64	110.94	329.90
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.79	534.79	89.38	36.08	114.74	294.60
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	34.70	513.00	87.51	40.03	126.19	259.27
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.97	499.03	85.85	45.33	131.74	236.12
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	34.64	483.44	84.23	51.26	137.19	210.77
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	57.83	31.80	480.35	83.39	52.18	140.39	204.39
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.80	469.08	82.07	51.74	148.89	186.38
2044	0.00	0.00	114.10	0.00	0.00	0.00	114.10	58.40	33.50	453.75	80.56	65.67	150.25	157.27
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	59.65	33.50	439.41	79.16	72.32	156.24	131.70
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	59.77	37.43	431.07	77.82	82.13	165.05	106.06
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.93	417.03	76.45	83.10	177.71	79.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.08	429.17	77.81	79.18	166.33	105.84
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	59.77	37.92	429.17	77.81	79.18	166.33	105.84
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	59.77	35.08	429.17	77.81	79.18	166.33	105.84
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	59.77	37.94	429.17	77.81	79.18	166.33	105.84
2052	0.00	0.00	97.87	0.00	34.18	1.89	133.94	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2053	0.00	0.00	133.93	0.00	26.47	5.68	166.08	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2054	0.00	0.00	20.36	0.00	21.59	5.68	47.63	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2055	0.00	0.00	0.00	0.00	0.00	5.89	5.89	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2057	0.00	0.00	101.34	0.00	0.00	0.00	101.34	59.77	36.81	429.17	77.81	79.18	166.33	105.84
2058	0.00	0.00	138.69	0.00	11.87	0.00	150.56	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2059	0.00	0.00	21.08	0.00	0.00	0.00	21.08	59.77	39.65	429.17	77.81	79.18	166.33	105.84
2060	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2061	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	37.95	429.17	77.81	79.18	166.33	105.84
2062	0.00	0.00	0.00	0.00	12.34	0.00	12.34	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2063	0.00	0.00	0.00	0.00	18.04	2.76	20.80	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2064	0.00	0.00	0.00	0.00	23.70	3.90	27.60	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2065	0.00	0.00	0.00	0.00	28.62	2.66	31.28	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2066	0.00	0.00	0.00	0.00	26.02	3.85	29.87	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2067	0.00	0.00	0.00	0.00	41.44	5.77	47.21	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2068	0.00	0.00	0.00	0.00	24.84	17.30	42.15	59.77	65.55	429.17	77.81	79.18	166.33	105.84
2069	0.00	0.00	0.00	0.00	39.20	17.30	56.50	59.77	37.95	429.17	77.81	79.18	166.33	105.84
2070	0.00	0.00	0.00	0.00	0.01	17.95	17.96	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	39.65	429.17	77.81	79.18	166.33	105.84
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.95	429.17	77.81	79.18	166.33	105.84
2074	0.00	0.00	114.10	0.00	0.00	0.00	114.10	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2075	0.00	0.00	156.15	0.00	3.13	0.00	159.28	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2076	0.00	0.00	23.73	0.00	3.13	0.00	26.87	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2077	0.00	0.00	0.00	0.00	38.41	0.00	38.41	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2078	0.00	0.00	0.00	0.00	20.39	0.00	20.39	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2079	0.00	0.00	0.00	0.00	34.51	0.00	34.51	59.77	37.95	429.17	77.81	79.18	166.33	105.84
2080	0.00	0.00	0.00	0.00	130.50	0.00	130.50	59.77	50.33	429.17	77.81	79.18	166.33	105.84
2081	0.00	0.00	0.00	0.00	78.40	0.00	78.40	59.77	37.95	429.17	77.81	79.18	166.33	105.84
2082	0.00	0.00	97.87	0.00	90.91	0.00	188.78	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2083	0.00	0.00	133.93	0.00	0.00	0.00	133.93	59.77	36.81	429.17	77.81	79.18	166.33	105.84
2084	0.00	0.00	20.36	0.00	10.63	0.21	31.20	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	59.77	36.81	429.17	77.81	79.18	166.33	105.84
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	59.77	52.03	429.17	77.81	79.18	166.33	105.84
2087	0.00	0.00	101.34	0.00	34.18	1.89	137.41	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2088	0.00	0.00	138.69	0.00	26.47	5.68	170.83	59.77	35.10	429.17	77.81	79.18	166.33	105.84
2089	0.00	0.00	21.08	0.00	21.59	5.68	48.35	59.77	37.95	429.17	77.81	79.18	166.33	105.84
2090	0.00	0.00	0.00	0.00	0.00	5.89	5.89	59.77	37.95	429.17	77.81	79.18	166.33	105.84
Salvage Value	62.18	0.00	49.85	0.00	46.02	5.38	163.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4235.48	3326.34	667.69	0.00	606.43	95.07	8931.01	1193.56	699.58	13396.52	2530.37	1279.33	3713.76	5873.05

Net Present Value -4951

All Gas

TABLE 069
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	348.56	97.52	24.18	102.50	124.35
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	366.75	95.97	24.82	104.37	141.59
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	346.75	93.24	27.15	107.07	119.29
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	338.31	91.33	24.51	108.49	113.98
2020	0.00	0.00	117.94	0.00	0.00	0.00	117.94	0.99	0.00	372.44	91.26	19.34	118.12	143.73
2021	0.00	0.00	153.55	0.00	11.87	0.00	165.42	1.71	0.00	374.30	89.46	18.21	128.37	138.26
2022	0.00	0.00	20.08	0.00	0.00	0.00	20.08	1.81	3.92	362.08	87.28	33.96	130.55	110.29
2023	0.00	0.00	98.55	0.00	0.00	0.00	98.55	2.30	3.92	347.27	85.12	42.05	136.52	83.57
2024	0.00	0.00	136.91	0.00	93.47	0.00	230.38	3.44	3.92	339.09	83.70	48.13	141.55	65.71
2025	0.00	0.00	20.50	0.00	0.00	0.00	20.50	3.54	7.84	267.79	83.22	40.26	128.46	15.86
2026	0.00	0.00	100.64	0.00	0.00	0.00	100.64	4.05	7.84	250.09	81.94	41.32	130.70	-3.87
2027	0.00	0.00	137.72	0.00	0.00	0.00	137.72	4.73	7.84	233.49	80.11	41.50	142.02	-30.14
2028	0.00	0.00	234.73	0.00	0.00	0.00	234.73	5.91	11.76	216.91	78.24	63.85	141.01	-66.18
2029	0.00	0.00	309.48	0.00	0.00	0.00	309.48	7.46	11.76	201.71	76.82	72.69	145.29	-93.09
2030	0.00	0.00	138.89	0.00	11.87	0.00	150.76	8.21	11.77	214.36	77.72	67.36	141.54	-72.26
2031	0.00	0.00	10.23	0.00	0.00	0.00	10.23	8.26	18.57	231.18	75.36	119.37	134.48	-98.03
2032	0.00	0.00	104.94	0.00	0.00	0.00	104.94	8.79	18.58	211.51	73.49	132.08	140.95	-135.01
2033	0.00	0.00	143.61	0.00	78.64	0.00	222.24	9.90	18.58	191.90	71.79	144.94	146.37	-171.20
2034	0.00	0.00	244.76	0.00	0.00	0.00	244.76	11.12	22.50	178.29	70.41	162.98	149.87	-204.97
2035	0.00	0.00	322.71	0.00	0.00	0.00	322.71	12.73	22.50	167.50	69.53	172.53	152.77	-227.33
2036	0.00	0.00	144.82	0.00	0.00	0.00	144.82	13.46	22.50	165.69	69.48	167.98	158.71	-230.48
2037	0.00	0.00	238.32	0.00	0.00	0.00	238.32	14.65	29.30	172.57	67.52	222.71	145.03	-262.69
2038	0.00	0.00	329.54	0.00	0.00	0.00	329.54	16.30	29.31	157.78	66.34	236.20	151.13	-295.89
2039	0.00	0.00	147.89	0.00	0.00	0.00	147.89	17.04	29.31	152.81	66.27	239.53	157.83	-310.82
2040	0.00	0.00	10.90	0.00	0.00	0.00	10.90	17.09	36.11	162.54	64.39	290.23	151.66	-343.73
2041	0.00	0.00	234.09	0.00	0.00	0.00	234.09	18.26	36.12	152.71	62.65	319.82	159.78	-389.55
2042	0.00	0.00	338.86	0.00	0.00	0.00	338.86	19.96	36.12	147.09	61.62	341.29	165.75	-421.57
2043	0.00	0.00	152.07	0.00	78.64	0.00	230.71	21.11	36.12	148.33	61.59	346.20	166.91	-426.37
2044	0.00	0.00	11.21	0.00	0.00	0.00	11.21	21.17	42.93	156.58	60.07	395.17	159.01	-457.67
2045	0.00	0.00	50.54	0.00	0.00	0.00	50.54	21.42	42.93	148.01	58.56	427.15	166.08	-503.78
2046	0.00	0.00	69.17	0.00	0.00	0.00	69.17	21.76	42.93	142.37	57.48	453.23	171.71	-540.05
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	21.82	44.34	133.45	56.64	472.46	176.49	-572.14
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.35	141.28	57.56	450.95	171.43	-538.66
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	21.82	44.35	141.28	57.56	450.95	171.43	-538.66
2050	0.00	0.00	96.51	0.00	9.69	0.00	106.21	21.82	44.36	141.28	57.56	450.95	171.43	-538.66
2051	0.00	0.00	132.08	0.00	9.69	0.00	141.77	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2052	0.00	0.00	20.08	0.00	9.69	0.00	29.77	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2053	0.00	0.00	98.55	0.00	0.00	0.00	98.55	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2054	0.00	0.00	134.87	0.00	0.00	0.00	134.87	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2055	0.00	0.00	20.50	0.00	0.00	0.00	20.50	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2056	0.00	0.00	100.64	0.00	11.87	0.00	112.51	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2057	0.00	0.00	137.72	0.00	0.00	0.00	137.72	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2058	0.00	0.00	234.73	0.00	0.00	0.00	234.73	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2059	0.00	0.00	309.48	0.00	70.10	0.00	379.59	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2060	0.00	0.00	138.89	0.00	0.00	0.00	138.89	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2061	0.00	0.00	10.23	0.00	0.00	0.00	10.23	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2062	0.00	0.00	104.94	0.00	0.00	0.00	104.94	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2063	0.00	0.00	143.61	0.00	0.00	0.00	143.61	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2064	0.00	0.00	244.76	0.00	0.00	0.00	244.76	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2065	0.00	0.00	322.71	0.00	11.87	0.00	334.58	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2066	0.00	0.00	144.82	0.00	0.00	0.00	144.82	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2067	0.00	0.00	238.32	0.00	0.00	0.00	238.32	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2068	0.00	0.00	329.54	0.00	58.98	0.00	388.51	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2069	0.00	0.00	147.89	0.00	0.00	0.00	147.89	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2070	0.00	0.00	10.90	0.00	0.00	0.00	10.90	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2071	0.00	0.00	234.09	0.00	0.00	0.00	234.09	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2072	0.00	0.00	338.86	0.00	0.00	0.00	338.86	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2073	0.00	0.00	152.07	0.00	0.00	0.00	152.07	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2074	0.00	0.00	11.21	0.00	23.37	0.00	34.57	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2075	0.00	0.00	50.54	0.00	0.00	0.00	50.54	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2076	0.00	0.00	69.17	0.00	0.00	0.00	69.17	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2078	0.00	0.00	0.00	0.00	58.98	0.00	58.98	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2080	0.00	0.00	96.51	0.00	0.00	0.00	96.51	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2081	0.00	0.00	132.08	0.00	0.00	0.00	132.08	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2082	0.00	0.00	20.08	0.00	0.00	0.00	20.08	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2083	0.00	0.00	98.55	0.00	19.66	0.00	118.21	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2084	0.00	0.00	134.87	0.00	9.69	0.00	144.56	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2085	0.00	0.00	20.50	0.00	9.69	0.00	30.19	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2086	0.00	0.00	100.64	0.00	9.69	0.00	110.33	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2087	0.00	0.00	137.72	0.00	9.69	0.00	147.42	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2088	0.00	0.00	20.93	0.00	0.00	0.00	20.93	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	141.28	57.56	450.95	171.43	-538.66
Salvage Value	0.00	0.00	134.34	0.00	11.05	0.00	145.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2900.43	0.00	240.64	0.00	3202.93	314.51	608.54	6518.87	2118.84	5827.22	4077.80	-5504.98

Net Present Value: -9631

Wind/Gas

TABLE 070
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	348.56	97.52	24.18	102.50	124.35
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	366.75	95.97	24.82	104.37	141.59
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	346.74	93.24	27.15	107.07	119.28
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	338.31	91.32	24.51	108.49	113.99
2020	0.00	0.00	0.00	12.59	20.40	0.00	32.99	0.67	0.00	368.86	90.81	20.86	119.32	137.88
2021	0.00	0.00	0.35	384.42	34.00	0.00	418.77	2.76	0.00	370.22	89.01	20.27	128.87	132.07
2022	0.00	0.00	0.00	391.62	41.07	0.00	432.69	4.92	6.10	374.43	87.42	20.39	129.37	137.26
2023	0.00	0.00	218.54	379.03	21.49	0.00	619.05	7.91	12.20	371.39	84.99	23.48	133.15	129.77
2024	0.00	0.00	291.21	7.20	33.81	0.00	332.22	9.47	18.31	375.57	83.27	23.86	136.77	131.68
2025	0.00	0.00	41.00	6.30	6.55	0.00	53.85	9.73	26.14	314.38	83.32	27.72	120.34	83.00
2026	0.00	0.00	100.64	192.21	16.46	0.00	309.31	11.28	26.14	302.15	82.35	26.57	121.04	72.18
2027	0.00	0.00	139.76	195.81	119.62	0.00	455.20	13.55	29.19	287.74	80.05	32.47	125.08	50.13
2028	0.00	0.00	20.93	195.81	36.25	0.00	252.99	14.81	36.17	282.64	78.35	41.97	128.09	34.22
2029	0.00	0.00	102.77	195.81	36.38	0.00	334.96	16.49	39.22	274.94	76.80	45.41	131.69	21.05
2030	0.00	0.00	140.63	195.81	36.38	0.00	372.83	18.35	42.27	277.82	75.92	47.52	132.99	21.39
2031	0.00	0.00	125.59	195.81	36.38	0.00	357.78	20.14	49.24	279.73	74.73	56.53	134.92	13.55
2032	0.00	0.00	142.61	195.81	115.02	0.00	453.44	22.41	52.29	276.44	73.64	57.03	138.25	7.52
2033	0.00	0.00	21.68	195.81	36.38	0.00	253.87	23.68	59.28	281.67	73.00	60.27	140.62	7.78
2034	0.00	0.00	106.41	195.81	36.38	0.00	338.61	25.37	62.33	269.19	71.26	70.19	143.42	-15.68
2035	0.00	0.00	145.63	195.81	36.38	0.00	377.82	27.26	65.39	257.00	69.62	76.09	147.86	-36.57
2036	0.00	0.00	130.04	195.81	36.38	0.00	362.24	29.07	72.36	252.01	68.31	87.50	150.71	-54.50
2037	0.00	0.00	147.67	195.81	36.38	0.00	379.87	30.97	75.41	243.40	67.06	92.56	154.84	-71.06
2038	0.00	0.00	131.87	195.81	36.38	0.00	364.06	32.79	82.39	242.37	66.05	101.91	158.75	-84.34
2039	0.00	0.00	149.75	195.81	115.02	0.00	460.58	35.09	85.44	236.13	64.93	102.14	173.60	-104.55
2040	0.00	0.00	22.76	208.40	36.38	0.00	267.55	36.43	92.43	238.77	64.16	107.61	179.64	-112.64
2041	0.00	0.00	111.74	580.23	36.38	0.00	728.36	40.07	95.48	225.86	62.68	128.24	177.71	-142.77
2042	0.00	0.00	152.91	587.43	36.38	0.00	776.72	43.96	98.53	215.07	61.36	137.17	184.11	-167.56
2043	0.00	0.00	136.55	574.84	36.11	0.00	747.50	47.69	105.50	210.14	60.22	151.69	188.17	-189.93
2044	0.00	0.00	155.06	203.00	35.29	0.00	393.36	49.66	108.55	205.52	59.31	157.46	193.33	-204.57
2045	0.00	0.00	74.11	202.11	33.11	0.00	309.33	51.21	115.53	202.39	58.26	166.73	201.86	-224.45
2046	0.00	0.00	69.17	381.72	29.84	0.00	480.73	53.61	118.58	197.90	57.26	167.64	215.22	-242.21
2047	0.00	0.00	10.51	199.41	19.92	0.00	229.84	54.76	123.06	191.84	56.23	173.15	218.62	-256.15
2048	0.00	0.00	0.00	195.81	10.23	0.00	206.04	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2049	0.00	0.00	0.00	195.81	9.83	0.00	205.64	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2050	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2051	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2052	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2053	0.00	0.00	197.11	195.81	0.00	0.00	392.92	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2054	0.00	0.00	269.74	195.81	0.00	0.00	465.55	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2055	0.00	0.00	41.00	195.81	5.10	0.00	241.91	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2056	0.00	0.00	100.64	195.81	8.50	0.00	304.95	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2057	0.00	0.00	137.72	195.81	10.34	0.00	343.87	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2058	0.00	0.00	20.93	195.81	5.78	0.00	222.52	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2059	0.00	0.00	102.77	195.81	26.67	0.00	325.24	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2060	0.00	0.00	140.63	208.40	2.87	0.00	351.90	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2061	0.00	0.00	125.59	580.23	4.59	0.00	710.41	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2062	0.00	0.00	142.61	587.43	76.74	0.00	806.78	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2063	0.00	0.00	21.68	574.84	9.10	0.00	605.61	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2064	0.00	0.00	106.41	203.00	9.10	0.00	318.51	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2065	0.00	0.00	145.63	202.11	9.10	0.00	356.83	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2066	0.00	0.00	130.04	381.72	9.10	0.00	520.86	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2067	0.00	0.00	147.67	199.41	68.07	0.00	415.15	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2068	0.00	0.00	131.87	195.81	9.10	0.00	336.78	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2069	0.00	0.00	149.75	195.81	9.10	0.00	354.65	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2070	0.00	0.00	22.76	195.81	24.40	0.00	242.97	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2071	0.00	0.00	111.74	195.81	34.59	0.00	342.14	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2072	0.00	0.00	152.91	195.81	39.83	0.00	388.55	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2073	0.00	0.00	136.55	195.81	24.80	0.00	357.16	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2074	0.00	0.00	155.06	195.81	75.22	0.00	426.09	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2075	0.00	0.00	74.11	195.81	12.78	0.00	282.70	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2076	0.00	0.00	69.17	195.81	20.97	0.00	285.94	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2077	0.00	0.00	10.51	195.81	51.98	0.00	258.30	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2078	0.00	0.00	0.00	195.81	36.11	0.00	231.92	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2079	0.00	0.00	0.00	195.81	35.70	0.00	231.51	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2080	0.00	0.00	0.00	208.40	35.16	0.00	243.56	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2081	0.00	0.00	0.00	580.23	33.52	0.00	613.75	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2082	0.00	0.00	0.00	587.43	51.45	0.00	638.88	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2083	0.00	0.00	197.11	574.84	29.74	0.00	801.69	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2084	0.00	0.00	269.74	203.00	36.85	0.00	509.59	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2085	0.00	0.00	41.00	202.11	36.57	0.00	279.68	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2086	0.00	0.00	100.64	381.72	34.94	0.00	517.30	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2087	0.00	0.00	137.72	199.41	33.30	0.00	370.43	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2088	0.00	0.00	20.93	195.81	15.42	0.00	232.16	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2089	0.00	0.00	0.00	189.51	27.44	0.00	216.95	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
2090	0.00	0.00	0.00	3.60	0.14	0.00	3.73	54.76	123.06	197.38	57.25	169.17	211.90	-240.94
Salvage Value	0.00	0.00	100.16	237.43	50.24	0.00	387.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2085.14	5197.93	755.22	0.00	8100.16	756.52	1713.36	7763.76	2112.72	2438.95	4426.85	-1214.75

Net Present Value -11785

K22/Gas

TABLE 071
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	103.56	0.00	0.00	9.69	0.00	113.25	0.57	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	34.13	0.00	0.00	10.88	0.00	45.01	0.79	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	36.65	0.00	0.00	10.98	0.00	47.64	1.03	0.00	348.16	97.52	24.18	102.50	123.95
2017	0.00	239.36	0.00	0.00	31.97	0.00	271.33	2.39	0.00	365.75	95.97	24.83	104.40	140.55
2018	0.00	467.46	0.00	0.00	11.42	0.00	478.88	4.78	0.00	344.73	93.25	27.17	107.14	117.16
2019	0.00	747.62	0.00	0.00	19.89	0.00	767.50	8.62	0.00	336.22	91.33	24.52	108.57	111.80
2020	0.00	840.88	0.00	0.00	36.19	0.00	877.07	13.00	0.00	363.98	90.64	21.53	120.01	131.80
2021	0.00	683.97	0.00	0.00	51.33	0.00	735.30	16.68	0.00	367.82	88.96	20.67	130.24	127.95
2022	0.00	398.08	0.00	0.00	60.79	0.00	458.87	18.97	12.78	374.52	88.94	23.58	124.01	137.98
2023	0.00	185.31	0.00	0.00	0.01	0.00	185.32	19.90	12.99	491.10	94.51	23.39	113.03	260.17
2024	0.00	64.22	0.00	0.00	0.00	0.00	64.22	20.22	12.71	506.73	94.41	26.57	117.86	267.89
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	20.22	12.92	450.58	94.36	18.64	108.82	228.76
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.22	12.75	432.25	92.53	18.93	111.54	209.25
2027	0.00	0.00	122.77	0.00	0.00	0.00	122.77	20.73	12.70	391.08	90.74	18.11	110.82	171.41
2028	0.00	0.00	160.16	0.00	11.87	0.00	172.03	21.48	12.47	370.63	89.21	18.85	113.77	148.81
2029	0.00	0.00	21.08	0.00	0.00	0.00	21.08	21.59	15.96	364.20	88.39	23.59	114.19	138.03
2030	0.00	0.00	103.49	0.00	0.00	0.00	103.49	22.10	15.96	353.73	86.67	28.99	118.08	119.98
2031	0.00	0.00	361.98	0.00	93.47	0.00	455.45	24.37	16.00	342.58	85.06	33.86	122.79	100.87
2032	0.00	0.00	337.55	0.00	0.00	0.00	337.55	26.06	22.58	333.35	83.50	45.78	127.06	77.01
2033	0.00	0.00	141.82	0.00	11.87	0.00	153.69	26.83	18.71	339.87	83.67	39.98	127.79	88.43
2034	0.00	0.00	10.45	0.00	0.00	0.00	10.45	26.88	25.51	361.74	81.28	95.66	121.95	62.85
2035	0.00	0.00	224.49	0.00	0.00	0.00	224.49	28.00	25.51	345.06	79.28	107.45	127.93	30.40
2036	0.00	0.00	324.97	0.00	0.00	0.00	324.97	29.63	25.51	331.95	77.80	117.02	132.21	4.93
2037	0.00	0.00	145.84	0.00	0.00	0.00	145.84	30.36	25.52	340.56	78.23	111.49	129.97	20.87
2038	0.00	0.00	239.99	0.00	0.00	0.00	239.99	31.56	31.67	361.34	75.89	171.71	127.79	-14.04
2039	0.00	0.00	331.84	0.00	0.00	0.00	331.84	33.22	31.68	349.57	74.55	184.28	138.27	-47.53
2040	0.00	0.00	148.92	0.00	78.64	0.00	227.56	34.35	31.68	349.09	74.11	188.93	140.25	-54.20
2041	0.00	0.00	10.97	0.00	0.00	0.00	10.97	34.41	38.49	373.63	72.16	249.94	136.45	-84.93
2042	0.00	0.00	235.73	0.00	0.00	0.00	235.73	35.59	41.33	360.27	70.38	272.34	142.14	-124.59
2043	0.00	0.00	341.23	0.00	0.00	0.00	341.23	37.29	38.49	350.40	69.08	288.72	146.53	-153.93
2044	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.06	38.49	338.86	68.74	286.04	147.18	-163.09
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.12	45.29	365.49	67.15	347.57	143.50	-192.73
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.29	356.65	65.95	368.26	146.63	-224.20
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	47.01	334.53	64.61	382.10	150.82	-263.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	47.01	352.22	65.91	365.97	146.99	-226.64
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	47.01	352.22	65.91	365.97	146.99	-226.64
2050	0.00	0.00	0.00	0.00	10.22	0.00	10.22	38.12	46.16	352.22	65.91	365.97	146.99	-226.64
2051	0.00	0.00	0.00	0.00	10.29	0.00	10.29	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2052	0.00	0.00	0.00	0.00	10.30	0.00	10.30	38.12	48.15	352.22	65.91	365.97	146.99	-226.64
2053	0.00	0.00	0.00	0.00	0.56	0.00	0.56	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2054	0.00	0.00	0.00	0.00	18.46	0.00	18.46	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2055	0.00	0.00	0.00	0.00	24.49	0.00	24.49	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2056	0.00	0.00	0.00	0.00	26.47	0.00	26.47	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2057	0.00	0.00	101.34	0.00	21.59	0.00	122.94	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2058	0.00	0.00	138.69	0.00	0.00	0.00	138.69	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2059	0.00	0.00	21.08	0.00	0.00	0.00	21.08	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2060	0.00	0.00	103.49	0.00	0.00	0.00	103.49	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2061	0.00	0.00	359.94	0.00	0.00	0.00	359.94	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2062	0.00	0.00	337.55	0.00	0.00	0.00	337.55	38.12	48.15	352.22	65.91	365.97	146.99	-226.64
2063	0.00	0.00	141.82	0.00	11.87	0.00	153.69	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2064	0.00	0.00	10.45	0.00	0.00	0.00	10.45	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2065	0.00	0.00	224.49	0.00	0.66	0.00	225.16	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2066	0.00	0.00	324.97	0.00	70.80	0.00	395.77	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2067	0.00	0.00	145.84	0.00	21.67	0.00	167.50	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2068	0.00	0.00	239.99	0.00	22.73	0.00	262.72	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2069	0.00	0.00	331.84	0.00	1.43	0.00	333.27	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2070	0.00	0.00	148.92	0.00	11.70	0.00	160.62	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2071	0.00	0.00	10.97	0.00	24.86	0.00	35.84	38.12	60.53	352.22	65.91	365.97	146.99	-226.64
2072	0.00	0.00	235.73	0.00	39.20	0.00	274.93	38.12	48.15	352.22	65.91	365.97	146.99	-226.64
2073	0.00	0.00	341.23	0.00	0.01	0.00	341.24	38.12	47.01	352.22	65.91	365.97	146.99	-226.64
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.12	47.01	352.22	65.91	365.97	146.99	-226.64
2075	0.00	0.00	11.28	0.00	58.98	0.00	70.26	38.12	47.01	352.22	65.91	365.97	146.99	-226.64
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	46.16	352.22	65.91	365.97	146.99	-226.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2081	0.00	0.00	0.00	0.00	23.37	0.00	23.37	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	48.15	352.22	65.91	365.97	146.99	-226.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2087	0.00	0.00	101.34	0.00	9.69	0.00	111.04	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2088	0.00	0.00	138.69	0.00	0.00	0.00	138.69	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2089	0.00	0.00	21.08	0.00	0.00	0.00	21.08	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
2090	0.00	0.00	0.00	0.00	19.66	0.00	19.66	38.12	45.30	352.22	65.91	365.97	146.99	-226.64
Salvage Value	0.00	0.00	93.33	0.00	17.07	0.00	110.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3154.41	2218.51	0.00	372.80	0.00	5745.73	694.55	684.05	10330.59	2309.88	4418.71	3606.44	-4.44

Net Present Value: -7129

K22/C29

TABLE 072
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	103.56	0.00	0.00	9.69	0.00	143.98	0.72	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.31	34.13	0.00	0.00	10.88	0.00	84.32	1.14	0.00	338.97	99.34	23.11	100.27	116.26
2016	11.08	36.65	0.00	0.00	10.98	0.00	58.72	1.44	0.00	348.16	97.52	24.18	102.50	123.95
2017	11.83	239.36	0.00	0.00	31.97	0.00	283.16	2.85	0.00	365.75	95.97	24.83	104.40	140.55
2018	11.92	467.46	0.00	0.00	11.42	0.00	490.80	5.30	0.00	344.73	93.25	27.17	107.14	117.16
2019	14.28	747.62	0.00	0.00	19.89	0.00	781.79	9.21	0.00	336.22	91.33	24.52	108.57	111.80
2020	181.67	840.88	0.00	0.00	36.19	0.00	1058.74	14.51	0.00	363.99	90.64	21.53	120.01	131.81
2021	273.94	683.97	0.00	0.00	51.33	0.00	1009.24	19.55	0.00	367.59	88.96	20.68	130.38	127.56
2022	297.17	398.08	0.00	0.00	60.79	0.00	756.04	23.33	12.78	374.23	88.95	23.53	124.19	137.56
2023	303.46	185.31	0.00	0.00	4.17	0.00	492.95	25.80	12.99	490.18	94.51	23.44	113.15	259.08
2024	823.83	64.22	0.00	0.00	4.16	0.00	892.22	30.26	12.71	504.80	94.40	26.58	117.96	265.86
2025	1311.89	0.00	0.00	0.00	50.75	0.00	1362.64	37.07	12.92	448.23	94.38	18.67	108.99	226.19
2026	1180.07	0.00	0.00	0.00	26.56	0.00	1206.63	43.11	12.75	429.30	92.54	18.98	111.76	206.02
2027	844.27	0.00	0.00	0.00	44.79	0.00	889.07	47.55	12.70	389.18	90.96	17.38	110.73	170.11
2028	585.80	0.00	0.00	0.00	77.88	0.00	663.68	50.87	12.47	363.86	89.11	19.08	114.56	141.10
2029	385.49	0.00	0.00	0.00	103.08	0.00	488.57	53.31	26.10	470.70	92.85	21.81	98.52	257.52
2030	142.25	0.00	0.00	0.00	120.74	0.00	262.98	54.63	26.31	622.94	99.86	21.27	90.67	411.14
2031	44.97	0.00	0.00	0.00	0.00	0.00	44.97	54.85	26.22	642.08	99.64	21.73	94.31	426.39
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	29.08	621.65	97.99	21.47	95.79	406.40
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	25.04	599.39	96.40	21.42	97.10	384.46
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	25.00	580.04	94.84	21.86	99.26	364.09
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	24.83	559.47	93.33	21.97	100.51	343.66
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	54.85	24.47	535.69	91.82	21.91	101.80	320.17
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	24.54	511.70	90.32	21.99	103.67	295.72
2038	0.00	0.00	130.85	0.00	0.00	0.00	130.85	55.40	24.00	488.72	88.84	22.02	107.06	270.80
2039	0.00	0.00	171.17	0.00	11.87	0.00	183.04	56.21	26.68	481.38	87.50	21.55	121.26	251.07
2040	0.00	0.00	22.76	0.00	0.00	0.00	22.76	56.32	27.75	469.70	85.82	37.80	122.96	223.13
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.32	27.75	458.07	84.40	42.25	128.27	203.16
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	56.88	30.59	446.87	83.02	43.59	135.98	184.28
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	57.71	27.75	433.69	81.58	44.26	145.58	162.27
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	58.40	31.66	423.73	80.15	68.18	143.13	132.26
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	59.65	31.02	412.46	78.94	72.88	148.76	111.89
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	59.77	34.94	423.79	78.57	72.08	155.20	117.94
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.65	395.57	76.42	96.14	160.11	62.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.65	410.61	77.98	80.37	154.69	97.57
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	39.50	410.61	77.98	80.37	154.69	97.57
2050	0.00	0.00	0.00	0.00	10.22	0.00	10.22	59.77	35.80	410.61	77.98	80.37	154.69	97.57
2051	0.00	0.00	0.00	0.00	10.29	0.00	10.29	59.77	34.96	410.61	77.98	80.37	154.69	97.57
2052	0.00	0.00	0.00	0.00	10.30	0.00	10.30	59.77	37.81	410.61	77.98	80.37	154.69	97.57
2053	0.00	0.00	0.00	0.00	0.56	0.00	0.56	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2054	0.00	0.00	0.00	0.00	18.46	0.00	18.46	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2055	0.00	0.00	0.00	0.00	24.49	0.00	24.49	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2056	0.00	0.00	0.00	0.00	26.47	0.00	26.47	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2057	0.00	0.00	0.00	0.00	21.59	0.00	21.59	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2058	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2059	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	53.04	410.61	77.98	80.37	154.69	97.57
2060	0.00	0.00	0.00	0.00	12.34	0.00	12.34	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2061	0.00	0.00	0.00	0.00	6.17	0.00	6.17	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	59.77	37.81	410.61	77.98	80.37	154.69	97.57
2063	0.00	0.00	0.00	0.00	17.48	0.00	17.48	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2064	0.00	0.00	0.00	0.00	24.68	0.00	24.68	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2065	0.00	0.00	0.00	0.00	30.49	0.00	30.49	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2066	0.00	0.00	0.00	0.00	0.70	0.00	0.70	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2067	0.00	0.00	0.00	0.00	21.67	0.00	21.67	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2068	0.00	0.00	109.42	0.00	10.86	0.00	120.28	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2069	0.00	0.00	149.75	0.00	1.43	0.00	151.17	59.77	53.04	410.61	77.98	80.37	154.69	97.57
2070	0.00	0.00	22.76	0.00	11.70	0.00	34.46	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2071	0.00	0.00	0.00	0.00	24.86	0.00	24.86	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2072	0.00	0.00	112.52	0.00	39.20	0.00	151.72	59.77	53.04	410.61	77.98	80.37	154.69	97.57
2073	0.00	0.00	153.98	0.00	3.15	0.00	157.13	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2074	0.00	0.00	137.51	0.00	15.00	0.00	152.51	59.77	51.90	410.61	77.98	80.37	154.69	97.57
2075	0.00	0.00	156.15	0.00	38.41	0.00	194.55	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2076	0.00	0.00	23.73	0.00	20.39	0.00	44.12	59.77	51.05	410.61	77.98	80.37	154.69	97.57
2077	0.00	0.00	0.00	0.00	34.51	0.00	34.51	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2078	0.00	0.00	0.00	0.00	72.27	0.00	72.27	59.77	50.19	410.61	77.98	80.37	154.69	97.57
2079	0.00	0.00	0.00	0.00	78.40	0.00	78.40	59.77	37.81	410.61	77.98	80.37	154.69	97.57
2080	0.00	0.00	0.00	0.00	161.02	0.00	161.02	59.77	51.90	410.61	77.98	80.37	154.69	97.57
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	54.75	410.61	77.98	80.37	154.69	97.57
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.68	410.61	77.98	80.37	154.69	97.57
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	51.90	410.61	77.98	80.37	154.69	97.57
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	34.97	410.61	77.98	80.37	154.69	97.57
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	37.81	410.61	77.98	80.37	154.69	97.57
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	34.97	410.61	77.98	80.37	154.69	97.57
Salvage Value	43.51	0.00	30.49	0.00	38.99	0.00	112.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4453.86	3154.41	462.38	0.00	607.68	0.00	8678.34	1167.65	620.27	12216.62	2510.40	1183.17	3514.21	5008.83

Net Present Value: -5457

SCGT/C26

TABLE 073
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	338.97	99.34	23.11	100.27	116.26
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	348.56	97.52	24.18	102.50	124.35
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	366.75	95.97	24.82	104.37	141.59
2018	233.71	0.00	0.35	0.00	0.00	0.00	234.06	3.44	0.00	346.33	93.24	27.16	107.08	118.85
2019	281.38	0.00	0.00	0.00	0.00	0.00	281.38	4.85	0.00	337.66	91.33	24.52	108.51	113.30
2020	288.58	0.00	117.94	0.00	0.00	0.00	406.52	6.78	0.00	371.24	91.24	19.44	118.26	142.31
2021	796.95	0.00	153.51	0.00	11.87	0.00	962.32	11.48	0.00	373.27	89.43	18.46	128.81	136.57
2022	1281.79	0.00	20.08	0.00	0.79	0.00	1302.66	17.99	3.92	360.70	87.30	34.35	130.92	108.13
2023	1153.00	0.00	0.00	0.00	1.58	0.00	1154.58	23.77	3.92	344.25	84.99	43.47	137.28	78.51
2024	824.90	0.00	0.00	0.00	3.16	0.00	828.06	27.91	3.92	339.08	83.86	47.77	141.83	65.62
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	30.80	3.92	271.84	84.35	29.19	132.51	25.79
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	32.70	17.97	342.32	88.21	21.91	108.15	124.05
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	33.40	18.18	483.74	95.83	20.78	96.89	270.25
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	33.62	17.90	510.48	95.92	22.77	105.19	286.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	18.11	487.27	94.25	23.43	106.53	263.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.94	472.06	93.07	23.15	106.52	249.31
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.89	450.35	91.16	25.21	110.46	223.51
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.66	423.79	89.28	26.77	113.83	193.92
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.23	405.21	87.38	31.52	118.30	168.01
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.23	394.63	85.85	36.42	123.81	148.55
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.27	384.83	84.57	40.40	126.58	133.28
2036	0.00	0.00	107.91	0.00	0.00	0.00	107.91	34.16	19.95	377.79	83.53	40.86	131.14	122.26
2037	0.00	0.00	147.72	0.00	11.87	0.00	159.58	34.96	17.10	366.21	82.06	41.57	141.41	101.16
2038	0.00	0.00	22.45	0.00	0.00	0.00	22.45	35.07	21.02	356.55	80.61	63.98	140.23	71.73
2039	0.00	0.00	110.19	0.00	0.00	0.00	110.19	35.62	21.02	345.72	79.39	69.31	152.02	45.00
2040	0.00	0.00	152.84	0.00	93.47	0.00	246.31	36.84	21.02	336.32	78.07	68.84	164.87	24.54
2041	0.00	0.00	134.66	0.00	0.00	0.00	134.66	37.51	24.95	322.89	76.47	96.69	163.40	-13.66
2042	0.00	0.00	152.91	0.00	0.00	0.00	152.91	38.28	24.30	309.92	75.15	108.42	168.88	-42.53
2043	0.00	0.00	136.55	0.00	0.00	0.00	136.55	38.96	28.21	302.41	73.88	121.63	177.56	-70.66
2044	0.00	0.00	155.06	0.00	78.64	0.00	233.70	40.13	28.21	292.02	72.60	123.18	193.74	-97.49
2045	0.00	0.00	23.57	0.00	0.00	0.00	23.57	40.25	32.15	283.73	71.30	169.25	182.02	-138.84
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	35.00	274.42	70.15	186.64	186.61	-168.98
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.16	264.42	68.87	189.77	205.81	-200.02
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.17	274.19	70.11	181.88	191.48	-169.28
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.17	274.19	70.11	181.88	191.48	-169.28
2050	0.00	0.00	96.51	0.00	9.69	0.00	106.21	40.25	32.18	274.19	70.11	181.88	191.48	-169.28
2051	0.00	0.00	132.08	0.00	9.69	0.00	141.77	40.25	33.89	274.19	70.11	181.88	191.48	-169.28
2052	0.00	0.00	20.08	0.00	9.69	0.00	29.77	40.25	33.90	274.19	70.11	181.88	191.48	-169.28
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	274.19	70.11	181.88	191.48	-169.28
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	274.19	70.11	181.88	191.48	-169.28
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	274.19	70.11	181.88	191.48	-169.28
2056	0.00	0.00	0.00	0.00	11.87	0.00	11.87	40.25	35.04	274.19	70.11	181.88	191.48	-169.28
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2066	0.00	0.00	107.91	0.00	0.00	0.00	107.91	40.25	35.04	274.19	70.11	181.88	191.48	-169.28
2067	0.00	0.00	147.67	0.00	0.00	0.00	147.67	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2068	0.00	0.00	22.45	0.00	0.00	0.00	22.45	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2069	0.00	0.00	110.19	0.00	0.00	0.00	110.19	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2070	0.00	0.00	150.79	0.00	0.00	0.00	150.79	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2071	0.00	0.00	134.66	0.00	0.00	0.00	134.66	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2072	0.00	0.00	152.91	0.00	12.66	0.00	165.57	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2073	0.00	0.00	136.55	0.00	1.58	0.00	138.13	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2074	0.00	0.00	155.06	0.00	3.16	0.00	158.22	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2075	0.00	0.00	23.57	0.00	77.21	0.00	100.78	40.25	47.41	274.19	70.11	181.88	191.48	-169.28
2076	0.00	0.00	0.00	0.00	3.16	0.00	3.16	40.25	35.04	274.19	70.11	181.88	191.48	-169.28
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	49.12	274.19	70.11	181.88	191.48	-169.28
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	274.19	70.11	181.88	191.48	-169.28
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	40.25	49.12	274.19	70.11	181.88	191.48	-169.28
2080	0.00	0.00	96.51	0.00	0.00	0.00	96.51	40.25	33.90	274.19	70.11	181.88	191.48	-169.28
2081	0.00	0.00	132.08	0.00	0.00	0.00	132.08	40.25	49.12	274.19	70.11	181.88	191.48	-169.28
2082	0.00	0.00	20.08	0.00	0.00	0.00	20.08	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	35.04	274.19	70.11	181.88	191.48	-169.28
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
2090	0.00	0.00	0.00	0.00	23.37	0.00	23.37	40.25	32.19	274.19	70.11	181.88	191.48	-169.28
Salvage Value	16.99	0.00	49.93	0.00	12.59	0.00	79.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	944.22	0.00	159.84	0.00	5996.54	784.10	509.81	9667.97	2367.37	2310.98	4076.86	912.76

Net Present Value -6378

CCGT/C26

TABLE 074
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	338.97	99.34	23.11	100.27	116.26
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	348.56	97.52	24.18	102.50	124.35
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	366.75	95.97	24.82	104.37	141.59
2018	233.71	0.00	0.35	0.00	0.00	0.00	234.06	3.44	0.00	346.33	93.24	27.16	107.08	118.85
2019	281.38	0.00	200.79	0.00	0.00	0.00	482.17	5.86	0.00	337.66	91.33	24.52	108.51	113.30
2020	288.58	0.00	312.08	0.00	0.00	0.00	600.66	8.75	0.00	371.24	91.24	19.44	118.26	142.31
2021	796.95	0.00	151.86	0.00	11.87	0.00	960.68	13.45	0.00	379.83	90.15	16.19	126.65	146.83
2022	1281.79	0.00	9.61	0.00	0.79	0.00	1292.19	19.91	6.79	399.55	87.79	67.29	113.32	131.15
2023	1153.00	0.00	0.00	0.00	1.58	0.00	1154.58	25.68	6.79	388.84	85.78	75.28	118.39	109.40
2024	824.90	0.00	0.00	0.00	3.16	0.00	828.06	29.82	6.79	387.07	84.81	80.62	121.05	100.58
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	32.72	6.79	316.17	84.48	67.06	116.21	48.42
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	34.62	20.85	374.28	88.12	55.54	98.92	131.70
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	35.31	21.06	505.24	95.81	41.09	91.25	277.10
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	35.53	20.78	533.30	96.04	41.54	98.91	296.81
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.99	512.75	94.37	45.65	99.27	273.46
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.82	487.43	92.30	49.05	102.02	244.05
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.77	490.98	92.25	45.59	99.81	253.33
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.54	456.28	89.44	52.72	105.30	208.83
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.11	442.36	87.79	57.50	109.19	187.89
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.11	427.36	85.82	63.55	115.90	162.09
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.15	419.00	84.40	68.95	119.92	145.73
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	22.83	406.40	82.81	78.43	122.89	122.28
2037	0.00	0.00	108.66	0.00	0.00	0.00	108.66	36.08	19.98	405.73	82.09	81.82	125.24	116.58
2038	0.00	0.00	148.75	0.00	11.87	0.00	160.62	36.88	19.98	399.10	80.94	85.18	131.73	101.25
2039	0.00	0.00	22.60	0.00	0.00	0.00	22.60	36.99	23.90	386.96	79.22	105.79	140.43	61.53
2040	0.00	0.00	110.96	0.00	0.00	0.00	110.96	37.55	23.90	375.39	77.83	115.53	145.14	36.89
2041	0.00	0.00	153.89	0.00	93.47	0.00	247.36	38.77	23.90	364.55	76.54	122.18	151.64	14.18
2042	0.00	0.00	135.60	0.00	0.00	0.00	135.60	39.45	27.18	356.46	75.24	134.25	159.42	-12.44
2043	0.00	0.00	153.98	0.00	0.00	0.00	153.98	40.22	27.18	343.78	73.88	155.01	158.50	-43.61
2044	0.00	0.00	23.41	0.00	0.00	0.00	23.41	40.34	31.09	333.03	72.59	172.03	163.05	-74.65
2045	0.00	0.00	114.90	0.00	0.00	0.00	114.90	40.91	31.09	321.99	71.30	178.61	174.43	-102.35
2046	0.00	0.00	157.24	0.00	78.64	0.00	235.88	42.09	33.95	317.77	70.42	178.80	186.36	-117.81
2047	0.00	0.00	23.90	0.00	0.00	0.00	23.90	42.21	35.03	295.11	68.89	212.78	180.36	-166.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.04	311.62	70.20	190.06	180.38	-129.03
2049	0.00	0.00	200.79	0.00	9.69	0.00	210.48	42.21	35.05	311.62	70.20	190.06	180.38	-129.03
2050	0.00	0.00	290.65	0.00	9.69	0.00	300.35	42.21	35.05	311.62	70.20	190.06	180.38	-129.03
2051	0.00	0.00	130.44	0.00	9.69	0.00	140.13	42.21	36.76	311.62	70.20	190.06	180.38	-129.03
2052	0.00	0.00	9.61	0.00	9.69	0.00	19.30	42.21	36.77	311.62	70.20	190.06	180.38	-129.03
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.77	311.62	70.20	190.06	180.38	-129.03
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	311.62	70.20	190.06	180.38	-129.03
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	311.62	70.20	190.06	180.38	-129.03
2056	0.00	0.00	0.00	0.00	11.87	0.00	11.87	42.21	37.92	311.62	70.20	190.06	180.38	-129.03
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	37.92	311.62	70.20	190.06	180.38	-129.03
2067	0.00	0.00	108.66	0.00	0.00	0.00	108.66	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2068	0.00	0.00	148.71	0.00	0.00	0.00	148.71	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2069	0.00	0.00	22.60	0.00	0.00	0.00	22.60	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2070	0.00	0.00	110.96	0.00	0.00	0.00	110.96	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2071	0.00	0.00	151.85	0.00	0.00	0.00	151.85	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2072	0.00	0.00	135.60	0.00	0.79	0.00	136.39	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2073	0.00	0.00	153.98	0.00	13.45	0.00	167.43	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2074	0.00	0.00	23.41	0.00	3.16	0.00	26.56	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2075	0.00	0.00	114.90	0.00	7.11	0.00	122.01	42.21	50.29	311.62	70.20	190.06	180.38	-129.03
2076	0.00	0.00	157.24	0.00	73.26	0.00	230.50	42.21	37.92	311.62	70.20	190.06	180.38	-129.03
2077	0.00	0.00	23.90	0.00	0.00	0.00	23.90	42.21	52.00	311.62	70.20	190.06	180.38	-129.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	311.62	70.20	190.06	180.38	-129.03
2079	0.00	0.00	200.79	0.00	0.00	0.00	200.79	42.21	52.00	311.62	70.20	190.06	180.38	-129.03
2080	0.00	0.00	290.65	0.00	0.00	0.00	290.65	42.21	36.78	311.62	70.20	190.06	180.38	-129.03
2081	0.00	0.00	130.44	0.00	58.98	0.00	189.41	42.21	52.00	311.62	70.20	190.06	180.38	-129.03
2082	0.00	0.00	9.61	0.00	0.00	0.00	9.61	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	37.92	311.62	70.20	190.06	180.38	-129.03
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	311.62	70.20	190.06	180.38	-129.03
Salvage Value	16.99	0.00	78.22	0.00	11.25	0.00	106.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	1379.07	0.00	155.13	0.00	6426.68	825.88	563.34	10448.84	2370.65	2757.90	3825.02	1495.27

Net Present Value: -6321

Wind/C26

TABLE 075
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	307.53	101.19	19.46	96.20	90.70
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	338.97	99.34	23.11	100.27	116.26
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	348.56	97.52	24.18	102.50	124.35
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	366.75	95.97	24.82	104.36	141.60
2018	233.71	0.00	0.00	0.00	0.00	0.00	233.71	3.44	0.00	346.33	93.24	27.16	107.08	118.85
2019	281.38	0.00	0.00	0.00	0.00	0.00	281.38	4.85	0.00	337.66	91.33	24.52	108.51	113.30
2020	288.58	0.00	0.00	12.59	20.40	0.00	321.57	6.46	0.00	367.95	90.82	20.85	119.34	136.95
2021	796.95	0.00	0.00	384.42	34.00	0.00	1215.37	12.54	0.00	369.44	89.01	20.34	129.28	130.82
2022	1281.79	0.00	0.00	391.62	41.59	0.00	1715.00	21.11	6.10	373.24	87.42	20.40	130.20	135.23
2023	1153.00	0.00	0.00	379.03	21.98	0.00	1554.00	28.88	12.20	370.21	85.01	23.44	134.00	127.76
2024	824.90	0.00	0.00	7.20	9.96	0.00	842.06	33.09	18.31	372.58	83.17	24.14	138.76	126.50
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	35.99	18.31	301.58	83.06	15.90	154.11	48.50
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	37.89	32.36	397.16	87.02	18.92	106.63	184.58
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	38.58	32.58	539.35	94.62	17.05	95.25	332.43
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	38.80	32.29	561.42	94.51	18.66	103.00	345.24
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.50	538.65	92.89	18.96	104.14	322.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.33	526.16	91.85	18.47	103.73	312.12
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.28	512.55	90.44	19.08	106.26	296.77
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	38.80	32.05	493.31	89.04	19.02	108.43	276.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	31.62	467.83	87.55	18.90	109.96	251.42
2034	0.00	0.00	127.84	0.00	0.00	0.00	127.84	39.33	31.62	444.29	86.12	18.99	111.80	227.38
2035	0.00	0.00	167.05	0.00	11.87	0.00	178.92	40.12	31.66	436.26	85.13	17.54	115.22	218.37
2036	0.00	0.00	130.04	0.00	0.00	0.00	130.04	40.77	38.26	419.73	83.09	32.21	119.04	185.38
2037	0.00	0.00	147.72	0.00	11.87	0.00	159.58	41.57	35.41	406.34	81.67	36.40	124.04	164.23
2038	0.00	0.00	22.45	0.00	0.00	0.00	22.45	41.68	39.32	399.46	80.44	47.26	128.11	143.66
2039	0.00	0.00	110.19	0.00	0.00	0.00	110.19	42.23	39.32	389.83	79.30	46.51	142.14	121.88
2040	0.00	0.00	152.84	12.59	93.47	0.00	258.90	43.52	39.32	373.89	77.65	59.82	145.72	90.71
2041	0.00	0.00	134.66	384.42	0.00	0.00	519.08	46.11	43.25	363.63	76.30	73.22	150.68	63.44
2042	0.00	0.00	152.91	391.62	0.00	0.00	544.53	48.84	42.61	352.58	75.03	76.54	159.97	41.03
2043	0.00	0.00	136.55	379.03	0.00	0.00	515.58	51.41	46.52	345.28	73.77	85.47	170.82	15.22
2044	0.00	0.00	155.06	7.20	78.64	0.00	240.89	52.62	46.52	329.65	72.44	106.90	168.58	-18.28
2045	0.00	0.00	23.57	0.00	0.00	0.00	23.57	52.74	50.45	320.18	71.19	124.68	173.72	-49.41
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	53.31	308.88	69.95	127.25	188.05	-76.37
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.47	298.09	68.74	128.94	205.29	-104.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.47	309.05	69.96	126.95	189.02	-76.89
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.48	309.05	69.96	126.95	189.02	-76.89
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.48	309.05	69.96	126.95	189.02	-76.89
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2055	0.00	0.00	0.00	0.00	5.10	0.00	5.10	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2056	0.00	0.00	0.00	0.00	8.50	0.00	8.50	52.74	53.34	309.05	69.96	126.95	189.02	-76.89
2057	0.00	0.00	0.00	0.00	10.20	0.00	10.20	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2058	0.00	0.00	0.00	0.00	5.10	0.00	5.10	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2059	0.00	0.00	0.00	0.00	1.70	0.00	1.70	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2060	0.00	0.00	0.00	12.59	0.00	0.00	12.59	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2061	0.00	0.00	0.00	384.42	0.00	0.00	384.42	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2062	0.00	0.00	0.00	391.62	0.00	0.00	391.62	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2063	0.00	0.00	0.00	379.03	0.00	0.00	379.03	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2064	0.00	0.00	106.41	7.20	0.00	0.00	113.61	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2065	0.00	0.00	145.63	0.00	0.00	0.00	145.63	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2066	0.00	0.00	130.04	0.00	0.00	0.00	130.04	52.74	53.34	309.05	69.96	126.95	189.02	-76.89
2067	0.00	0.00	147.67	0.00	0.00	0.00	147.67	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2068	0.00	0.00	22.45	0.00	0.00	0.00	22.45	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2069	0.00	0.00	110.19	0.00	0.00	0.00	110.19	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2070	0.00	0.00	150.79	0.00	27.17	0.00	177.96	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2071	0.00	0.00	134.66	0.00	25.50	0.00	160.16	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2072	0.00	0.00	152.91	0.00	43.26	0.00	196.17	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2073	0.00	0.00	136.55	0.00	16.88	0.00	153.43	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2074	0.00	0.00	155.06	0.00	8.26	0.00	163.32	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2075	0.00	0.00	23.57	0.00	77.21	0.00	100.78	52.74	65.72	309.05	69.96	126.95	189.02	-76.89
2076	0.00	0.00	0.00	0.00	3.16	0.00	3.16	52.74	53.34	309.05	69.96	126.95	189.02	-76.89
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	67.43	309.05	69.96	126.95	189.02	-76.89
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	52.74	67.43	309.05	69.96	126.95	189.02	-76.89
2080	0.00	0.00	0.00	12.59	0.00	0.00	12.59	52.74	52.20	309.05	69.96	126.95	189.02	-76.89
2081	0.00	0.00	0.00	384.42	0.00	0.00	384.42	52.74	67.43	309.05	69.96	126.95	189.02	-76.89
2082	0.00	0.00	0.00	391.62	0.00	0.00	391.62	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2083	0.00	0.00	0.00	379.03	0.00	0.00	379.03	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2084	0.00	0.00	0.00	7.20	9.69	0.00	16.89	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	53.34	309.05	69.96	126.95	189.02	-76.89
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
2090	0.00	0.00	0.00	0.00	23.37	0.00	23.37	52.74	50.50	309.05	69.96	126.95	189.02	-76.89
Salvage Value	16.99	0.00	38.97	59.57	18.14	0.00	133.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	831.20	1678.05	266.07	0.00	7667.81	969.83	850.83	10523.63	2359.19	1668.01	3985.50	2510.94

Net Present Value -6978

K19/C25/750MW (WPS Sale &Inv)

TABLE 076
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	2.97	249.43	1.25	0.00	305.83	101.20	19.48	96.63	88.52
2015	83.73	439.66	0.00	0.00	16.69	5.29	545.38	3.97	0.00	335.18	99.35	23.08	100.34	112.41
2016	166.43	579.79	0.00	0.00	22.08	13.33	781.64	7.88	0.00	345.50	97.54	24.20	102.65	121.10
2017	191.52	700.61	0.00	0.00	31.35	19.36	942.85	12.60	0.00	360.99	95.61	25.86	105.56	133.96
2018	228.68	492.58	0.00	0.00	30.79	81.40	833.45	16.76	0.00	345.80	93.56	26.47	106.70	119.07
2019	232.37	351.28	0.00	0.00	38.97	66.51	689.13	20.21	12.78	372.31	93.49	25.08	106.40	147.34
2020	638.66	143.03	0.00	0.00	2.50	125.91	910.10	24.76	44.08	606.42	100.50	19.87	121.52	364.53
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	30.27	42.24	685.12	101.05	21.85	130.95	431.27
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	34.93	40.92	682.51	99.89	21.86	133.39	427.37
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	38.32	39.11	652.54	97.60	21.73	137.51	395.69
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	40.80	37.57	630.10	95.44	24.15	142.99	367.52
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	42.59	50.01	649.57	99.98	21.44	111.61	416.54
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	43.49	48.49	847.21	107.95	21.38	112.35	605.53
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	43.66	47.09	883.47	107.99	20.92	122.88	631.68
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	46.10	873.86	106.35	21.62	126.01	619.88
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	47.36	853.82	104.46	21.65	129.03	598.67
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	42.28	844.34	103.14	21.19	130.71	589.29
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	40.98	832.25	101.52	21.65	134.27	574.80
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	39.52	813.86	99.86	21.70	137.47	554.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	38.53	790.22	98.10	21.72	140.59	529.79
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	37.61	767.97	96.41	21.89	144.64	505.03
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	38.86	728.88	94.76	21.68	141.33	471.11
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	35.47	661.27	93.17	22.08	126.32	419.70
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	43.66	34.96	629.68	91.58	22.18	127.58	388.33
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	34.46	605.06	89.96	22.14	132.15	360.80
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	43.91	36.82	582.15	88.38	22.09	143.66	328.03
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	44.28	33.50	578.78	87.12	21.00	153.59	317.07
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	44.33	36.31	560.22	85.15	37.47	155.28	282.32
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	44.58	35.87	545.98	83.64	41.79	161.22	259.33
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	44.96	35.44	535.56	82.31	44.10	169.03	240.12
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	45.26	40.65	531.84	81.11	50.58	177.69	222.46
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.86	43.10	507.70	79.30	65.45	178.72	184.24
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.91	43.79	496.40	77.89	79.42	184.32	154.78
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	42.56	483.06	76.63	83.00	192.84	130.58
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	41.34	495.72	77.94	75.96	185.29	156.53
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	45.91	43.83	495.72	77.94	75.96	185.29	156.53
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	45.91	42.36	495.72	77.94	75.96	185.29	156.53
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	45.91	42.03	495.72	77.94	75.96	185.29	156.53
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	45.91	41.72	495.72	77.94	75.96	185.29	156.53
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	45.91	41.42	495.72	77.94	75.96	185.29	156.53
2054	0.00	0.00	0.00	0.00	13.57	14.35	27.92	45.91	41.12	495.72	77.94	75.96	185.29	156.53
2055	0.00	0.00	0.00	0.00	0.62	14.88	15.49	45.91	41.96	495.72	77.94	75.96	185.29	156.53
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.91	54.06	495.72	77.94	75.96	185.29	156.53
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	45.91	38.57	495.72	77.94	75.96	185.29	156.53
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	45.91	53.53	495.72	77.94	75.96	185.29	156.53
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	45.91	40.90	495.72	77.94	75.96	185.29	156.53
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	45.91	50.37	495.72	77.94	75.96	185.29	156.53
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	65.59	495.72	77.94	75.96	185.29	156.53
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	45.91	65.59	495.72	77.94	75.96	185.29	156.53
2065	0.00	0.00	0.00	0.00	6.68	3.24	9.92	45.91	37.99	495.72	77.94	75.96	185.29	156.53
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	45.91	65.59	495.72	77.94	75.96	185.29	156.53
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	45.91	65.59	495.72	77.94	75.96	185.29	156.53
2069	0.00	0.00	49.93	0.00	25.40	43.73	119.06	45.91	37.99	495.72	77.94	75.96	185.29	156.53
2070	0.00	0.00	67.93	0.00	1.89	45.35	115.16	45.91	52.08	495.72	77.94	75.96	185.29	156.53
2071	0.00	0.00	10.26	0.00	23.04	0.00	33.31	45.91	36.85	495.72	77.94	75.96	185.29	156.53
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	45.91	52.08	495.72	77.94	75.96	185.29	156.53
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	45.91	36.00	495.72	77.94	75.96	185.29	156.53
2074	0.00	0.00	60.48	0.00	36.24	0.00	96.72	45.91	50.37	495.72	77.94	75.96	185.29	156.53
2075	0.00	0.00	68.27	0.00	53.67	0.00	121.94	45.91	37.99	495.72	77.94	75.96	185.29	156.53
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	45.91	52.08	495.72	77.94	75.96	185.29	156.53
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	36.85	495.72	77.94	75.96	185.29	156.53
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	45.91	52.08	495.72	77.94	75.96	185.29	156.53
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	39.70	495.72	77.94	75.96	185.29	156.53
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	45.91	52.08	495.72	77.94	75.96	185.29	156.53
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	45.91	37.99	495.72	77.94	75.96	185.29	156.53
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	45.91	35.14	495.72	77.94	75.96	185.29	156.53
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	45.91	37.99	495.72	77.94	75.96	185.29	156.53
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	45.91	37.99	495.72	77.94	75.96	185.29	156.53
Salvage Value	6.76	0.00	13.89	0.00	26.13	12.50	59.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	213.74	0.00	419.51	302.60	7601.58	1036.41	974.39	16221.18	2594.75	1132.54	4096.71	8397.18

Net Present Value -1215

K19/C25/750MW

TABLE 077
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	4.21	250.66	1.25	0.00	306.80	101.20	19.48	96.25	89.88
2015	83.73	439.66	0.00	0.00	16.69	6.77	546.86	3.99	0.00	337.13	99.35	23.11	100.29	114.38
2016	166.43	579.79	0.00	0.00	22.08	13.97	782.28	7.90	0.00	346.69	97.53	24.16	102.58	122.41
2017	191.52	700.61	0.00	0.00	31.35	19.36	942.85	12.61	0.00	361.24	95.61	25.83	105.49	134.31
2018	228.68	492.58	0.00	0.00	30.79	116.38	868.43	16.96	0.00	344.82	93.55	26.40	106.66	118.21
2019	232.37	351.28	0.00	0.00	38.97	79.16	701.79	20.46	12.78	371.04	93.48	25.05	106.40	146.10
2020	638.66	143.03	0.00	0.00	2.50	224.44	1008.63	25.51	47.15	609.69	100.50	19.84	121.14	368.21
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	31.02	45.41	688.50	101.06	21.99	130.87	434.58
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	35.67	44.12	685.89	99.89	21.86	133.13	431.01
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	39.07	42.17	656.55	97.60	21.73	137.34	399.87
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	41.55	40.51	634.30	95.42	24.20	142.84	371.84
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	43.33	52.82	653.74	99.97	21.47	111.33	420.98
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	44.24	51.19	831.50	107.94	21.47	109.03	593.06
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	44.41	49.67	846.10	108.00	20.77	114.30	603.04
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	48.57	835.00	106.36	21.58	116.78	590.28
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	49.73	817.34	104.46	21.65	120.01	571.21
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	44.54	810.43	103.13	21.21	121.78	564.30
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	43.14	801.25	101.51	21.76	125.38	552.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	41.59	786.08	99.85	21.76	129.00	535.48
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	40.50	765.90	98.11	21.66	132.62	513.50
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	39.49	747.22	96.42	21.79	137.33	491.69
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	40.66	679.55	94.82	21.90	121.74	441.10
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	37.19	650.15	93.17	22.11	123.24	411.63
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	44.41	36.60	627.57	91.56	22.12	126.90	386.99
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	36.04	603.86	89.96	22.10	131.35	360.44
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	44.66	38.33	581.75	88.38	22.13	142.81	328.43
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	45.03	34.95	578.23	87.12	21.00	152.75	317.36
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	45.08	37.70	559.82	85.15	37.47	154.67	282.53
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	45.33	37.20	545.75	83.64	41.79	160.70	259.63
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	45.71	36.72	535.10	82.31	44.10	168.40	240.29
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	46.01	41.87	531.55	81.11	50.58	177.17	222.69
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	46.61	44.26	507.50	79.30	65.45	178.32	184.43
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	46.66	44.90	496.07	77.89	79.42	183.79	154.97
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	43.62	482.75	76.63	83.00	192.34	130.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	42.35	495.44	77.94	75.96	184.82	156.73
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	46.66	44.80	495.44	77.94	75.96	184.82	156.73
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	46.66	43.28	495.44	77.94	75.96	184.82	156.73
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	46.66	42.91	495.44	77.94	75.96	184.82	156.73
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	46.66	42.55	495.44	77.94	75.96	184.82	156.73
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	46.66	42.21	495.44	77.94	75.96	184.82	156.73
2054	0.00	0.00	0.00	0.00	13.57	14.35	27.92	46.66	41.87	495.44	77.94	75.96	184.82	156.73
2055	0.00	0.00	0.00	0.00	0.62	14.88	15.49	46.66	42.68	495.44	77.94	75.96	184.82	156.73
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	46.66	54.74	495.44	77.94	75.96	184.82	156.73
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	46.66	39.21	495.44	77.94	75.96	184.82	156.73
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	46.66	54.14	495.44	77.94	75.96	184.82	156.73
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	46.66	41.48	495.44	77.94	75.96	184.82	156.73
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	46.66	50.37	495.44	77.94	75.96	184.82	156.73
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	65.59	495.44	77.94	75.96	184.82	156.73
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	46.66	65.59	495.44	77.94	75.96	184.82	156.73
2065	0.00	0.00	0.00	0.00	6.68	3.24	9.92	46.66	37.99	495.44	77.94	75.96	184.82	156.73
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	46.66	65.59	495.44	77.94	75.96	184.82	156.73
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	46.66	65.59	495.44	77.94	75.96	184.82	156.73
2069	0.00	0.00	49.93	0.00	25.40	43.73	119.06	46.66	37.99	495.44	77.94	75.96	184.82	156.73
2070	0.00	0.00	67.93	0.00	1.89	45.35	115.16	46.66	52.08	495.44	77.94	75.96	184.82	156.73
2071	0.00	0.00	10.26	0.00	23.04	0.00	33.31	46.66	36.85	495.44	77.94	75.96	184.82	156.73
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	46.66	52.08	495.44	77.94	75.96	184.82	156.73
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	46.66	36.00	495.44	77.94	75.96	184.82	156.73
2074	0.00	0.00	60.48	0.00	36.24	0.00	96.72	46.66	50.37	495.44	77.94	75.96	184.82	156.73
2075	0.00	0.00	68.27	0.00	53.67	0.00	121.94	46.66	37.99	495.44	77.94	75.96	184.82	156.73
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	46.66	52.08	495.44	77.94	75.96	184.82	156.73
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	36.85	495.44	77.94	75.96	184.82	156.73
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	46.66	52.08	495.44	77.94	75.96	184.82	156.73
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	39.70	495.44	77.94	75.96	184.82	156.73
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	46.66	52.08	495.44	77.94	75.96	184.82	156.73
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	46.66	37.99	495.44	77.94	75.96	184.82	156.73
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	46.66	35.14	495.44	77.94	75.96	184.82	156.73
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	46.66	37.99	495.44	77.94	75.96	184.82	156.73
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	46.66	37.99	495.44	77.94	75.96	184.82	156.73
Salvage Value	6.76	0.00	13.89	0.00	26.13	12.50	59.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	213.74	0.00	419.51	428.11	7727.09	1053.94	1010.79	16046.81	2594.73	1132.60	4035.15	8284.33

Net Present Value -1507

K19/Gas25/750MW (WPS Sale & INV)

TABLE 078
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	2.97	219.60	1.10	0.00	305.83	101.20	19.48	96.63	88.52
2015	0.00	439.66	0.00	0.00	16.69	5.29	461.65	3.41	0.00	335.20	99.36	23.07	100.34	112.43
2016	0.00	579.79	0.00	0.00	22.08	13.33	615.21	6.48	0.00	345.53	97.54	24.19	102.64	121.14
2017	0.00	700.61	0.00	0.00	31.35	19.36	751.32	10.24	0.00	361.29	95.61	25.84	105.52	134.32
2018	0.00	492.58	0.00	0.00	30.79	81.40	604.76	13.26	0.00	346.27	93.55	26.42	106.64	119.65
2019	0.00	351.28	0.00	0.00	36.48	66.51	454.27	15.53	12.78	373.18	93.49	25.06	106.38	148.25
2020	0.00	143.03	0.00	0.00	0.01	125.91	268.95	16.88	44.08	607.80	100.50	19.84	121.40	366.07
2021	0.00	49.49	0.35	0.00	0.00	0.00	49.84	17.13	42.24	687.60	101.05	21.84	130.72	434.00
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.13	40.92	685.21	99.89	21.82	133.11	430.39
2023	0.00	0.00	70.57	0.00	0.00	0.00	70.57	17.37	39.11	652.81	97.11	23.26	137.70	394.74
2024	0.00	0.00	137.47	0.00	6.64	0.00	144.10	17.99	37.57	634.15	95.12	25.52	143.12	370.38
2025	0.00	0.00	79.06	0.00	52.27	0.00	131.32	18.63	39.87	560.31	94.84	24.76	129.86	310.86
2026	0.00	0.00	59.40	0.00	0.00	0.00	59.40	18.93	42.07	573.08	93.55	29.65	136.13	313.74
2027	0.00	0.00	67.05	0.00	0.00	0.00	67.05	19.26	40.80	560.70	91.60	29.07	145.87	294.16
2028	0.00	0.00	10.13	0.00	0.00	0.00	10.13	19.31	43.51	543.79	89.32	43.47	150.33	260.68
2029	0.00	0.00	49.44	0.00	0.00	0.00	49.44	19.56	44.95	528.20	87.55	48.36	156.41	235.88
2030	0.00	0.00	67.25	0.00	43.97	0.00	111.22	20.12	39.91	525.60	86.49	53.28	160.75	225.08
2031	0.00	0.00	59.70	0.00	0.00	0.00	59.70	20.42	42.71	533.06	86.13	58.02	163.48	225.42
2032	0.00	0.00	67.39	0.00	0.00	0.00	67.39	20.75	41.62	512.56	83.80	69.68	172.22	186.86
2033	0.00	0.00	10.18	0.00	0.00	0.00	10.18	20.80	44.48	503.30	82.29	83.49	178.50	159.02
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	43.45	499.81	81.56	88.02	183.03	147.20
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	42.03	428.21	79.46	84.43	176.17	88.15
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	41.50	350.36	78.03	86.07	155.69	30.57
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	40.99	323.56	76.63	94.03	157.06	-4.17
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	40.49	319.92	75.92	92.55	166.70	-15.25
2039	0.00	0.00	100.42	0.00	0.00	0.00	100.42	21.31	42.85	294.58	74.00	113.56	174.03	-67.02
2040	0.00	0.00	144.49	0.00	0.00	0.00	144.49	22.03	39.54	280.25	72.68	125.62	179.72	-97.78
2041	0.00	0.00	64.46	0.00	6.64	0.00	71.09	22.38	39.08	291.90	72.96	124.83	179.53	-85.42
2042	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.41	45.44	336.23	70.73	192.83	181.46	-108.79
2043	0.00	0.00	50.13	0.00	0.00	0.00	50.13	22.66	45.01	314.25	69.02	209.18	188.71	-152.66
2044	0.00	0.00	68.20	0.00	43.97	0.00	112.17	23.22	46.30	291.02	67.43	223.76	196.09	-196.26
2045	0.00	0.00	32.40	0.00	0.00	0.00	32.40	23.38	49.83	280.22	66.13	246.38	201.89	-234.19
2046	0.00	0.00	30.06	0.00	0.00	0.00	30.06	23.53	49.44	268.06	64.96	265.19	208.05	-270.14
2047	0.00	0.00	4.54	0.00	0.00	0.00	4.54	23.55	49.62	262.19	64.16	272.82	218.47	-293.27
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	48.40	270.16	65.09	261.46	209.47	-265.86
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	23.55	50.90	270.16	65.09	261.46	209.47	-265.86
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	23.55	47.72	270.16	65.09	261.46	209.47	-265.86
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	23.55	47.40	270.16	65.09	261.46	209.47	-265.86
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	23.55	47.08	270.16	65.09	261.46	209.47	-265.86
2053	0.00	0.00	49.14	0.00	15.88	14.35	79.37	23.55	46.77	270.16	65.09	261.46	209.47	-265.86
2054	0.00	0.00	116.04	0.00	12.96	14.35	143.34	23.55	46.47	270.16	65.09	261.46	209.47	-265.86
2055	0.00	0.00	77.02	0.00	0.00	14.88	91.89	23.55	46.18	270.16	65.09	261.46	209.47	-265.86
2056	0.00	0.00	59.40	0.00	0.00	0.00	59.40	23.55	61.13	270.16	65.09	261.46	209.47	-265.86
2057	0.00	0.00	67.05	0.00	0.00	0.00	67.05	23.55	45.63	270.16	65.09	261.46	209.47	-265.86
2058	0.00	0.00	10.13	0.00	0.00	0.00	10.13	23.55	60.60	270.16	65.09	261.46	209.47	-265.86
2059	0.00	0.00	49.44	0.00	6.64	0.00	56.07	23.55	47.96	270.16	65.09	261.46	209.47	-265.86
2060	0.00	0.00	67.25	0.00	39.20	0.00	106.45	23.55	57.43	270.16	65.09	261.46	209.47	-265.86
2061	0.00	0.00	59.70	0.00	0.00	0.00	59.70	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2062	0.00	0.00	67.39	0.00	0.00	0.00	67.39	23.55	57.43	270.16	65.09	261.46	209.47	-265.86
2063	0.00	0.00	10.18	0.00	0.00	0.00	10.18	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	23.55	57.43	270.16	65.09	261.46	209.47	-265.86
2065	0.00	0.00	0.00	0.00	39.66	3.24	42.90	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	23.55	57.43	270.16	65.09	261.46	209.47	-265.86
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	23.55	57.43	270.16	65.09	261.46	209.47	-265.86
2069	0.00	0.00	100.42	0.00	23.52	43.73	167.66	23.55	45.05	270.16	65.09	261.46	209.47	-265.86
2070	0.00	0.00	144.49	0.00	0.01	45.35	189.85	23.55	43.92	270.16	65.09	261.46	209.47	-265.86
2071	0.00	0.00	64.46	0.00	0.00	0.00	64.46	23.55	43.92	270.16	65.09	261.46	209.47	-265.86
2072	0.00	0.00	4.72	0.00	0.00	0.00	4.72	23.55	43.92	270.16	65.09	261.46	209.47	-265.86
2073	0.00	0.00	50.13	0.00	0.00	0.00	50.13	23.55	43.06	270.16	65.09	261.46	209.47	-265.86
2074	0.00	0.00	68.20	0.00	0.00	0.00	68.20	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2075	0.00	0.00	32.40	0.00	13.07	0.00	45.47	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2076	0.00	0.00	30.06	0.00	6.64	0.00	36.70	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2077	0.00	0.00	4.54	0.00	0.00	0.00	4.54	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	23.55	45.05	270.16	65.09	261.46	209.47	-265.86
2080	0.00	0.00	0.00	0.00	10.99	0.00	10.99	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2083	0.00	0.00	49.14	0.00	0.00	0.00	49.14	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2084	0.00	0.00	116.04	0.00	10.26	0.53	126.83	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2085	0.00	0.00	77.02	0.00	10.01	1.06	88.09	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2086	0.00	0.00	59.40	0.00	21.28	3.19	83.87	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2087	0.00	0.00	67.05	0.00	24.39	4.78	96.22	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2088	0.00	0.00	10.13	0.00	15.88	14.35	40.36	23.55	42.21	270.16	65.09	261.46	209.47	-265.86
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	23.55	45.05	270.16	65.09	261.46	209.47	-265.86
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	23.55	45.05	270.16	65.09	261.46	209.47	-265.86
Salvage Value	0.00	0.00	45.82	0.00	15.10	12.50	73.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	864.04	0.00	283.12	302.60	4137.31	528.20	1020.30	11399.09	2332.94	3355.53	4593.38	1117.23

Net Present Value -4569

K19/C31/750MW | **TABLE 079** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	198.32	0.00	0.00	18.31	4.21	250.04	1.25	0.00	306.80	101.20	19.48	96.25	89.88
2015	36.79	439.66	0.00	0.00	16.69	6.77	499.92	3.75	0.00	337.13	99.35	23.11	100.29	114.38
2016	10.34	579.79	0.00	0.00	22.08	13.97	626.18	6.88	0.00	346.69	97.53	24.16	102.58	122.41
2017	10.37	700.61	0.00	0.00	31.35	19.36	761.69	10.69	0.00	361.64	95.61	25.83	105.49	134.71
2018	12.29	492.58	0.00	0.00	30.79	116.38	652.04	13.95	0.00	345.26	93.53	26.39	106.60	118.74
2019	12.32	351.28	0.00	0.00	36.48	79.16	479.24	16.35	12.78	371.83	93.47	25.09	106.37	146.90
2020	12.36	143.03	0.00	0.00	0.01	224.44	379.84	18.24	47.15	611.17	100.49	19.89	121.02	369.77
2021	15.59	49.49	0.00	0.00	0.00	0.00	65.07	18.57	45.41	690.58	101.04	21.95	130.57	437.02
2022	146.66	0.00	0.00	0.00	0.00	0.00	146.66	19.30	44.12	688.92	99.90	21.84	132.81	434.37
2023	225.28	0.00	0.00	0.00	0.00	0.00	225.28	20.43	42.17	655.36	97.01	23.51	137.78	397.06
2024	241.57	0.00	0.00	0.00	0.00	0.00	241.57	21.64	40.51	636.09	94.94	26.15	144.07	370.92
2025	244.26	0.00	0.00	0.00	2.50	0.00	246.76	22.87	38.77	561.17	94.86	18.85	136.96	310.50
2026	657.87	0.00	0.00	0.00	2.50	0.00	660.37	26.17	36.92	542.14	92.99	19.46	150.25	279.44
2027	1040.67	0.00	0.00	0.00	30.45	0.00	1071.12	31.53	35.54	497.04	91.09	18.32	148.74	238.89
2028	931.65	0.00	0.00	0.00	15.94	0.00	947.58	36.27	34.22	475.70	89.55	19.02	161.70	205.43
2029	663.37	0.00	0.00	0.00	26.88	0.00	690.24	39.72	35.55	460.10	87.96	19.58	178.18	174.38
2030	458.09	0.00	0.00	0.00	46.73	0.00	504.82	42.24	30.41	456.12	86.65	20.02	191.83	157.61
2031	300.01	0.00	0.00	0.00	61.85	0.00	361.86	44.05	43.23	535.56	90.62	23.13	120.00	301.80
2032	110.18	0.00	0.00	0.00	72.44	0.00	182.62	44.96	42.25	712.62	97.74	22.71	115.87	476.30
2033	34.67	0.00	0.00	0.00	0.00	0.00	34.67	45.14	40.96	769.49	98.20	22.21	132.97	516.11
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	40.05	747.38	96.43	21.78	137.24	491.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	38.37	678.47	94.82	21.76	121.66	440.23
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	37.71	650.08	93.17	22.24	123.23	411.44
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	45.14	36.95	627.99	91.57	22.17	126.93	387.31
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	36.03	603.92	89.96	22.09	131.35	360.52
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	45.39	38.39	581.83	88.39	22.12	142.81	328.51
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	45.76	35.12	578.23	87.12	21.00	152.76	317.35
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	45.81	41.20	559.82	85.15	37.47	154.66	282.54
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	46.06	37.85	545.75	83.64	41.79	160.71	259.62
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	46.44	37.36	535.10	82.31	44.10	168.41	240.28
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	46.74	42.52	531.55	81.11	50.58	177.16	222.70
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	47.34	42.06	507.50	79.30	65.45	178.32	184.43
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	47.39	45.55	496.07	77.89	79.42	183.80	154.96
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	43.62	482.75	76.63	83.00	192.34	130.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	42.35	495.44	77.94	75.96	184.82	156.72
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	47.39	44.80	495.44	77.94	75.96	184.82	156.72
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	47.39	41.57	495.44	77.94	75.96	184.82	156.72
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	47.39	44.05	495.44	77.94	75.96	184.82	156.72
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	47.39	40.84	495.44	77.94	75.96	184.82	156.72
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	47.39	40.50	495.44	77.94	75.96	184.82	156.72
2054	0.00	0.00	0.00	0.00	12.96	14.35	27.30	47.39	40.16	495.44	77.94	75.96	184.82	156.72
2055	0.00	0.00	0.00	0.00	0.00	14.88	14.88	47.39	39.83	495.44	77.94	75.96	184.82	156.72
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	56.45	495.44	77.94	75.96	184.82	156.72
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	40.92	495.44	77.94	75.96	184.82	156.72
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	55.85	495.44	77.94	75.96	184.82	156.72
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	43.18	495.44	77.94	75.96	184.82	156.72
2060	0.00	0.00	0.00	0.00	0.62	0.00	0.62	47.39	52.08	495.44	77.94	75.96	184.82	156.72
2061	0.00	0.00	0.00	0.00	0.62	0.00	0.62	47.39	37.99	495.44	77.94	75.96	184.82	156.72
2062	0.00	0.00	0.00	0.00	7.40	0.00	7.40	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2063	0.00	0.00	0.00	0.00	3.70	0.00	3.70	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2064	0.00	0.00	0.00	0.00	14.22	1.62	15.84	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2065	0.00	0.00	0.00	0.00	17.17	3.24	20.41	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2066	0.00	0.00	0.00	0.00	15.61	9.72	25.33	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2067	0.00	0.00	0.00	0.00	24.86	14.58	39.44	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	47.39	65.59	495.44	77.94	75.96	184.82	156.72
2069	0.00	0.00	49.93	0.00	23.52	43.73	117.18	47.39	37.99	495.44	77.94	75.96	184.82	156.72
2070	0.00	0.00	67.93	0.00	0.01	45.35	113.28	47.39	52.08	495.44	77.94	75.96	184.82	156.72
2071	0.00	0.00	10.26	0.00	0.00	0.00	10.26	47.39	39.70	495.44	77.94	75.96	184.82	156.72
2072	0.00	0.00	50.08	0.00	0.00	0.00	50.08	47.39	52.08	495.44	77.94	75.96	184.82	156.72
2073	0.00	0.00	68.13	0.00	0.00	0.00	68.13	47.39	36.00	495.44	77.94	75.96	184.82	156.72
2074	0.00	0.00	60.48	0.00	0.00	0.00	60.48	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2075	0.00	0.00	68.27	0.00	8.52	0.00	76.78	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2076	0.00	0.00	10.31	0.00	1.88	0.00	12.20	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2077	0.00	0.00	0.00	0.00	23.04	0.00	23.04	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2078	0.00	0.00	0.00	0.00	18.87	0.00	18.87	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2079	0.00	0.00	0.00	0.00	20.70	0.00	20.70	47.39	37.99	495.44	77.94	75.96	184.82	156.72
2080	0.00	0.00	0.00	0.00	75.44	0.00	75.44	47.39	50.37	495.44	77.94	75.96	184.82	156.72
2081	0.00	0.00	0.00	0.00	47.04	0.00	47.04	47.39	37.99	495.44	77.94	75.96	184.82	156.72
2082	0.00	0.00	0.00	0.00	54.55	0.00	54.55	47.39	52.08	495.44	77.94	75.96	184.82	156.72
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	36.85	495.44	77.94	75.96	184.82	156.72
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	47.39	52.08	495.44	77.94	75.96	184.82	156.72
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	47.39	36.85	495.44	77.94	75.96	184.82	156.72
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	47.39	52.08	495.44	77.94	75.96	184.82	156.72
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	47.39	35.14	495.44	77.94	75.96	184.82	156.72
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	47.39	37.99	495.44	77.94	75.96	184.82	156.72
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	47.39	37.99	495.44	77.94	75.96	184.82	156.72
Salvage Value	48.98	0.00	13.89	0.00	29.11	12.50	104.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3336.80	2687.55	213.74	0.00	375.76	428.11	7041.96	954.59	953.49	14722.87	2531.54	1128.60	4198.69	6864.04

Net Present Value -2086

K19/Gas31/750MW | **TABLE 080** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	4.21	220.83	1.10	0.00	306.80	101.20	19.48	96.25	89.88
2015	0.00	439.66	0.00	0.00	16.69	6.77	463.13	3.42	0.00	337.13	99.35	23.11	100.29	114.38
2016	0.00	579.79	0.00	0.00	22.08	13.97	615.84	6.50	0.00	346.69	97.53	24.16	102.58	122.41
2017	0.00	700.61	0.00	0.00	31.35	19.36	751.32	10.26	0.00	361.64	95.61	25.83	105.49	134.71
2018	0.00	492.58	0.00	0.00	30.79	116.38	639.75	13.45	0.00	345.26	93.53	26.39	106.60	118.74
2019	0.00	351.28	0.00	0.00	36.48	79.16	466.92	15.79	12.78	371.83	93.47	25.09	106.37	146.90
2020	0.00	143.03	0.00	0.00	0.01	224.44	367.48	17.63	47.15	611.17	100.49	19.89	121.02	369.77
2021	0.00	49.49	0.00	0.00	0.00	0.00	49.49	17.87	45.41	690.58	101.04	21.95	130.57	437.02
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	44.12	688.87	99.90	21.86	132.84	434.27
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	42.17	655.89	97.01	23.51	137.76	397.61
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	40.51	636.96	94.94	26.17	144.00	371.84
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	38.77	563.35	94.85	18.87	137.32	312.32
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	36.92	546.35	92.98	19.58	151.08	282.71
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.87	35.54	502.35	91.08	18.38	149.42	243.47
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.87	34.22	483.64	89.53	19.02	163.45	211.64
2029	0.00	0.00	120.30	0.00	0.00	0.00	120.30	18.37	35.55	466.54	88.02	19.29	178.02	181.21
2030	0.00	0.00	205.42	0.00	13.27	0.00	218.69	19.35	30.41	468.89	87.44	17.17	187.67	176.61
2031	0.00	0.00	89.68	0.00	52.27	0.00	141.95	20.05	37.01	457.62	85.32	39.56	152.25	180.49
2032	0.00	0.00	59.76	0.00	0.00	0.00	59.76	20.35	39.74	447.39	83.77	50.24	156.84	156.55
2033	0.00	0.00	67.45	0.00	0.00	0.00	67.45	20.69	38.59	433.40	82.35	55.23	162.33	133.50
2034	0.00	0.00	10.19	0.00	0.00	0.00	10.19	20.74	41.38	433.62	81.57	59.88	168.54	123.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.74	39.87	359.99	79.49	72.53	150.19	57.79
2036	0.00	0.00	100.12	0.00	0.00	0.00	100.12	21.24	39.26	334.64	78.08	79.24	151.74	25.58
2037	0.00	0.00	144.06	0.00	0.00	0.00	144.06	21.96	38.68	320.07	76.79	86.67	156.43	0.17
2038	0.00	0.00	64.26	0.00	43.97	0.00	108.23	22.50	38.12	327.53	76.66	80.14	166.02	4.69
2039	0.00	0.00	4.71	0.00	0.00	0.00	4.71	22.53	47.22	374.05	74.42	155.97	166.97	-23.32
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.53	43.85	351.55	72.57	168.84	174.45	-64.32
2041	0.00	0.00	50.03	0.00	0.00	0.00	50.03	22.78	43.33	334.56	71.13	180.96	180.42	-97.96
2042	0.00	0.00	168.78	0.00	0.00	0.00	168.78	23.62	42.83	318.92	69.81	194.57	186.25	-131.71
2043	0.00	0.00	155.21	0.00	0.00	0.00	155.21	24.40	46.26	314.04	68.96	206.79	191.70	-153.41
2044	0.00	0.00	64.65	0.00	43.97	0.00	108.62	24.94	47.51	312.58	68.65	198.23	201.99	-156.30
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.96	53.86	361.08	66.69	284.95	192.16	-182.73
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	53.43	346.91	65.52	298.56	197.68	-214.84
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	52.15	325.34	64.29	310.73	203.34	-253.01
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	50.88	344.44	65.50	298.08	197.72	-216.86
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	24.96	53.33	344.44	65.50	298.08	197.72	-216.86
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	24.96	50.10	344.44	65.50	298.08	197.72	-216.86
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	24.96	49.74	344.44	65.50	298.08	197.72	-216.86
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	24.96	49.38	344.44	65.50	298.08	197.72	-216.86
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	24.96	49.03	344.44	65.50	298.08	197.72	-216.86
2054	0.00	0.00	0.00	0.00	12.96	14.35	27.30	24.96	48.69	344.44	65.50	298.08	197.72	-216.86
2055	0.00	0.00	0.00	0.00	0.00	14.88	14.88	24.96	48.36	344.44	65.50	298.08	197.72	-216.86
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	63.27	344.44	65.50	298.08	197.72	-216.86
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	47.74	344.44	65.50	298.08	197.72	-216.86
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	62.67	344.44	65.50	298.08	197.72	-216.86
2059	0.00	0.00	98.87	0.00	0.00	0.00	98.87	24.96	50.00	344.44	65.50	298.08	197.72	-216.86
2060	0.00	0.00	183.99	0.00	0.00	0.00	183.99	24.96	58.90	344.44	65.50	298.08	197.72	-216.86
2061	0.00	0.00	87.64	0.00	0.00	0.00	87.64	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2062	0.00	0.00	59.76	0.00	0.00	0.00	59.76	24.96	58.90	344.44	65.50	298.08	197.72	-216.86
2063	0.00	0.00	67.45	0.00	0.00	0.00	67.45	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2064	0.00	0.00	10.19	0.00	8.05	1.62	19.86	24.96	58.90	344.44	65.50	298.08	197.72	-216.86
2065	0.00	0.00	0.00	0.00	19.96	3.24	23.20	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2066	0.00	0.00	100.12	0.00	40.00	9.72	149.84	24.96	58.90	344.44	65.50	298.08	197.72	-216.86
2067	0.00	0.00	144.06	0.00	6.97	14.58	165.61	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2068	0.00	0.00	64.26	0.00	14.91	43.73	122.90	24.96	58.90	344.44	65.50	298.08	197.72	-216.86
2069	0.00	0.00	4.71	0.00	23.52	43.73	71.96	24.96	46.52	344.44	65.50	298.08	197.72	-216.86
2070	0.00	0.00	0.00	0.00	0.01	45.35	45.36	24.96	45.38	344.44	65.50	298.08	197.72	-216.86
2071	0.00	0.00	50.03	0.00	0.00	0.00	50.03	24.96	45.38	344.44	65.50	298.08	197.72	-216.86
2072	0.00	0.00	168.78	0.00	0.00	0.00	168.78	24.96	45.38	344.44	65.50	298.08	197.72	-216.86
2073	0.00	0.00	155.21	0.00	32.98	0.00	188.19	24.96	44.53	344.44	65.50	298.08	197.72	-216.86
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2075	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	24.96	46.52	344.44	65.50	298.08	197.72	-216.86
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2081	0.00	0.00	0.00	0.00	13.07	0.00	13.07	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2088	0.00	0.00	0.00	0.00	26.87	14.35	41.22	24.96	43.67	344.44	65.50	298.08	197.72	-216.86
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	24.96	46.52	344.44	65.50	298.08	197.72	-216.86
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	24.96	46.52	344.44	65.50	298.08	197.72	-216.86
Salvage Value	0.00	0.00	26.02	0.00	16.46	12.50	54.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	843.11	0.00	266.09	428.11	4224.86	542.43	1017.33	11787.83	2335.99	3582.44	4499.69	1369.70

Net Present Value -4415

K19/C25/250MW

TABLE 081
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	3.72	250.18	1.26	0.00	306.80	101.20	19.48	96.25	89.88
2015	83.73	439.66	0.00	0.00	16.69	2.31	542.40	3.98	0.00	337.13	99.35	23.11	100.29	114.38
2016	166.43	579.79	0.00	0.00	22.08	2.80	771.11	7.83	0.00	346.69	97.53	24.16	102.58	122.41
2017	191.52	700.61	0.00	0.00	31.35	4.20	927.68	12.47	0.00	361.24	95.61	25.83	105.49	134.31
2018	228.68	492.58	0.00	0.00	30.79	12.59	764.64	16.29	0.00	341.12	92.97	28.34	107.46	112.35
2019	232.37	351.28	0.00	0.00	38.97	12.59	635.21	19.47	12.78	364.44	92.61	28.44	107.58	135.81
2020	638.66	143.03	0.00	0.00	2.50	13.05	797.24	23.46	12.99	573.14	100.82	20.40	108.94	342.98
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	28.97	12.75	637.37	101.41	20.88	115.44	399.64
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	33.62	12.97	625.61	99.54	21.84	118.95	385.28
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	37.02	12.80	609.95	97.39	21.87	126.98	363.71
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	39.50	12.75	598.52	95.11	24.28	137.28	341.85
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	41.28	26.59	604.75	99.78	21.63	98.88	384.46
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	42.19	26.40	760.78	107.31	21.21	94.96	537.29
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	42.36	26.29	757.93	106.74	20.06	97.92	533.21
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	26.56	744.08	105.03	20.87	100.25	517.94
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	29.04	724.99	103.29	21.04	101.56	499.10
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	25.13	715.79	102.03	20.80	102.01	490.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.96	702.24	100.44	21.23	103.92	476.65
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.60	684.77	98.84	21.40	106.22	458.32
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.67	662.77	97.20	21.49	108.04	436.05
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.78	641.51	95.58	21.66	110.49	413.77
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	26.81	604.04	94.00	21.83	108.11	380.10
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	42.36	23.97	576.57	92.45	22.14	109.51	352.46
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	23.97	552.04	90.92	22.09	111.69	327.34
2038	0.00	0.00	71.31	0.00	0.00	0.00	71.31	42.61	23.97	526.09	89.39	22.06	114.58	300.06
2039	0.00	0.00	89.29	0.00	6.64	0.00	95.92	42.98	26.81	517.85	88.23	20.85	126.71	282.08
2040	0.00	0.00	10.25	0.00	0.00	0.00	10.25	43.03	27.88	501.32	86.25	36.58	130.34	248.16
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.03	27.23	488.16	84.76	41.08	135.69	226.64
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	43.28	27.23	477.47	83.45	43.71	141.48	208.82
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	43.65	27.23	465.16	82.08	43.44	150.51	189.13
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	43.96	32.86	453.64	80.55	65.71	150.34	157.04
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	44.56	35.70	439.38	79.16	72.35	156.30	131.57
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	44.61	36.78	431.03	77.82	82.15	165.06	105.99
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.93	417.02	76.44	83.10	177.71	79.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.08	429.14	77.81	79.20	166.36	105.78
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	44.61	37.92	429.14	77.81	79.20	166.36	105.78
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	44.61	36.79	429.14	77.81	79.20	166.36	105.78
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	44.61	36.80	429.14	77.81	79.20	166.36	105.78
2052	0.00	0.00	0.00	0.00	24.39	1.04	25.42	44.61	36.80	429.14	77.81	79.20	166.36	105.78
2053	0.00	0.00	0.00	0.00	15.88	3.11	18.99	44.61	36.81	429.14	77.81	79.20	166.36	105.78
2054	0.00	0.00	0.00	0.00	13.57	3.11	16.68	44.61	36.81	429.14	77.81	79.20	166.36	105.78
2055	0.00	0.00	0.00	0.00	0.62	3.22	3.84	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	44.61	50.33	429.14	77.81	79.20	166.36	105.78
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	44.61	50.33	429.14	77.81	79.20	166.36	105.78
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	44.61	50.33	429.14	77.81	79.20	166.36	105.78
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	65.55	429.14	77.81	79.20	166.36	105.78
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2064	0.00	0.00	0.00	0.00	8.05	3.61	11.66	44.61	65.55	429.14	77.81	79.20	166.36	105.78
2065	0.00	0.00	0.00	0.00	6.68	2.08	8.76	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2066	0.00	0.00	0.00	0.00	0.80	2.11	2.91	44.61	65.55	429.14	77.81	79.20	166.36	105.78
2067	0.00	0.00	0.00	0.00	6.97	3.16	10.13	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2068	0.00	0.00	49.88	0.00	14.91	9.48	74.27	44.61	65.55	429.14	77.81	79.20	166.36	105.78
2069	0.00	0.00	67.86	0.00	25.40	9.48	102.74	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2070	0.00	0.00	10.25	0.00	1.89	9.83	21.97	44.61	52.03	429.14	77.81	79.20	166.36	105.78
2071	0.00	0.00	0.00	0.00	23.04	0.00	23.04	44.61	36.81	429.14	77.81	79.20	166.36	105.78
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	44.61	52.03	429.14	77.81	79.20	166.36	105.78
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	44.61	35.95	429.14	77.81	79.20	166.36	105.78
2074	0.00	0.00	60.48	0.00	42.88	0.00	103.35	44.61	50.33	429.14	77.81	79.20	166.36	105.78
2075	0.00	0.00	68.27	0.00	47.04	0.00	115.30	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	44.61	52.03	429.14	77.81	79.20	166.36	105.78
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	36.81	429.14	77.81	79.20	166.36	105.78
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	44.61	52.03	429.14	77.81	79.20	166.36	105.78
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	39.65	429.14	77.81	79.20	166.36	105.78
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	44.61	52.03	429.14	77.81	79.20	166.36	105.78
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2084	0.00	0.00	0.00	0.00	10.26	0.12	10.37	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2087	0.00	0.00	0.00	0.00	24.39	1.04	25.42	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2088	0.00	0.00	0.00	0.00	15.88	3.11	18.99	44.61	35.10	429.14	77.81	79.20	166.36	105.78
2089	0.00	0.00	0.00	0.00	12.96	3.11	16.07	44.61	37.95	429.14	77.81	79.20	166.36	105.78
2090	0.00	0.00	0.00	0.00	0.00	3.22	3.22	44.61	37.95	429.14	77.81	79.20	166.36	105.78
Salvage Value	6.76	0.00	13.53	0.00	26.11	3.14	49.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	217.19	0.00	419.65	55.88	7358.44	1005.71	692.55	14437.67	2584.24	1176.48	3640.78	7036.16

Net Present Value -2021

K19/Gas24/250MW

TABLE 082
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	3.72	220.34	1.12	0.00	306.80	101.20	19.48	96.25	89.88
2015	0.00	439.66	0.00	0.00	16.69	2.31	458.67	3.41	0.00	337.13	99.35	23.11	100.30	114.37
2016	0.00	579.79	0.00	0.00	22.08	2.80	604.67	6.43	0.00	346.69	97.53	24.16	102.58	122.41
2017	0.00	700.61	0.00	0.00	31.35	4.20	736.16	10.11	0.00	361.64	95.61	25.83	105.49	134.71
2018	0.00	492.58	0.00	0.00	30.79	12.59	535.95	12.79	0.00	341.66	92.97	28.30	107.40	112.99
2019	0.00	351.28	0.00	0.00	36.48	12.59	400.34	14.79	12.78	365.32	92.61	28.44	107.55	136.72
2020	0.00	143.03	0.35	0.00	0.01	13.05	156.44	15.57	12.99	574.64	100.82	20.41	108.87	344.55
2021	0.00	49.49	0.00	0.00	0.00	0.00	49.49	15.82	12.75	639.79	101.39	20.89	115.27	402.25
2022	0.00	0.00	70.52	0.00	0.00	0.00	70.52	16.07	12.97	632.00	99.97	20.62	117.39	394.02
2023	0.00	0.00	88.21	0.00	6.64	0.00	94.85	16.43	12.80	624.87	98.91	17.38	119.77	388.81
2024	0.00	0.00	10.09	0.00	0.00	0.00	10.09	16.49	16.67	618.39	97.10	28.29	122.03	370.96
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	16.49	16.45	508.63	94.90	21.43	115.98	276.32
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.49	16.05	485.23	92.65	24.32	120.36	247.90
2027	0.00	0.00	49.34	0.00	0.00	0.00	49.34	16.73	16.07	451.92	90.63	26.43	122.57	212.29
2028	0.00	0.00	69.16	0.00	52.27	0.00	121.42	17.33	16.13	435.15	88.86	30.57	126.93	188.79
2029	0.00	0.00	109.56	0.00	0.00	0.00	109.56	17.88	22.71	425.84	87.15	42.28	131.30	165.11
2030	0.00	0.00	143.06	0.00	0.00	0.00	143.06	18.59	18.84	424.81	86.26	45.90	133.89	158.77
2031	0.00	0.00	63.82	0.00	6.64	0.00	70.45	18.94	18.84	438.70	86.83	39.32	133.36	179.20
2032	0.00	0.00	4.67	0.00	0.00	0.00	4.67	18.97	25.64	464.94	84.31	95.61	129.08	155.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.97	25.65	453.12	82.83	103.36	133.08	133.85
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.97	25.65	442.18	81.37	112.24	137.75	110.83
2035	0.00	0.00	100.02	0.00	0.00	0.00	100.02	19.47	25.01	378.91	79.40	112.38	135.81	51.33
2036	0.00	0.00	143.92	0.00	0.00	0.00	143.92	20.19	25.02	353.64	77.95	120.36	136.58	18.75
2037	0.00	0.00	64.20	0.00	0.00	0.00	64.20	20.51	25.02	362.94	78.38	115.91	134.05	34.60
2038	0.00	0.00	105.02	0.00	0.00	0.00	105.02	21.03	31.81	388.66	75.99	180.48	132.56	-0.38
2039	0.00	0.00	144.35	0.00	0.00	0.00	144.35	21.76	34.66	376.59	74.63	192.81	143.22	-34.07
2040	0.00	0.00	64.39	0.00	43.97	0.00	108.36	22.30	31.81	373.19	74.06	198.45	145.38	-44.70
2041	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.32	38.62	403.33	72.22	262.16	141.25	-72.29
2042	0.00	0.00	100.72	0.00	0.00	0.00	100.72	22.82	38.62	389.60	70.46	283.56	146.82	-111.24
2043	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.55	38.62	379.50	69.16	299.51	151.23	-140.41
2044	0.00	0.00	64.65	0.00	0.00	0.00	64.65	23.87	40.33	364.03	68.67	297.13	152.54	-154.32
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	23.90	47.13	387.73	66.41	372.44	150.97	-202.09
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	47.13	393.00	66.59	370.55	149.26	-193.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	46.28	363.67	64.66	393.54	155.45	-249.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	23.90	48.28	381.46	65.89	378.84	151.89	-215.16
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2052	0.00	0.00	49.09	0.00	24.39	1.04	74.51	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2053	0.00	0.00	66.78	0.00	15.88	3.11	85.77	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2054	0.00	0.00	10.09	0.00	12.96	3.11	26.16	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2055	0.00	0.00	0.00	0.00	0.00	3.22	3.22	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2057	0.00	0.00	49.34	0.00	0.00	0.00	49.34	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2058	0.00	0.00	67.12	0.00	6.64	0.00	73.75	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2059	0.00	0.00	109.56	0.00	0.00	0.00	109.56	23.90	48.28	381.46	65.89	378.84	151.89	-215.16
2060	0.00	0.00	143.06	0.00	0.00	0.00	143.06	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2061	0.00	0.00	63.82	0.00	0.00	0.00	63.82	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2062	0.00	0.00	4.67	0.00	0.00	0.00	4.67	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2063	0.00	0.00	0.00	0.00	39.20	2.76	41.95	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2064	0.00	0.00	0.00	0.00	8.05	3.61	11.66	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2065	0.00	0.00	100.02	0.00	6.68	2.08	108.78	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2066	0.00	0.00	143.92	0.00	7.44	2.11	153.46	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2067	0.00	0.00	64.20	0.00	6.97	3.16	74.33	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2068	0.00	0.00	105.02	0.00	14.91	9.48	129.40	23.90	60.66	381.46	65.89	378.84	151.89	-215.16
2069	0.00	0.00	144.35	0.00	23.52	9.48	177.34	23.90	48.28	381.46	65.89	378.84	151.89	-215.16
2070	0.00	0.00	64.39	0.00	0.01	9.83	74.23	23.90	47.14	381.46	65.89	378.84	151.89	-215.16
2071	0.00	0.00	4.72	0.00	0.00	0.00	4.72	23.90	47.14	381.46	65.89	378.84	151.89	-215.16
2072	0.00	0.00	100.72	0.00	0.00	0.00	100.72	23.90	47.14	381.46	65.89	378.84	151.89	-215.16
2073	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.90	46.29	381.46	65.89	378.84	151.89	-215.16
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2075	0.00	0.00	4.74	0.00	32.98	0.00	37.71	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2078	0.00	0.00	0.00	0.00	13.07	0.00	13.07	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	48.28	381.46	65.89	378.84	151.89	-215.16
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2082	0.00	0.00	49.09	0.00	0.00	0.00	49.09	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2083	0.00	0.00	66.78	0.00	0.00	0.00	66.78	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2084	0.00	0.00	10.09	0.00	10.26	0.12	20.46	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2087	0.00	0.00	49.34	0.00	24.39	1.04	74.76	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2088	0.00	0.00	67.12	0.00	15.88	3.11	86.11	23.90	45.44	381.46	65.89	378.84	151.89	-215.16
2089	0.00	0.00	10.14	0.00	12.96	3.11	26.21	23.90	48.28	381.46	65.89	378.84	151.89	-215.16
2090	0.00	0.00	0.00	0.00	10.99	3.22	14.22	23.90	48.28	381.46	65.89	378.84	151.89	-215.16
Salvage Value	0.00	0.00	47.66	0.00	14.40	3.14	65.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	1068.52	0.00	251.44	55.88	4063.40	513.67	744.62	11947.31	2342.72	4677.91	3718.35	1208.33

Net Present Value -4113

K19/C31/250MW | **TABLE 083** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** Low
NFAT 2012 | **Capital Cost** Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	198.32	0.00	0.00	18.31	3.72	249.56	1.26	0.00	306.80	101.20	19.48	96.25	89.88
2015	36.79	439.66	0.00	0.00	16.69	2.31	495.46	3.74	0.00	337.13	99.35	23.11	100.30	114.37
2016	10.34	579.79	0.00	0.00	22.08	2.80	615.01	6.81	0.00	346.69	97.53	24.16	102.58	122.41
2017	10.37	700.61	0.00	0.00	31.35	4.20	746.53	10.55	0.00	361.64	95.61	25.83	105.49	134.71
2018	12.29	492.58	0.00	0.00	30.79	12.59	548.24	13.29	0.00	341.66	92.97	28.30	107.40	112.99
2019	12.32	351.28	0.00	0.00	36.48	12.59	412.67	15.35	12.78	365.32	92.61	28.44	107.55	136.72
2020	12.36	143.03	0.35	0.00	0.01	13.05	168.80	16.19	12.99	574.64	100.82	20.41	108.87	344.55
2021	15.59	49.49	0.00	0.00	0.00	0.00	65.07	16.52	12.75	639.79	101.39	20.89	115.27	402.25
2022	146.66	0.00	70.52	0.00	0.00	0.00	217.18	17.50	12.97	631.89	99.96	20.65	117.42	393.85
2023	225.28	0.00	88.21	0.00	6.64	0.00	320.13	18.99	12.80	624.28	98.88	17.52	119.96	387.92
2024	241.57	0.00	10.09	0.00	0.00	0.00	251.66	20.25	16.67	617.71	97.07	28.47	122.34	369.83
2025	244.26	0.00	0.00	0.00	2.50	0.00	246.76	21.48	16.45	507.32	94.87	21.50	116.27	274.69
2026	657.87	0.00	0.00	0.00	2.50	0.00	660.37	24.78	16.05	484.17	92.64	24.52	120.71	246.30
2027	1040.67	0.00	49.34	0.00	30.45	0.00	1120.46	30.39	16.07	450.24	90.63	26.80	122.88	209.93
2028	931.65	0.00	67.12	0.00	22.57	0.00	1021.34	35.49	16.13	432.73	88.79	31.39	127.56	184.99
2029	663.37	0.00	10.14	0.00	26.88	0.00	700.38	39.00	22.70	422.65	87.11	43.19	131.96	160.38
2030	458.09	0.00	0.00	0.00	46.73	0.00	504.82	41.52	18.83	441.96	88.15	37.67	127.72	188.41
2031	300.01	0.00	0.00	0.00	61.85	0.00	361.86	43.33	32.89	499.83	91.21	31.15	103.78	273.70
2032	110.18	0.00	0.00	0.00	72.44	0.00	182.62	44.24	33.10	660.21	98.12	30.48	99.37	432.24
2033	34.67	0.00	0.00	0.00	0.00	0.00	34.67	44.42	32.96	687.15	98.11	31.45	107.38	450.21
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	33.18	661.34	96.37	32.24	109.41	423.32
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.36	622.93	94.71	32.74	107.63	387.85
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.31	596.02	93.13	33.47	108.20	361.22
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.15	566.78	91.30	34.64	110.94	329.90
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.79	534.79	89.38	36.08	114.74	294.60
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	34.70	513.00	87.51	40.03	126.19	259.27
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.97	499.03	85.85	45.33	131.74	236.12
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	34.64	483.44	84.23	51.26	137.19	210.77
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	44.42	31.80	480.35	83.39	52.18	140.39	204.39
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.80	469.08	82.07	51.74	148.89	186.38
2044	0.00	0.00	50.18	0.00	0.00	0.00	50.18	44.67	33.50	453.75	80.56	65.67	150.25	157.27
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.27	33.50	439.41	79.16	72.32	156.24	131.70
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.32	37.43	431.07	77.82	82.13	165.05	106.06
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.93	417.03	76.45	83.10	177.71	79.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.08	429.17	77.81	79.18	166.33	105.84
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	45.32	37.92	429.17	77.81	79.18	166.33	105.84
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	45.32	35.08	429.17	77.81	79.18	166.33	105.84
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	45.32	37.94	429.17	77.81	79.18	166.33	105.84
2052	0.00	0.00	49.09	0.00	24.39	1.04	74.51	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2053	0.00	0.00	66.78	0.00	15.88	3.11	85.77	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2054	0.00	0.00	10.09	0.00	12.96	3.11	26.16	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2055	0.00	0.00	0.00	0.00	0.00	3.22	3.22	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2057	0.00	0.00	49.34	0.00	0.00	0.00	49.34	45.32	36.81	429.17	77.81	79.18	166.33	105.84
2058	0.00	0.00	67.12	0.00	6.64	0.00	73.75	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2059	0.00	0.00	10.14	0.00	0.00	0.00	10.14	45.32	39.65	429.17	77.81	79.18	166.33	105.84
2060	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2061	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.32	37.95	429.17	77.81	79.18	166.33	105.84
2062	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2063	0.00	0.00	0.00	0.00	10.34	2.76	13.09	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2064	0.00	0.00	0.00	0.00	14.22	3.61	17.83	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2065	0.00	0.00	0.00	0.00	17.17	2.08	19.25	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2066	0.00	0.00	0.00	0.00	15.61	2.11	17.72	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2067	0.00	0.00	0.00	0.00	24.86	3.16	28.02	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2068	0.00	0.00	0.00	0.00	14.91	9.48	24.38	45.32	65.55	429.17	77.81	79.18	166.33	105.84
2069	0.00	0.00	0.00	0.00	23.52	9.48	33.00	45.32	37.95	429.17	77.81	79.18	166.33	105.84
2070	0.00	0.00	0.00	0.00	0.01	9.83	9.83	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	39.65	429.17	77.81	79.18	166.33	105.84
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.95	429.17	77.81	79.18	166.33	105.84
2074	0.00	0.00	50.18	0.00	0.00	0.00	50.18	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2075	0.00	0.00	68.27	0.00	1.88	0.00	70.15	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2076	0.00	0.00	10.31	0.00	1.88	0.00	12.20	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2077	0.00	0.00	0.00	0.00	23.04	0.00	23.04	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2078	0.00	0.00	0.00	0.00	12.23	0.00	12.23	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2079	0.00	0.00	0.00	0.00	20.70	0.00	20.70	45.32	37.95	429.17	77.81	79.18	166.33	105.84
2080	0.00	0.00	0.00	0.00	75.44	0.00	75.44	45.32	50.33	429.17	77.81	79.18	166.33	105.84
2081	0.00	0.00	0.00	0.00	47.04	0.00	47.04	45.32	37.95	429.17	77.81	79.18	166.33	105.84
2082	0.00	0.00	49.09	0.00	54.55	0.00	103.64	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2083	0.00	0.00	66.78	0.00	0.00	0.00	66.78	45.32	36.81	429.17	77.81	79.18	166.33	105.84
2084	0.00	0.00	10.09	0.00	10.26	0.12	20.46	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	45.32	36.81	429.17	77.81	79.18	166.33	105.84
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	45.32	52.03	429.17	77.81	79.18	166.33	105.84
2087	0.00	0.00	49.34	0.00	24.39	1.04	74.76	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2088	0.00	0.00	67.12	0.00	15.88	3.11	86.11	45.32	35.10	429.17	77.81	79.18	166.33	105.84
2089	0.00	0.00	10.14	0.00	12.96	3.11	26.21	45.32	37.95	429.17	77.81	79.18	166.33	105.84
2090	0.00	0.00	0.00	0.00	0.00	3.22	3.22	45.32	37.95	429.17	77.81	79.18	166.33	105.84
Salvage Value	48.98	0.00	23.82	0.00	28.62	3.14	104.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3336.80	2687.55	338.65	0.00	381.19	55.88	6800.06	917.54	699.58	13396.52	2530.37	1279.33	3713.76	5873.05

Net Present Value -2544

All Gas

TABLE 084
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	348.56	97.52	24.18	102.50	124.35
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	366.75	95.97	24.82	104.37	141.59
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	346.75	93.24	27.15	107.07	119.29
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	338.31	91.33	24.51	108.49	113.98
2020	0.00	0.00	70.42	0.00	0.00	0.00	70.42	0.75	0.00	372.44	91.26	19.34	118.12	143.73
2021	0.00	0.00	88.12	0.00	6.64	0.00	94.76	1.11	0.00	374.30	89.46	18.21	128.37	138.26
2022	0.00	0.00	10.07	0.00	0.00	0.00	10.07	1.16	3.92	362.08	87.28	33.96	130.55	110.29
2023	0.00	0.00	49.14	0.00	0.00	0.00	49.14	1.41	3.92	347.27	85.12	42.05	136.52	83.57
2024	0.00	0.00	68.89	0.00	52.27	0.00	121.15	2.01	3.92	339.09	83.70	48.13	141.55	65.71
2025	0.00	0.00	10.10	0.00	0.00	0.00	10.10	2.06	7.84	267.79	83.22	40.26	128.46	15.86
2026	0.00	0.00	49.29	0.00	0.00	0.00	49.29	2.30	7.84	250.09	81.94	41.32	130.70	-3.87
2027	0.00	0.00	67.05	0.00	0.00	0.00	67.05	2.64	7.84	233.49	80.11	41.50	142.02	-30.14
2028	0.00	0.00	109.45	0.00	0.00	0.00	109.45	3.19	11.76	216.91	78.24	63.85	141.01	-66.18
2029	0.00	0.00	142.91	0.00	0.00	0.00	142.91	3.90	11.76	201.71	76.82	72.69	145.29	-93.09
2030	0.00	0.00	63.75	0.00	6.64	0.00	70.39	4.25	11.77	214.36	77.72	67.36	141.54	-72.26
2031	0.00	0.00	4.67	0.00	0.00	0.00	4.67	4.28	18.57	231.18	75.36	119.37	134.48	-98.03
2032	0.00	0.00	49.59	0.00	0.00	0.00	49.59	4.52	18.58	211.51	73.49	132.08	140.95	-135.01
2033	0.00	0.00	67.45	0.00	43.97	0.00	111.42	5.08	18.58	191.90	71.79	144.94	146.37	-171.20
2034	0.00	0.00	110.11	0.00	0.00	0.00	110.11	5.63	22.50	178.29	70.41	162.98	149.87	-204.97
2035	0.00	0.00	143.77	0.00	0.00	0.00	143.77	6.35	22.50	167.50	69.53	172.53	152.77	-227.33
2036	0.00	0.00	64.14	0.00	0.00	0.00	64.14	6.67	22.50	165.69	69.48	167.98	158.71	-230.48
2037	0.00	0.00	104.91	0.00	0.00	0.00	104.91	7.20	29.30	172.57	67.52	222.71	145.03	-262.69
2038	0.00	0.00	144.20	0.00	0.00	0.00	144.20	7.92	29.31	157.78	66.34	236.20	151.13	-295.89
2039	0.00	0.00	64.33	0.00	0.00	0.00	64.33	8.24	29.31	152.81	66.27	239.53	157.83	-310.82
2040	0.00	0.00	4.71	0.00	0.00	0.00	4.71	8.26	36.11	162.54	64.39	290.23	151.66	-343.73
2041	0.00	0.00	100.62	0.00	0.00	0.00	100.62	8.76	36.12	152.71	62.65	319.82	159.78	-389.55
2042	0.00	0.00	144.78	0.00	0.00	0.00	144.78	9.49	36.12	147.09	61.62	341.29	165.75	-421.57
2043	0.00	0.00	64.59	0.00	43.97	0.00	108.56	10.03	36.12	148.33	61.59	346.20	166.91	-426.37
2044	0.00	0.00	4.73	0.00	0.00	0.00	4.73	10.05	42.93	156.58	60.07	395.17	159.01	-457.67
2045	0.00	0.00	22.10	0.00	0.00	0.00	22.10	10.17	42.93	148.01	58.56	427.15	166.08	-503.78
2046	0.00	0.00	30.06	0.00	0.00	0.00	30.06	10.32	42.93	142.37	57.48	453.23	171.71	-540.05
2047	0.00	0.00	4.54	0.00	0.00	0.00	4.54	10.34	44.34	133.45	56.64	472.46	176.49	-572.14
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.35	141.28	57.56	450.95	171.43	-538.66
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	10.34	44.35	141.28	57.56	450.95	171.43	-538.66
2050	0.00	0.00	48.99	0.00	9.69	0.00	58.69	10.34	44.36	141.28	57.56	450.95	171.43	-538.66
2051	0.00	0.00	66.65	0.00	9.69	0.00	76.34	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2052	0.00	0.00	10.07	0.00	9.69	0.00	19.76	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2053	0.00	0.00	49.14	0.00	0.00	0.00	49.14	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2054	0.00	0.00	66.85	0.00	0.00	0.00	66.85	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2055	0.00	0.00	10.10	0.00	0.00	0.00	10.10	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2056	0.00	0.00	49.29	0.00	6.64	0.00	55.93	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2057	0.00	0.00	67.05	0.00	0.00	0.00	67.05	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2058	0.00	0.00	109.45	0.00	0.00	0.00	109.45	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2059	0.00	0.00	142.91	0.00	39.20	0.00	182.11	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2060	0.00	0.00	63.75	0.00	0.00	0.00	63.75	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2061	0.00	0.00	4.67	0.00	0.00	0.00	4.67	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2062	0.00	0.00	49.59	0.00	0.00	0.00	49.59	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2063	0.00	0.00	67.45	0.00	0.00	0.00	67.45	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2064	0.00	0.00	110.11	0.00	0.00	0.00	110.11	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2065	0.00	0.00	143.77	0.00	6.64	0.00	150.41	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2066	0.00	0.00	64.14	0.00	0.00	0.00	64.14	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2067	0.00	0.00	104.91	0.00	0.00	0.00	104.91	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2068	0.00	0.00	144.20	0.00	32.98	0.00	177.18	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2069	0.00	0.00	64.33	0.00	0.00	0.00	64.33	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2070	0.00	0.00	4.71	0.00	0.00	0.00	4.71	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2071	0.00	0.00	100.62	0.00	0.00	0.00	100.62	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2072	0.00	0.00	144.78	0.00	0.00	0.00	144.78	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2073	0.00	0.00	64.59	0.00	0.00	0.00	64.59	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2074	0.00	0.00	4.73	0.00	13.07	0.00	17.80	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2075	0.00	0.00	22.10	0.00	0.00	0.00	22.10	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2076	0.00	0.00	30.06	0.00	0.00	0.00	30.06	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2077	0.00	0.00	4.54	0.00	0.00	0.00	4.54	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2078	0.00	0.00	0.00	0.00	32.98	0.00	32.98	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2080	0.00	0.00	48.99	0.00	0.00	0.00	48.99	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2081	0.00	0.00	66.65	0.00	0.00	0.00	66.65	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2082	0.00	0.00	10.07	0.00	0.00	0.00	10.07	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2083	0.00	0.00	49.14	0.00	10.99	0.00	60.13	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2084	0.00	0.00	66.85	0.00	9.69	0.00	76.54	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2085	0.00	0.00	10.10	0.00	9.69	0.00	19.79	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2086	0.00	0.00	49.29	0.00	9.69	0.00	58.98	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2087	0.00	0.00	67.05	0.00	9.69	0.00	76.74	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2088	0.00	0.00	10.13	0.00	0.00	0.00	10.13	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	141.28	57.56	450.95	171.43	-538.66
Salvage Value	0.00	0.00	70.13	0.00	7.48	0.00	77.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1348.54	0.00	156.29	0.00	1566.69	154.57	608.54	6518.87	2118.84	5827.22	4077.80	-5504.98

Net Present Value -7835

Wind/Gas

TABLE 085
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	348.56	97.52	24.18	102.50	124.35
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	366.75	95.97	24.82	104.37	141.59
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	346.74	93.24	27.15	107.07	119.28
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	338.31	91.32	24.51	108.49	113.99
2020	0.00	0.00	0.00	6.94	10.37	0.00	17.31	0.59	0.00	368.86	90.81	20.86	119.32	137.88
2021	0.00	0.00	0.35	211.88	17.29	0.00	229.52	1.74	0.00	370.22	89.01	20.27	128.87	132.07
2022	0.00	0.00	0.00	215.84	20.88	0.00	236.73	2.92	6.10	374.43	87.42	20.39	129.37	137.26
2023	0.00	0.00	119.71	208.90	10.93	0.00	339.54	4.51	12.20	371.39	84.99	23.48	133.15	129.77
2024	0.00	0.00	155.17	3.97	18.40	0.00	177.53	5.29	18.31	375.57	83.27	23.86	136.77	131.68
2025	0.00	0.00	20.20	3.47	3.33	0.00	27.00	5.43	26.14	314.38	83.32	27.72	120.34	83.00
2026	0.00	0.00	49.29	105.94	8.37	0.00	163.60	6.24	26.14	302.15	82.35	26.57	121.04	72.18
2027	0.00	0.00	69.09	107.92	65.56	0.00	242.57	7.45	29.19	287.74	80.05	32.47	125.08	50.13
2028	0.00	0.00	10.13	107.92	18.43	0.00	136.48	8.13	36.17	282.64	78.35	41.97	128.09	34.22
2029	0.00	0.00	49.44	107.92	18.50	0.00	175.86	9.01	39.22	274.94	76.80	45.41	131.69	21.05
2030	0.00	0.00	67.25	107.92	18.50	0.00	193.67	9.98	42.27	277.82	75.92	47.52	132.99	21.39
2031	0.00	0.00	59.70	107.92	18.50	0.00	186.12	10.91	49.24	279.73	74.73	56.53	134.92	13.55
2032	0.00	0.00	67.39	107.92	62.47	0.00	237.78	12.10	52.29	276.44	73.64	57.03	138.25	7.52
2033	0.00	0.00	10.18	107.92	18.50	0.00	136.60	12.78	59.28	281.67	73.00	60.27	140.62	7.78
2034	0.00	0.00	49.68	107.92	18.50	0.00	176.11	13.66	62.33	269.19	71.26	70.19	143.42	-15.68
2035	0.00	0.00	67.59	107.92	18.50	0.00	194.01	14.63	65.39	257.00	69.62	76.09	147.86	-36.57
2036	0.00	0.00	60.00	107.92	18.50	0.00	186.42	15.56	72.36	252.01	68.31	87.50	150.71	-54.50
2037	0.00	0.00	67.72	107.92	18.50	0.00	194.15	16.53	75.41	243.40	67.06	92.56	154.84	-71.06
2038	0.00	0.00	60.12	107.92	18.50	0.00	186.54	17.46	82.39	242.37	66.05	101.91	158.75	-84.34
2039	0.00	0.00	67.86	107.92	62.47	0.00	238.25	18.66	85.44	236.13	64.93	102.14	173.60	-104.55
2040	0.00	0.00	10.25	114.86	18.50	0.00	143.62	19.37	92.43	238.77	64.16	107.61	179.64	-112.64
2041	0.00	0.00	50.03	319.80	18.50	0.00	388.33	21.32	95.48	225.86	62.68	128.24	177.71	-142.77
2042	0.00	0.00	68.06	323.77	18.50	0.00	410.33	23.37	98.53	215.07	61.36	137.17	184.11	-167.56
2043	0.00	0.00	60.42	316.83	18.36	0.00	395.61	25.35	105.50	210.14	60.22	151.69	188.17	-189.93
2044	0.00	0.00	68.20	111.89	17.95	0.00	198.03	26.34	108.55	205.52	59.31	157.46	193.33	-204.57
2045	0.00	0.00	32.40	111.39	16.84	0.00	160.63	27.14	115.53	202.39	58.26	166.73	201.86	-224.45
2046	0.00	0.00	30.06	210.39	15.17	0.00	255.62	28.42	118.58	197.90	57.26	167.64	215.22	-242.21
2047	0.00	0.00	4.54	109.91	10.13	0.00	124.58	29.04	123.06	191.84	56.23	173.15	218.62	-256.15
2048	0.00	0.00	0.00	107.92	5.20	0.00	113.13	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2049	0.00	0.00	0.00	107.92	9.76	0.00	117.69	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2050	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2051	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2052	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2053	0.00	0.00	98.28	107.92	0.00	0.00	206.20	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2054	0.00	0.00	133.70	107.92	0.00	0.00	241.62	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2055	0.00	0.00	20.20	107.92	2.59	0.00	130.72	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2056	0.00	0.00	49.29	107.92	4.32	0.00	161.53	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2057	0.00	0.00	67.05	107.92	5.26	0.00	180.23	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2058	0.00	0.00	10.13	107.92	2.94	0.00	120.99	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2059	0.00	0.00	49.44	107.92	14.76	0.00	172.12	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2060	0.00	0.00	67.25	114.86	1.46	0.00	183.57	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2061	0.00	0.00	59.70	319.80	2.34	0.00	381.83	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2062	0.00	0.00	67.39	323.77	42.58	0.00	433.73	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2063	0.00	0.00	10.18	316.83	4.63	0.00	331.63	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2064	0.00	0.00	49.68	111.89	4.63	0.00	166.20	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2065	0.00	0.00	67.59	111.39	4.63	0.00	183.61	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2066	0.00	0.00	60.00	210.39	4.63	0.00	275.01	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2067	0.00	0.00	67.72	109.91	37.60	0.00	215.23	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2068	0.00	0.00	60.12	107.92	4.63	0.00	172.66	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2069	0.00	0.00	67.86	107.92	4.63	0.00	180.41	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2070	0.00	0.00	10.25	107.92	12.40	0.00	130.58	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2071	0.00	0.00	50.03	107.92	17.59	0.00	175.55	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2072	0.00	0.00	68.06	107.92	20.25	0.00	196.24	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2073	0.00	0.00	60.42	107.92	12.61	0.00	180.95	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2074	0.00	0.00	68.20	107.92	41.24	0.00	217.36	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2075	0.00	0.00	32.40	107.92	6.50	0.00	146.82	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2076	0.00	0.00	30.06	107.92	10.66	0.00	148.64	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2077	0.00	0.00	4.54	107.92	27.61	0.00	140.08	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2078	0.00	0.00	0.00	107.92	18.36	0.00	126.28	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2079	0.00	0.00	0.00	107.92	18.15	0.00	126.08	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2080	0.00	0.00	0.00	114.86	17.88	0.00	132.74	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2081	0.00	0.00	0.00	319.80	17.04	0.00	336.84	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2082	0.00	0.00	0.00	323.77	27.16	0.00	350.92	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2083	0.00	0.00	98.28	316.83	15.12	0.00	430.23	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2084	0.00	0.00	133.70	111.89	23.50	0.00	269.09	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2085	0.00	0.00	20.20	111.39	23.36	0.00	154.95	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2086	0.00	0.00	49.29	210.39	22.53	0.00	282.21	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2087	0.00	0.00	67.05	109.91	21.70	0.00	198.65	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2088	0.00	0.00	10.13	107.92	7.84	0.00	125.89	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2089	0.00	0.00	0.00	104.45	14.95	0.00	119.40	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
2090	0.00	0.00	0.00	1.98	0.07	0.00	2.05	29.04	123.06	197.38	57.25	169.17	211.90	-240.94
Salvage Value	0.00	0.00	47.38	130.86	27.47	0.00	205.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1003.30	2864.89	417.95	0.00	4348.00	405.26	1713.36	7763.76	2112.72	2438.95	4426.85	-1214.75

Net Present Value -7681

K22/Gas

TABLE 086
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	98.15	0.00	0.00	9.69	0.00	107.84	0.54	0.00	307.53	101.19	19.46	96.20	90.70
2015	0.00	29.32	0.00	0.00	10.40	0.00	39.72	0.74	0.00	338.97	99.34	23.11	100.27	116.26
2016	0.00	25.47	0.00	0.00	10.47	0.00	35.94	0.92	0.00	348.16	97.52	24.18	102.50	123.95
2017	0.00	189.44	0.00	0.00	23.06	0.00	212.50	1.98	0.00	365.75	95.97	24.83	104.40	140.55
2018	0.00	368.39	0.00	0.00	6.85	0.00	375.25	3.86	0.00	344.73	93.25	27.17	107.14	117.16
2019	0.00	599.13	0.00	0.00	11.93	0.00	611.06	6.91	0.00	336.22	91.33	24.52	108.57	111.80
2020	0.00	665.27	0.00	0.00	21.71	0.00	686.99	10.35	0.00	363.98	90.64	21.53	120.01	131.80
2021	0.00	542.28	0.00	0.00	30.80	0.00	573.08	13.21	0.00	367.82	88.96	20.67	130.24	127.95
2022	0.00	314.02	0.00	0.00	36.48	0.00	350.50	14.96	12.78	374.52	88.94	23.58	124.01	137.98
2023	0.00	145.56	0.00	0.00	0.01	0.00	145.57	15.69	12.99	491.10	94.51	23.39	113.03	260.17
2024	0.00	50.19	0.00	0.00	0.00	0.00	50.19	15.94	12.71	506.73	94.41	26.57	117.86	267.89
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	15.94	12.92	450.58	94.36	18.64	108.82	228.76
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.94	12.75	432.25	92.53	18.93	111.54	209.25
2027	0.00	0.00	70.77	0.00	0.00	0.00	70.77	16.19	12.70	391.08	90.74	18.11	110.82	171.41
2028	0.00	0.00	88.59	0.00	6.64	0.00	95.23	16.56	12.47	370.63	89.21	18.85	113.77	148.81
2029	0.00	0.00	10.14	0.00	0.00	0.00	10.14	16.61	15.96	364.20	88.39	23.59	114.19	138.03
2030	0.00	0.00	49.49	0.00	0.00	0.00	49.49	16.86	15.96	353.73	86.67	28.99	118.08	119.98
2031	0.00	0.00	168.98	0.00	52.27	0.00	221.24	17.95	16.00	342.58	85.06	33.86	122.79	100.87
2032	0.00	0.00	153.51	0.00	0.00	0.00	153.51	18.72	22.58	333.35	83.50	45.78	127.06	77.01
2033	0.00	0.00	63.94	0.00	6.64	0.00	70.58	19.07	18.71	339.87	83.67	39.98	127.79	88.43
2034	0.00	0.00	4.68	0.00	0.00	0.00	4.68	19.10	25.51	361.74	81.28	95.66	121.95	62.85
2035	0.00	0.00	100.02	0.00	0.00	0.00	100.02	19.60	25.51	345.06	79.28	107.45	127.93	30.40
2036	0.00	0.00	143.92	0.00	0.00	0.00	143.92	20.32	25.51	331.95	77.80	117.02	132.21	4.93
2037	0.00	0.00	64.20	0.00	0.00	0.00	64.20	20.64	25.52	340.56	78.23	111.49	129.97	20.87
2038	0.00	0.00	105.02	0.00	0.00	0.00	105.02	21.16	31.67	361.34	75.89	171.71	127.79	-14.04
2039	0.00	0.00	144.35	0.00	0.00	0.00	144.35	21.88	31.68	349.57	74.55	184.28	138.27	-47.53
2040	0.00	0.00	64.39	0.00	43.97	0.00	108.36	22.43	31.68	349.09	74.11	188.93	140.25	-54.20
2041	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.45	38.49	373.63	72.16	249.94	136.45	-84.93
2042	0.00	0.00	100.72	0.00	0.00	0.00	100.72	22.95	41.33	360.27	70.38	272.34	142.14	-124.59
2043	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.68	38.49	350.40	69.08	288.72	146.53	-153.93
2044	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.00	38.49	338.86	68.74	286.04	147.18	-163.09
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.02	45.29	365.49	67.15	347.57	143.50	-192.73
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.29	356.65	65.95	368.26	146.63	-224.20
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	47.01	334.53	64.61	382.10	150.82	-263.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	47.01	352.22	65.91	365.97	146.99	-226.64
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	47.01	352.22	65.91	365.97	146.99	-226.64
2050	0.00	0.00	0.00	0.00	10.01	0.00	10.01	24.02	46.16	352.22	65.91	365.97	146.99	-226.64
2051	0.00	0.00	0.00	0.00	10.05	0.00	10.05	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2052	0.00	0.00	0.00	0.00	10.06	0.00	10.06	24.02	48.15	352.22	65.91	365.97	146.99	-226.64
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2054	0.00	0.00	0.00	0.00	11.08	0.00	11.08	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2055	0.00	0.00	0.00	0.00	14.69	0.00	14.69	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2056	0.00	0.00	0.00	0.00	15.88	0.00	15.88	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2057	0.00	0.00	49.34	0.00	12.96	0.00	62.29	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2058	0.00	0.00	67.12	0.00	0.00	0.00	67.12	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2059	0.00	0.00	10.14	0.00	0.00	0.00	10.14	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2060	0.00	0.00	49.49	0.00	0.00	0.00	49.49	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2061	0.00	0.00	166.93	0.00	0.00	0.00	166.93	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2062	0.00	0.00	153.51	0.00	0.00	0.00	153.51	24.02	48.15	352.22	65.91	365.97	146.99	-226.64
2063	0.00	0.00	63.94	0.00	6.64	0.00	70.58	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2064	0.00	0.00	4.68	0.00	0.00	0.00	4.68	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2065	0.00	0.00	100.02	0.00	0.40	0.00	100.41	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2066	0.00	0.00	143.92	0.00	39.62	0.00	183.53	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2067	0.00	0.00	64.20	0.00	13.00	0.00	77.20	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2068	0.00	0.00	105.02	0.00	13.15	0.00	118.17	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2069	0.00	0.00	144.35	0.00	0.86	0.00	145.20	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2070	0.00	0.00	64.39	0.00	7.02	0.00	71.41	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2071	0.00	0.00	4.72	0.00	14.92	0.00	19.63	24.02	60.53	352.22	65.91	365.97	146.99	-226.64
2072	0.00	0.00	100.72	0.00	23.52	0.00	124.24	24.02	48.15	352.22	65.91	365.97	146.99	-226.64
2073	0.00	0.00	144.93	0.00	0.01	0.00	144.93	24.02	47.01	352.22	65.91	365.97	146.99	-226.64
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.02	47.01	352.22	65.91	365.97	146.99	-226.64
2075	0.00	0.00	4.74	0.00	32.98	0.00	37.71	24.02	47.01	352.22	65.91	365.97	146.99	-226.64
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	46.16	352.22	65.91	365.97	146.99	-226.64
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2081	0.00	0.00	0.00	0.00	13.07	0.00	13.07	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	48.15	352.22	65.91	365.97	146.99	-226.64
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2087	0.00	0.00	49.34	0.00	9.69	0.00	59.03	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2088	0.00	0.00	67.12	0.00	0.00	0.00	67.12	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2089	0.00	0.00	10.14	0.00	0.00	0.00	10.14	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
2090	0.00	0.00	0.00	0.00	10.99	0.00	10.99	24.02	45.30	352.22	65.91	365.97	146.99	-226.64
Salvage Value	0.00	0.00	41.60	0.00	11.10	0.00	52.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2515.06	1011.47	0.00	238.43	0.00	3764.96	473.01	684.05	10330.59	2309.88	4418.71	3606.44	-4.44

Net Present Value: -4926

K22/C29

TABLE 087
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	98.15	0.00	0.00	9.69	0.00	137.06	0.69	0.00	307.53	101.19	19.46	96.20	90.70
2015	37.30	29.32	0.00	0.00	10.40	0.00	77.02	1.07	0.00	338.97	99.34	23.11	100.27	116.26
2016	10.85	25.47	0.00	0.00	10.47	0.00	46.79	1.30	0.00	348.16	97.52	24.18	102.50	123.95
2017	11.52	189.44	0.00	0.00	23.06	0.00	224.03	2.42	0.00	365.75	95.97	24.83	104.40	140.55
2018	11.56	368.39	0.00	0.00	6.85	0.00	386.80	4.36	0.00	344.73	93.25	27.17	107.14	117.16
2019	13.78	599.13	0.00	0.00	11.93	0.00	624.84	7.48	0.00	336.22	91.33	24.52	108.57	111.80
2020	148.85	665.27	0.00	0.00	21.71	0.00	835.83	11.66	0.00	363.99	90.64	21.53	120.01	131.81
2021	227.01	542.28	0.00	0.00	30.80	0.00	800.10	15.66	0.00	367.59	88.96	20.68	130.38	127.56
2022	240.14	314.02	0.00	0.00	36.48	0.00	590.64	18.62	12.78	374.23	88.95	23.53	124.19	137.56
2023	242.82	145.56	0.00	0.00	2.50	0.00	390.88	20.57	12.99	490.18	94.51	23.44	113.15	259.08
2024	653.98	50.19	0.00	0.00	2.50	0.00	706.66	24.10	12.71	504.80	94.40	26.58	117.96	265.86
2025	1034.51	0.00	0.00	0.00	30.45	0.00	1064.96	29.43	12.92	448.23	94.38	18.67	108.99	226.19
2026	926.14	0.00	0.00	0.00	15.94	0.00	942.07	34.14	12.75	429.30	92.54	18.98	111.76	206.02
2027	659.44	0.00	0.00	0.00	26.88	0.00	686.32	37.57	12.70	389.18	90.96	17.38	110.73	170.11
2028	455.38	0.00	0.00	0.00	46.73	0.00	502.11	40.08	12.47	363.86	89.11	19.08	114.56	141.10
2029	298.24	0.00	0.00	0.00	61.85	0.00	360.08	41.88	26.10	470.70	92.85	21.81	98.52	257.52
2030	109.53	0.00	0.00	0.00	72.44	0.00	181.97	42.79	26.31	622.94	99.86	21.27	90.67	411.14
2031	34.46	0.00	0.00	0.00	0.00	0.00	34.46	42.96	26.22	642.08	99.64	21.73	94.31	426.39
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	29.08	621.65	97.99	21.47	95.79	406.40
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	25.04	599.39	96.40	21.42	97.10	384.46
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	25.00	580.04	94.84	21.86	99.26	364.09
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	24.83	559.47	93.33	21.97	100.51	343.66
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	42.96	24.47	535.69	91.82	21.91	101.80	320.17
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	24.54	511.70	90.32	21.99	103.67	295.72
2038	0.00	0.00	71.31	0.00	0.00	0.00	71.31	43.21	24.00	488.72	88.84	22.02	107.06	270.80
2039	0.00	0.00	89.29	0.00	6.64	0.00	95.92	43.59	26.68	481.38	87.50	21.55	121.26	251.07
2040	0.00	0.00	10.25	0.00	0.00	0.00	10.25	43.64	27.75	469.70	85.82	37.80	122.96	223.13
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.64	27.75	458.07	84.40	42.25	128.27	203.16
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	43.89	30.59	446.87	83.02	43.59	135.98	184.28
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	44.26	27.75	433.69	81.58	44.26	145.58	162.27
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	44.56	31.66	423.73	80.15	68.18	143.13	132.26
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.17	31.02	412.46	78.94	72.88	148.76	111.89
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.22	34.94	423.79	78.57	72.08	155.20	117.94
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.65	395.57	76.42	96.14	160.11	62.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.65	410.61	77.98	80.37	154.69	97.57
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	39.50	410.61	77.98	80.37	154.69	97.57
2050	0.00	0.00	0.00	0.00	10.01	0.00	10.01	45.22	35.80	410.61	77.98	80.37	154.69	97.57
2051	0.00	0.00	0.00	0.00	10.05	0.00	10.05	45.22	34.96	410.61	77.98	80.37	154.69	97.57
2052	0.00	0.00	0.00	0.00	10.06	0.00	10.06	45.22	37.81	410.61	77.98	80.37	154.69	97.57
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2054	0.00	0.00	0.00	0.00	11.08	0.00	11.08	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2055	0.00	0.00	0.00	0.00	14.69	0.00	14.69	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2056	0.00	0.00	0.00	0.00	15.88	0.00	15.88	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2057	0.00	0.00	0.00	0.00	12.96	0.00	12.96	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2058	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2059	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.22	53.04	410.61	77.98	80.37	154.69	97.57
2060	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2061	0.00	0.00	0.00	0.00	3.70	0.00	3.70	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2062	0.00	0.00	0.00	0.00	6.17	0.00	6.17	45.22	37.81	410.61	77.98	80.37	154.69	97.57
2063	0.00	0.00	0.00	0.00	10.49	0.00	10.49	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2064	0.00	0.00	0.00	0.00	14.81	0.00	14.81	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2065	0.00	0.00	0.00	0.00	18.29	0.00	18.29	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2066	0.00	0.00	0.00	0.00	0.42	0.00	0.42	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2067	0.00	0.00	0.00	0.00	13.00	0.00	13.00	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2068	0.00	0.00	49.88	0.00	6.52	0.00	56.40	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2069	0.00	0.00	67.86	0.00	0.86	0.00	68.71	45.22	53.04	410.61	77.98	80.37	154.69	97.57
2070	0.00	0.00	10.25	0.00	7.02	0.00	17.27	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2071	0.00	0.00	0.00	0.00	14.92	0.00	14.92	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2072	0.00	0.00	50.08	0.00	23.52	0.00	73.60	45.22	53.04	410.61	77.98	80.37	154.69	97.57
2073	0.00	0.00	68.13	0.00	1.89	0.00	70.02	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2074	0.00	0.00	60.48	0.00	8.52	0.00	69.00	45.22	51.90	410.61	77.98	80.37	154.69	97.57
2075	0.00	0.00	68.27	0.00	23.04	0.00	91.31	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2076	0.00	0.00	10.31	0.00	12.23	0.00	22.55	45.22	51.05	410.61	77.98	80.37	154.69	97.57
2077	0.00	0.00	0.00	0.00	20.70	0.00	20.70	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2078	0.00	0.00	0.00	0.00	42.88	0.00	42.88	45.22	50.19	410.61	77.98	80.37	154.69	97.57
2079	0.00	0.00	0.00	0.00	47.04	0.00	47.04	45.22	37.81	410.61	77.98	80.37	154.69	97.57
2080	0.00	0.00	0.00	0.00	93.75	0.00	93.75	45.22	51.90	410.61	77.98	80.37	154.69	97.57
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	54.75	410.61	77.98	80.37	154.69	97.57
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.68	410.61	77.98	80.37	154.69	97.57
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	51.90	410.61	77.98	80.37	154.69	97.57
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	34.97	410.61	77.98	80.37	154.69	97.57
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	37.81	410.61	77.98	80.37	154.69	97.57
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	34.97	410.61	77.98	80.37	154.69	97.57
Salvage Value	34.56	0.00	13.53	0.00	24.36	0.00	72.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3537.62	2515.06	217.19	0.00	382.32	0.00	6652.19	902.35	620.27	12216.62	2510.40	1183.17	3514.21	5008.83

Net Present Value: -3166

SCGT/C26

TABLE 088
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Reference
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	307.53	101.19	19.46	96.20	90.70
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	338.97	99.34	23.11	100.27	116.26
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	348.56	97.52	24.18	102.50	124.35
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	366.75	95.97	24.82	104.37	141.59
2018	192.09	0.00	0.35	0.00	0.00	0.00	192.45	3.06	0.00	346.33	93.24	27.16	107.08	118.85
2019	229.36	0.00	0.00	0.00	0.00	0.00	229.36	4.20	0.00	337.66	91.33	24.52	108.51	113.30
2020	233.06	0.00	70.42	0.00	0.00	0.00	303.48	5.61	0.00	371.24	91.24	19.44	118.26	142.31
2021	640.56	0.00	88.08	0.00	6.64	0.00	735.27	9.18	0.00	373.27	89.43	18.46	128.81	136.57
2022	1025.35	0.00	10.07	0.00	0.47	0.00	1035.89	14.36	3.92	360.70	87.30	34.35	130.92	108.13
2023	917.93	0.00	0.00	0.00	0.95	0.00	918.88	18.96	3.92	344.25	84.99	43.47	137.28	78.51
2024	653.60	0.00	0.00	0.00	1.90	0.00	655.50	22.23	3.92	339.08	83.86	47.77	141.83	65.62
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	24.51	3.92	271.84	84.35	29.19	132.51	25.79
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	26.00	17.97	342.32	88.21	21.91	108.15	124.05
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	26.54	18.18	483.74	95.83	20.78	96.89	270.25
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	26.71	17.90	510.48	95.92	22.77	105.19	286.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	18.11	487.27	94.25	23.43	106.53	263.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.94	472.06	93.07	23.15	106.52	249.31
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.89	450.35	91.16	25.21	110.46	223.51
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.66	423.79	89.28	26.77	113.83	193.92
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.23	405.21	87.38	31.52	118.30	168.01
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.23	394.63	85.85	36.42	123.81	148.55
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.27	384.83	84.57	40.40	126.58	133.28
2036	0.00	0.00	49.78	0.00	0.00	0.00	49.78	26.96	19.95	377.79	83.53	40.86	131.14	122.26
2037	0.00	0.00	67.77	0.00	6.64	0.00	74.40	27.33	17.10	366.21	82.06	41.57	141.41	101.16
2038	0.00	0.00	10.23	0.00	0.00	0.00	10.23	27.39	21.02	356.55	80.61	63.98	140.23	71.73
2039	0.00	0.00	49.93	0.00	0.00	0.00	49.93	27.64	21.02	345.72	79.39	69.31	152.02	45.00
2040	0.00	0.00	69.97	0.00	52.27	0.00	122.23	28.24	21.02	336.32	78.07	68.84	164.87	24.54
2041	0.00	0.00	60.30	0.00	0.00	0.00	60.30	28.54	24.95	322.89	76.47	96.69	163.40	-13.66
2042	0.00	0.00	68.06	0.00	0.00	0.00	68.06	28.88	24.30	309.92	75.15	108.42	168.88	-42.53
2043	0.00	0.00	60.42	0.00	0.00	0.00	60.42	29.18	28.21	302.41	73.88	121.63	177.56	-70.66
2044	0.00	0.00	68.20	0.00	43.97	0.00	112.17	29.74	28.21	292.02	72.60	123.18	193.74	-97.49
2045	0.00	0.00	10.30	0.00	0.00	0.00	10.30	29.79	32.15	283.73	71.30	169.25	182.02	-138.84
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	35.00	274.42	70.15	186.64	186.61	-168.98
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.16	264.42	68.87	189.77	205.81	-200.02
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.17	274.19	70.11	181.88	191.48	-169.28
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.17	274.19	70.11	181.88	191.48	-169.28
2050	0.00	0.00	48.99	0.00	9.69	0.00	58.69	29.79	32.18	274.19	70.11	181.88	191.48	-169.28
2051	0.00	0.00	66.65	0.00	9.69	0.00	76.34	29.79	33.89	274.19	70.11	181.88	191.48	-169.28
2052	0.00	0.00	10.07	0.00	9.69	0.00	19.76	29.79	33.90	274.19	70.11	181.88	191.48	-169.28
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	274.19	70.11	181.88	191.48	-169.28
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	274.19	70.11	181.88	191.48	-169.28
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	274.19	70.11	181.88	191.48	-169.28
2056	0.00	0.00	0.00	0.00	6.64	0.00	6.64	29.79	35.04	274.19	70.11	181.88	191.48	-169.28
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2066	0.00	0.00	49.78	0.00	0.00	0.00	49.78	29.79	35.04	274.19	70.11	181.88	191.48	-169.28
2067	0.00	0.00	67.72	0.00	0.00	0.00	67.72	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2068	0.00	0.00	10.23	0.00	0.00	0.00	10.23	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2069	0.00	0.00	49.93	0.00	0.00	0.00	49.93	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2070	0.00	0.00	67.93	0.00	0.00	0.00	67.93	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2071	0.00	0.00	60.30	0.00	0.00	0.00	60.30	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2072	0.00	0.00	68.06	0.00	7.11	0.00	75.17	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2073	0.00	0.00	60.42	0.00	0.95	0.00	61.37	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2074	0.00	0.00	68.20	0.00	1.90	0.00	70.09	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2075	0.00	0.00	10.30	0.00	43.46	0.00	53.77	29.79	47.41	274.19	70.11	181.88	191.48	-169.28
2076	0.00	0.00	0.00	0.00	1.90	0.00	1.90	29.79	35.04	274.19	70.11	181.88	191.48	-169.28
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	49.12	274.19	70.11	181.88	191.48	-169.28
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	274.19	70.11	181.88	191.48	-169.28
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	29.79	49.12	274.19	70.11	181.88	191.48	-169.28
2080	0.00	0.00	48.99	0.00	0.00	0.00	48.99	29.79	33.90	274.19	70.11	181.88	191.48	-169.28
2081	0.00	0.00	66.65	0.00	0.00	0.00	66.65	29.79	49.12	274.19	70.11	181.88	191.48	-169.28
2082	0.00	0.00	10.07	0.00	0.00	0.00	10.07	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	35.04	274.19	70.11	181.88	191.48	-169.28
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
2090	0.00	0.00	0.00	0.00	13.07	0.00	13.07	29.79	32.19	274.19	70.11	181.88	191.48	-169.28
Salvage Value	13.69	0.00	23.21	0.00	8.38	0.00	45.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	460.49	0.00	111.62	0.00	4525.00	601.92	509.81	9667.97	2367.37	2310.98	4076.86	912.76

Net Present Value -4724

CCGT/C26

TABLE 089
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: Low
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	307.53	101.19	19.46	96.20	90.70
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	338.97	99.34	23.11	100.27	116.26
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	348.56	97.52	24.18	102.50	124.35
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	366.75	95.97	24.82	104.37	141.59
2018	192.09	0.00	0.35	0.00	0.00	0.00	192.45	3.06	0.00	346.33	93.24	27.16	107.08	118.85
2019	229.36	0.00	98.43	0.00	0.00	0.00	327.79	4.70	0.00	337.66	91.33	24.52	108.51	113.30
2020	233.06	0.00	163.06	0.00	0.00	0.00	396.12	6.57	0.00	371.24	91.24	19.44	118.26	142.31
2021	640.56	0.00	84.61	0.00	6.64	0.00	731.80	10.12	0.00	379.83	90.15	16.19	126.65	146.83
2022	1025.35	0.00	4.63	0.00	0.47	0.00	1030.45	15.27	6.79	399.55	87.79	67.29	113.32	131.15
2023	917.93	0.00	0.00	0.00	0.95	0.00	918.88	19.87	6.79	388.84	85.78	75.28	118.39	109.40
2024	653.60	0.00	0.00	0.00	1.90	0.00	655.50	23.15	6.79	387.07	84.81	80.62	121.05	100.58
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	25.42	6.79	316.17	84.48	67.06	116.21	48.42
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	26.91	20.85	374.28	88.12	55.54	98.92	131.70
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	27.45	21.06	505.24	95.81	41.09	91.25	277.10
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	27.62	20.78	533.30	96.04	41.54	98.91	296.81
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.99	512.75	94.37	45.65	99.27	273.46
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.82	487.43	92.30	49.05	102.02	244.05
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.77	490.98	92.25	45.59	99.81	253.33
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.54	456.28	89.44	52.72	105.30	208.83
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.11	442.36	87.79	57.50	109.19	187.89
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.11	427.36	85.82	63.55	115.90	162.09
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.15	419.00	84.40	68.95	119.92	145.73
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	22.83	406.40	82.81	78.43	122.89	122.28
2037	0.00	0.00	49.83	0.00	0.00	0.00	49.83	27.87	19.98	405.73	82.09	81.82	125.24	116.58
2038	0.00	0.00	67.83	0.00	6.64	0.00	74.47	28.25	19.98	399.10	80.94	85.18	131.73	101.25
2039	0.00	0.00	10.24	0.00	0.00	0.00	10.24	28.30	23.90	386.96	79.22	105.79	140.43	61.53
2040	0.00	0.00	49.98	0.00	0.00	0.00	49.98	28.55	23.90	375.39	77.83	115.53	145.14	36.89
2041	0.00	0.00	70.04	0.00	52.27	0.00	122.30	29.15	23.90	364.55	76.54	122.18	151.64	14.18
2042	0.00	0.00	60.36	0.00	0.00	0.00	60.36	29.45	27.18	356.46	75.24	134.25	159.42	-12.44
2043	0.00	0.00	68.13	0.00	0.00	0.00	68.13	29.79	27.18	343.78	73.88	155.01	158.50	-43.61
2044	0.00	0.00	10.29	0.00	0.00	0.00	10.29	29.84	31.09	333.03	72.59	172.03	163.05	-74.65
2045	0.00	0.00	50.23	0.00	0.00	0.00	50.23	30.09	31.09	321.99	71.30	178.61	174.43	-102.35
2046	0.00	0.00	68.33	0.00	43.97	0.00	112.30	30.65	33.95	317.77	70.42	178.80	186.36	-117.81
2047	0.00	0.00	10.33	0.00	0.00	0.00	10.33	30.71	35.03	295.11	68.89	212.78	180.36	-166.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.04	311.62	70.20	190.06	180.38	-129.03
2049	0.00	0.00	98.43	0.00	9.69	0.00	108.12	30.71	35.05	311.62	70.20	190.06	180.38	-129.03
2050	0.00	0.00	141.63	0.00	9.69	0.00	151.33	30.71	35.05	311.62	70.20	190.06	180.38	-129.03
2051	0.00	0.00	63.18	0.00	9.69	0.00	72.88	30.71	36.76	311.62	70.20	190.06	180.38	-129.03
2052	0.00	0.00	4.63	0.00	9.69	0.00	14.32	30.71	36.77	311.62	70.20	190.06	180.38	-129.03
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.77	311.62	70.20	190.06	180.38	-129.03
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	311.62	70.20	190.06	180.38	-129.03
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	311.62	70.20	190.06	180.38	-129.03
2056	0.00	0.00	0.00	0.00	6.64	0.00	6.64	30.71	37.92	311.62	70.20	190.06	180.38	-129.03
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	37.92	311.62	70.20	190.06	180.38	-129.03
2067	0.00	0.00	49.83	0.00	0.00	0.00	49.83	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2068	0.00	0.00	67.79	0.00	0.00	0.00	67.79	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2069	0.00	0.00	10.24	0.00	0.00	0.00	10.24	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2070	0.00	0.00	49.98	0.00	0.00	0.00	49.98	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2071	0.00	0.00	67.99	0.00	0.00	0.00	67.99	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2072	0.00	0.00	60.36	0.00	0.47	0.00	60.83	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2073	0.00	0.00	68.13	0.00	7.58	0.00	75.71	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2074	0.00	0.00	10.29	0.00	1.90	0.00	12.19	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2075	0.00	0.00	50.23	0.00	4.26	0.00	54.50	30.71	50.29	311.62	70.20	190.06	180.38	-129.03
2076	0.00	0.00	68.33	0.00	41.09	0.00	109.43	30.71	37.92	311.62	70.20	190.06	180.38	-129.03
2077	0.00	0.00	10.33	0.00	0.00	0.00	10.33	30.71	52.00	311.62	70.20	190.06	180.38	-129.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	311.62	70.20	190.06	180.38	-129.03
2079	0.00	0.00	98.43	0.00	0.00	0.00	98.43	30.71	52.00	311.62	70.20	190.06	180.38	-129.03
2080	0.00	0.00	141.63	0.00	0.00	0.00	141.63	30.71	36.78	311.62	70.20	190.06	180.38	-129.03
2081	0.00	0.00	63.18	0.00	32.98	0.00	96.16	30.71	52.00	311.62	70.20	190.06	180.38	-129.03
2082	0.00	0.00	4.63	0.00	0.00	0.00	4.63	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	37.92	311.62	70.20	190.06	180.38	-129.03
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	311.62	70.20	190.06	180.38	-129.03
Salvage Value	13.69	0.00	36.42	0.00	7.63	0.00	57.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	666.39	0.00	108.99	0.00	4728.28	621.66	563.34	10448.84	2370.65	2757.90	3825.02	1495.27

Net Present Value: -4418

Wind/C26

TABLE 090
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	307.53	101.19	19.46	96.20	90.70
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	338.97	99.34	23.11	100.27	116.26
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	348.56	97.52	24.18	102.50	124.35
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	366.75	95.97	24.82	104.36	141.60
2018	192.09	0.00	0.00	0.00	0.00	0.00	192.09	3.06	0.00	346.33	93.24	27.16	107.08	118.85
2019	229.36	0.00	0.00	0.00	0.00	0.00	229.36	4.20	0.00	337.66	91.33	24.52	108.51	113.30
2020	233.06	0.00	0.00	6.94	10.37	0.00	250.37	5.46	0.00	367.95	90.82	20.85	119.34	136.95
2021	640.56	0.00	0.00	211.88	17.29	0.00	869.72	9.80	0.00	369.44	89.01	20.34	129.28	130.82
2022	1025.35	0.00	0.00	215.84	21.22	0.00	1262.41	16.12	6.10	373.24	87.42	20.40	130.20	135.23
2023	917.93	0.00	0.00	208.90	11.32	0.00	1138.16	21.81	12.20	370.21	85.01	23.44	134.00	127.76
2024	653.60	0.00	0.00	3.97	5.35	0.00	662.92	25.12	18.31	372.58	83.17	24.14	138.76	126.50
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	27.40	18.31	301.58	83.06	15.90	154.11	48.50
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	28.89	32.36	397.16	87.02	18.92	106.63	184.58
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	29.43	32.58	539.35	94.62	17.05	95.25	332.43
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	29.60	32.29	561.42	94.51	18.66	103.00	345.24
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.50	538.65	92.89	18.96	104.14	322.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.33	526.16	91.85	18.47	103.73	312.12
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.28	512.55	90.44	19.08	106.26	296.77
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	29.60	32.05	493.31	89.04	19.02	108.43	276.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	31.62	467.83	87.55	18.90	109.96	251.42
2034	0.00	0.00	71.11	0.00	0.00	0.00	71.11	29.85	31.62	444.29	86.12	18.99	111.80	227.38
2035	0.00	0.00	89.02	0.00	6.64	0.00	95.65	30.22	31.66	436.26	85.13	17.54	115.22	218.37
2036	0.00	0.00	60.00	0.00	0.00	0.00	60.00	30.52	38.26	419.73	83.09	32.21	119.04	185.38
2037	0.00	0.00	67.77	0.00	6.64	0.00	74.40	30.89	35.41	406.34	81.67	36.40	124.04	164.23
2038	0.00	0.00	10.23	0.00	0.00	0.00	10.23	30.94	39.32	399.46	80.44	47.26	128.11	143.66
2039	0.00	0.00	49.93	0.00	0.00	0.00	49.93	31.19	39.32	389.83	79.30	46.51	142.14	121.88
2040	0.00	0.00	69.97	6.94	52.27	0.00	129.17	31.83	39.32	373.89	77.65	59.82	145.72	90.71
2041	0.00	0.00	60.30	211.88	0.00	0.00	272.18	33.19	43.25	363.63	76.30	73.22	150.68	63.44
2042	0.00	0.00	68.06	215.84	0.00	0.00	283.91	34.61	42.61	352.58	75.03	76.54	159.97	41.03
2043	0.00	0.00	60.42	208.90	0.00	0.00	269.32	35.96	46.52	345.28	73.77	85.47	170.82	15.22
2044	0.00	0.00	68.20	3.97	43.97	0.00	116.13	36.54	46.52	329.65	72.44	106.90	168.58	-18.28
2045	0.00	0.00	10.30	0.00	0.00	0.00	10.30	36.59	50.45	320.18	71.19	124.68	173.72	-49.41
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	53.31	308.88	69.95	127.25	188.05	-76.37
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.47	298.09	68.74	128.94	205.29	-104.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.47	309.05	69.96	126.95	189.02	-76.89
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.48	309.05	69.96	126.95	189.02	-76.89
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.48	309.05	69.96	126.95	189.02	-76.89
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2055	0.00	0.00	0.00	0.00	2.59	0.00	2.59	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2056	0.00	0.00	0.00	0.00	4.32	0.00	4.32	36.59	53.34	309.05	69.96	126.95	189.02	-76.89
2057	0.00	0.00	0.00	0.00	5.19	0.00	5.19	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2058	0.00	0.00	0.00	0.00	2.59	0.00	2.59	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2059	0.00	0.00	0.00	0.00	0.86	0.00	0.86	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2060	0.00	0.00	0.00	6.94	0.00	0.00	6.94	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2061	0.00	0.00	0.00	211.88	0.00	0.00	211.88	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2062	0.00	0.00	0.00	215.84	0.00	0.00	215.84	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2063	0.00	0.00	0.00	208.90	0.00	0.00	208.90	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2064	0.00	0.00	49.68	3.97	0.00	0.00	53.65	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2065	0.00	0.00	67.59	0.00	0.00	0.00	67.59	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2066	0.00	0.00	60.00	0.00	0.00	0.00	60.00	36.59	53.34	309.05	69.96	126.95	189.02	-76.89
2067	0.00	0.00	67.72	0.00	0.00	0.00	67.72	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2068	0.00	0.00	10.23	0.00	0.00	0.00	10.23	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2069	0.00	0.00	49.93	0.00	0.00	0.00	49.93	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2070	0.00	0.00	67.93	0.00	14.42	0.00	82.34	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2071	0.00	0.00	60.30	0.00	12.97	0.00	73.26	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2072	0.00	0.00	68.06	0.00	22.67	0.00	90.73	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2073	0.00	0.00	60.42	0.00	8.73	0.00	69.14	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2074	0.00	0.00	68.20	0.00	4.49	0.00	72.69	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2075	0.00	0.00	10.30	0.00	43.46	0.00	53.77	36.59	65.72	309.05	69.96	126.95	189.02	-76.89
2076	0.00	0.00	0.00	0.00	1.90	0.00	1.90	36.59	53.34	309.05	69.96	126.95	189.02	-76.89
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	67.43	309.05	69.96	126.95	189.02	-76.89
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	36.59	67.43	309.05	69.96	126.95	189.02	-76.89
2080	0.00	0.00	0.00	6.94	0.00	0.00	6.94	36.59	52.20	309.05	69.96	126.95	189.02	-76.89
2081	0.00	0.00	0.00	211.88	0.00	0.00	211.88	36.59	67.43	309.05	69.96	126.95	189.02	-76.89
2082	0.00	0.00	0.00	215.84	0.00	0.00	215.84	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2083	0.00	0.00	0.00	208.90	0.00	0.00	208.90	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2084	0.00	0.00	0.00	3.97	9.69	0.00	13.66	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	53.34	309.05	69.96	126.95	189.02	-76.89
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
2090	0.00	0.00	0.00	0.00	13.07	0.00	13.07	36.59	50.50	309.05	69.96	126.95	189.02	-76.89
Salvage Value	13.69	0.00	17.51	32.83	11.22	0.00	75.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	389.40	924.88	165.38	0.00	5432.56	703.43	850.83	10523.63	2359.19	1668.01	3985.50	2510.94

Net Present Value -4476

K19/C25/750MW (WPS Sale &Inv)

TABLE 091
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	3.86	283.93	1.42	0.00	317.99	105.22	20.25	100.48	92.04
2015	89.38	496.39	0.00	0.00	19.33	6.90	611.99	4.48	0.00	348.51	103.30	24.00	104.33	116.88
2016	186.20	657.29	0.00	0.00	26.45	17.53	887.47	8.92	0.00	359.24	101.42	25.17	106.74	125.92
2017	216.63	796.58	0.00	0.00	38.71	25.50	1077.42	14.30	0.00	375.35	99.42	26.89	109.76	139.29
2018	260.39	561.68	0.00	0.00	40.69	105.59	968.35	19.15	0.00	359.55	97.28	27.52	110.94	123.81
2019	266.64	401.73	0.00	0.00	51.81	87.01	807.19	23.18	13.29	387.12	97.21	26.08	110.63	153.20
2020	734.99	164.04	0.00	0.00	3.62	161.28	1063.92	28.50	45.83	630.53	104.50	20.66	126.35	379.02
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	34.90	43.92	712.36	105.07	22.72	136.16	448.42
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	40.32	42.55	709.65	103.86	22.73	138.69	444.37
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	44.29	40.67	678.49	101.48	22.60	142.98	411.42
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	47.24	39.07	655.15	99.24	25.11	148.68	382.13
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	49.40	52.00	675.40	103.96	22.29	116.05	433.10
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	50.56	50.42	880.89	112.24	22.23	116.82	629.61
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	50.76	48.96	918.60	112.29	21.75	127.77	656.80
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	47.93	908.61	110.58	22.48	131.02	644.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	49.25	887.77	108.61	22.51	134.16	622.48
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	43.96	877.91	107.25	22.04	135.90	612.73
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	42.61	865.34	105.56	22.51	139.61	597.66
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	41.09	846.22	103.83	22.57	142.94	576.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	40.06	821.64	102.00	22.59	146.18	550.86
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	39.10	798.51	100.24	22.76	150.40	525.11
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	40.40	757.86	98.52	22.55	146.95	489.84
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	36.88	687.57	96.88	22.96	131.34	436.39
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	50.76	36.35	654.72	95.22	23.07	132.66	403.77
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	35.83	629.12	93.54	23.02	137.41	375.15
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	51.16	38.28	605.30	91.89	22.97	149.37	341.07
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	51.76	34.83	601.80	90.59	21.84	159.70	329.67
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	51.84	37.76	582.50	88.54	38.96	161.45	293.55
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	52.24	37.30	567.69	86.97	43.45	167.63	269.64
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	52.85	36.85	556.85	85.58	45.86	175.75	249.66
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	53.34	42.27	552.99	84.34	52.59	184.75	231.31
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	54.27	44.81	527.89	82.45	68.05	185.82	191.56
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	54.36	45.53	516.14	80.99	82.58	191.65	160.93
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	44.25	502.27	79.68	86.30	200.51	135.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	42.98	515.43	81.04	78.98	192.66	162.76
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	54.36	45.58	515.43	81.04	78.98	192.66	162.76
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	54.36	44.04	515.43	81.04	78.98	192.66	162.76
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	54.36	43.70	515.43	81.04	78.98	192.66	162.76
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	54.36	43.38	515.43	81.04	78.98	192.66	162.76
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	54.36	43.06	515.43	81.04	78.98	192.66	162.76
2054	0.00	0.00	0.00	0.00	18.01	18.89	36.91	54.36	42.75	515.43	81.04	78.98	192.66	162.76
2055	0.00	0.00	0.00	0.00	0.89	19.59	20.49	54.36	43.63	515.43	81.04	78.98	192.66	162.76
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	54.36	56.21	515.43	81.04	78.98	192.66	162.76
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	54.36	40.10	515.43	81.04	78.98	192.66	162.76
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	54.36	55.66	515.43	81.04	78.98	192.66	162.76
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	54.36	42.53	515.43	81.04	78.98	192.66	162.76
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	54.36	52.37	515.43	81.04	78.98	192.66	162.76
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	68.20	515.43	81.04	78.98	192.66	162.76
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	54.36	68.20	515.43	81.04	78.98	192.66	162.76
2065	0.00	0.00	0.00	0.00	8.83	4.27	13.10	54.36	39.50	515.43	81.04	78.98	192.66	162.76
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	54.36	68.20	515.43	81.04	78.98	192.66	162.76
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	54.36	68.20	515.43	81.04	78.98	192.66	162.76
2069	0.00	0.00	80.00	0.00	33.80	57.59	171.40	54.36	39.50	515.43	81.04	78.98	192.66	162.76
2070	0.00	0.00	109.27	0.00	2.73	59.73	171.72	54.36	54.15	515.43	81.04	78.98	192.66	162.76
2071	0.00	0.00	16.58	0.00	33.14	0.00	49.72	54.36	38.32	515.43	81.04	78.98	192.66	162.76
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	54.36	54.15	515.43	81.04	78.98	192.66	162.76
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	54.36	37.43	515.43	81.04	78.98	192.66	162.76
2074	0.00	0.00	98.85	0.00	51.10	0.00	149.95	54.36	52.37	515.43	81.04	78.98	192.66	162.76
2075	0.00	0.00	112.03	0.00	76.86	0.00	188.89	54.36	39.50	515.43	81.04	78.98	192.66	162.76
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	54.36	54.15	515.43	81.04	78.98	192.66	162.76
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	38.32	515.43	81.04	78.98	192.66	162.76
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	54.36	54.15	515.43	81.04	78.98	192.66	162.76
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	41.28	515.43	81.04	78.98	192.66	162.76
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	54.36	54.15	515.43	81.04	78.98	192.66	162.76
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	54.36	39.50	515.43	81.04	78.98	192.66	162.76
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	54.36	36.54	515.43	81.04	78.98	192.66	162.76
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	54.36	39.50	515.43	81.04	78.98	192.66	162.76
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	54.36	39.50	515.43	81.04	78.98	192.66	162.76
Salvage Value	0.87	0.00	2.40	0.00	3.80	1.76	8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	128.68	0.00	397.09	314.63	7367.28	591.87	494.22	9549.58	1609.11	516.49	2207.98	5215.99

Net Present Value -3237

K19/C25/750MW | **TABLE 092** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** High
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	5.40	285.47	1.43	0.00	319.00	105.22	20.25	100.07	93.45
2015	89.38	496.39	0.00	0.00	19.33	8.74	613.84	4.50	0.00	350.53	103.30	24.03	104.27	118.93
2016	186.20	657.29	0.00	0.00	26.45	18.32	888.26	8.94	0.00	360.47	101.41	25.12	106.66	127.28
2017	216.63	796.58	0.00	0.00	38.71	25.50	1077.42	14.32	0.00	375.60	99.42	26.85	109.69	139.65
2018	260.39	561.68	0.00	0.00	40.69	149.24	1012.00	19.39	0.00	358.53	97.27	27.45	110.91	122.91
2019	266.64	401.73	0.00	0.00	51.81	102.80	822.98	23.50	13.29	385.79	97.20	26.05	110.63	151.91
2020	734.99	164.04	0.00	0.00	3.62	284.21	1186.86	29.43	49.02	633.93	104.50	20.63	125.96	382.85
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	35.84	47.22	715.88	105.08	22.86	136.07	451.86
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	41.25	45.88	713.16	103.86	22.73	138.43	448.14
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	45.22	43.85	682.66	101.48	22.60	142.80	415.77
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	48.17	42.12	659.53	99.21	25.17	148.52	386.63
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	50.34	54.92	679.74	103.95	22.32	115.75	437.71
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	51.49	53.22	864.56	112.23	22.32	113.37	616.64
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	51.69	51.65	879.75	112.30	21.59	118.84	627.02
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	50.50	868.20	110.59	22.44	121.42	613.75
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	51.71	849.84	108.61	22.51	124.78	593.92
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	46.31	842.65	107.23	22.06	126.62	586.74
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	44.86	833.11	105.55	22.62	130.36	574.57
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	43.24	817.34	103.82	22.62	134.13	556.77
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	42.11	796.35	102.01	22.52	137.90	533.91
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	41.06	776.94	100.25	22.65	142.79	511.24
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	42.27	706.57	98.59	22.77	126.58	458.64
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	38.67	676.00	96.88	22.99	128.14	428.00
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	51.69	38.06	652.52	95.20	23.00	131.95	402.37
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	37.47	627.87	93.54	22.98	136.57	374.78
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	52.09	39.86	604.88	91.89	23.01	148.49	341.49
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	52.69	36.34	601.22	90.59	21.84	158.82	329.98
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	52.77	39.20	582.08	88.54	38.96	160.82	293.77
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	53.18	38.68	567.45	86.97	43.45	167.09	269.95
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	53.78	38.18	556.38	85.58	45.86	175.10	249.84
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	54.27	43.53	552.68	84.34	52.59	184.21	231.54
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	55.21	46.02	527.68	82.45	68.05	185.41	191.76
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	55.29	46.69	515.79	80.99	82.58	191.10	161.13
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	45.35	501.95	79.68	86.30	199.99	135.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	44.04	515.14	81.04	78.98	192.16	162.96
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	55.29	46.58	515.14	81.04	78.98	192.16	162.96
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	55.29	45.00	515.14	81.04	78.98	192.16	162.96
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	55.29	44.62	515.14	81.04	78.98	192.16	162.96
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	55.29	44.24	515.14	81.04	78.98	192.16	162.96
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	55.29	43.89	515.14	81.04	78.98	192.16	162.96
2054	0.00	0.00	0.00	0.00	18.01	18.89	36.91	55.29	43.53	515.14	81.04	78.98	192.16	162.96
2055	0.00	0.00	0.00	0.00	0.89	19.59	20.49	55.29	44.38	515.14	81.04	78.98	192.16	162.96
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	55.29	56.92	515.14	81.04	78.98	192.16	162.96
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	55.29	40.77	515.14	81.04	78.98	192.16	162.96
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	55.29	56.29	515.14	81.04	78.98	192.16	162.96
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	55.29	43.13	515.14	81.04	78.98	192.16	162.96
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	55.29	52.37	515.14	81.04	78.98	192.16	162.96
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	68.20	515.14	81.04	78.98	192.16	162.96
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	55.29	68.20	515.14	81.04	78.98	192.16	162.96
2065	0.00	0.00	0.00	0.00	8.83	4.27	13.10	55.29	39.50	515.14	81.04	78.98	192.16	162.96
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	55.29	68.20	515.14	81.04	78.98	192.16	162.96
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	55.29	68.20	515.14	81.04	78.98	192.16	162.96
2069	0.00	0.00	80.00	0.00	33.80	57.59	171.40	55.29	39.50	515.14	81.04	78.98	192.16	162.96
2070	0.00	0.00	109.27	0.00	2.73	59.73	171.72	55.29	54.15	515.14	81.04	78.98	192.16	162.96
2071	0.00	0.00	16.58	0.00	33.14	0.00	49.72	55.29	38.32	515.14	81.04	78.98	192.16	162.96
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	55.29	54.15	515.14	81.04	78.98	192.16	162.96
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	55.29	37.43	515.14	81.04	78.98	192.16	162.96
2074	0.00	0.00	98.85	0.00	51.10	0.00	149.95	55.29	52.37	515.14	81.04	78.98	192.16	162.96
2075	0.00	0.00	112.03	0.00	76.86	0.00	188.89	55.29	39.50	515.14	81.04	78.98	192.16	162.96
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	55.29	54.15	515.14	81.04	78.98	192.16	162.96
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	38.32	515.14	81.04	78.98	192.16	162.96
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	55.29	54.15	515.14	81.04	78.98	192.16	162.96
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	41.28	515.14	81.04	78.98	192.16	162.96
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	55.29	54.15	515.14	81.04	78.98	192.16	162.96
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	55.29	39.50	515.14	81.04	78.98	192.16	162.96
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	55.29	36.54	515.14	81.04	78.98	192.16	162.96
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	55.29	39.50	515.14	81.04	78.98	192.16	162.96
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	55.29	39.50	515.14	81.04	78.98	192.16	162.96
Salvage Value	0.87	0.00	2.40	0.00	3.80	1.76	8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	128.68	0.00	397.09	448.31	7500.96	602.70	518.00	9443.90	1609.09	516.51	2170.91	5147.39

Net Present Value -3474

K19/Gas25/750MW (WPS Sale & INV)

TABLE 093
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	3.86	251.54	1.26	0.00	317.99	105.22	20.25	100.48	92.04
2015	0.00	496.39	0.00	0.00	19.33	6.90	522.61	3.87	0.00	348.53	103.31	23.99	104.33	116.90
2016	0.00	657.29	0.00	0.00	26.45	17.53	701.27	7.38	0.00	359.26	101.42	25.16	106.73	125.96
2017	0.00	796.58	0.00	0.00	38.71	25.50	860.79	11.68	0.00	375.66	99.42	26.86	109.72	139.66
2018	0.00	561.68	0.00	0.00	40.69	105.59	707.96	15.22	0.00	360.04	97.27	27.47	110.88	124.41
2019	0.00	401.73	0.00	0.00	48.21	87.01	536.95	17.91	13.29	388.02	97.21	26.06	110.61	154.14
2020	0.00	164.04	0.00	0.00	0.01	161.28	325.33	19.53	45.83	631.97	104.50	20.63	126.23	380.62
2021	0.00	56.92	0.37	0.00	0.00	0.00	57.29	19.82	43.92	714.94	105.07	22.71	135.91	451.25
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	19.82	42.55	712.46	103.86	22.68	138.41	447.51
2023	0.00	0.00	96.15	0.00	0.00	0.00	96.15	20.19	40.67	678.76	100.98	24.18	143.17	410.44
2024	0.00	0.00	197.40	0.00	9.48	0.00	206.89	21.11	39.07	659.37	98.91	26.54	148.82	385.11
2025	0.00	0.00	118.82	0.00	74.66	0.00	193.48	22.07	41.46	582.59	98.61	25.74	135.02	323.22
2026	0.00	0.00	90.36	0.00	0.00	0.00	90.36	22.52	43.74	595.87	97.27	30.83	141.55	326.21
2027	0.00	0.00	102.41	0.00	0.00	0.00	102.41	23.03	42.42	583.00	95.25	30.23	151.67	305.85
2028	0.00	0.00	15.54	0.00	0.00	0.00	15.54	23.11	45.24	565.42	92.87	45.20	156.31	271.04
2029	0.00	0.00	76.11	0.00	0.00	0.00	76.11	23.49	46.73	549.20	91.03	50.28	162.63	245.26
2030	0.00	0.00	103.95	0.00	62.81	0.00	166.76	24.32	41.50	546.50	89.93	55.39	167.14	234.03
2031	0.00	0.00	92.64	0.00	0.00	0.00	92.64	24.79	44.41	554.25	89.56	60.33	169.98	234.38
2032	0.00	0.00	104.99	0.00	0.00	0.00	104.99	25.31	43.28	532.94	87.13	72.46	179.06	194.29
2033	0.00	0.00	15.93	0.00	0.00	0.00	15.93	25.39	46.25	523.32	85.56	86.81	185.60	165.35
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	45.18	519.69	84.81	91.52	190.31	153.05
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	43.70	445.24	82.62	87.79	183.17	91.66
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	43.15	364.29	81.13	89.50	161.88	31.79
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	42.62	336.42	79.68	97.77	163.31	-4.34
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	42.10	332.64	78.94	96.23	173.32	-15.85
2039	0.00	0.00	164.92	0.00	0.00	0.00	164.92	26.21	44.56	306.29	76.94	118.08	180.95	-69.69
2040	0.00	0.00	238.26	0.00	0.00	0.00	238.26	27.41	41.11	291.39	75.57	130.62	186.86	-101.66
2041	0.00	0.00	106.71	0.00	9.48	0.00	116.19	27.99	40.64	303.51	75.86	129.79	186.67	-88.82
2042	0.00	0.00	7.85	0.00	0.00	0.00	7.85	28.03	47.24	349.60	73.54	200.50	188.68	-113.11
2043	0.00	0.00	81.62	0.00	0.00	0.00	81.62	28.43	46.80	326.74	71.77	217.49	196.21	-158.73
2044	0.00	0.00	111.47	0.00	62.81	0.00	174.28	29.31	48.14	302.60	70.11	232.66	203.89	-204.06
2045	0.00	0.00	53.17	0.00	0.00	0.00	53.17	29.57	51.81	291.36	68.76	256.18	209.92	-243.50
2046	0.00	0.00	49.52	0.00	0.00	0.00	49.52	29.82	51.40	278.72	67.54	275.73	216.33	-280.88
2047	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.86	51.60	272.61	66.72	283.67	227.16	-304.93
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	50.33	280.90	67.67	271.86	217.80	-276.44
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	29.86	52.93	280.90	67.67	271.86	217.80	-276.44
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	29.86	49.62	280.90	67.67	271.86	217.80	-276.44
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	29.86	49.28	280.90	67.67	271.86	217.80	-276.44
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	29.86	48.95	280.90	67.67	271.86	217.80	-276.44
2053	0.00	0.00	73.87	0.00	20.99	18.89	113.75	29.86	48.63	280.90	67.67	271.86	217.80	-276.44
2054	0.00	0.00	175.12	0.00	17.12	18.89	211.14	29.86	48.32	280.90	67.67	271.86	217.80	-276.44
2055	0.00	0.00	116.70	0.00	0.00	19.59	136.29	29.86	48.02	280.90	67.67	271.86	217.80	-276.44
2056	0.00	0.00	90.36	0.00	0.00	0.00	90.36	29.86	63.56	280.90	67.67	271.86	217.80	-276.44
2057	0.00	0.00	102.41	0.00	0.00	0.00	102.41	29.86	47.45	280.90	67.67	271.86	217.80	-276.44
2058	0.00	0.00	15.54	0.00	0.00	0.00	15.54	29.86	63.01	280.90	67.67	271.86	217.80	-276.44
2059	0.00	0.00	76.11	0.00	9.48	0.00	85.59	29.86	49.87	280.90	67.67	271.86	217.80	-276.44
2060	0.00	0.00	103.95	0.00	56.00	0.00	159.95	29.86	59.72	280.90	67.67	271.86	217.80	-276.44
2061	0.00	0.00	92.64	0.00	0.00	0.00	92.64	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2062	0.00	0.00	104.99	0.00	0.00	0.00	104.99	29.86	59.72	280.90	67.67	271.86	217.80	-276.44
2063	0.00	0.00	15.93	0.00	0.00	0.00	15.93	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	29.86	59.72	280.90	67.67	271.86	217.80	-276.44
2065	0.00	0.00	0.00	0.00	55.94	4.27	60.21	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	29.86	59.72	280.90	67.67	271.86	217.80	-276.44
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	29.86	59.72	280.90	67.67	271.86	217.80	-276.44
2069	0.00	0.00	164.92	0.00	31.08	57.59	253.60	29.86	46.85	280.90	67.67	271.86	217.80	-276.44
2070	0.00	0.00	238.26	0.00	0.01	59.73	298.00	29.86	45.66	280.90	67.67	271.86	217.80	-276.44
2071	0.00	0.00	106.71	0.00	0.00	0.00	106.71	29.86	45.66	280.90	67.67	271.86	217.80	-276.44
2072	0.00	0.00	7.85	0.00	0.00	0.00	7.85	29.86	45.66	280.90	67.67	271.86	217.80	-276.44
2073	0.00	0.00	81.62	0.00	0.00	0.00	81.62	29.86	44.77	280.90	67.67	271.86	217.80	-276.44
2074	0.00	0.00	111.47	0.00	0.00	0.00	111.47	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2075	0.00	0.00	53.17	0.00	18.67	0.00	71.84	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2076	0.00	0.00	49.52	0.00	9.48	0.00	59.01	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2077	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	29.86	46.85	280.90	67.67	271.86	217.80	-276.44
2080	0.00	0.00	0.00	0.00	15.70	0.00	15.70	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2083	0.00	0.00	73.87	0.00	0.00	0.00	73.87	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2084	0.00	0.00	175.12	0.00	10.82	0.70	186.65	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2085	0.00	0.00	116.70	0.00	10.50	1.40	128.59	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2086	0.00	0.00	90.36	0.00	25.39	4.20	119.95	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2087	0.00	0.00	102.41	0.00	29.50	6.30	138.20	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2088	0.00	0.00	15.54	0.00	20.99	18.89	55.42	29.86	43.89	280.90	67.67	271.86	217.80	-276.44
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	29.86	46.85	280.90	67.67	271.86	217.80	-276.44
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	29.86	46.85	280.90	67.67	271.86	217.80	-276.44
Salvage Value	0.00	0.00	7.66	0.00	2.07	1.76	11.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	683.17	0.00	258.06	314.63	4066.00	317.59	507.22	7352.42	1491.29	1258.59	2431.40	2171.14

Net Present Value -2720

K19/C31/750MW

TABLE 094
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	226.22	0.00	0.00	21.46	5.40	284.83	1.42	0.00	319.00	105.22	20.25	100.07	93.45
2015	40.08	496.39	0.00	0.00	19.33	8.74	564.54	4.25	0.00	350.53	103.30	24.03	104.27	118.93
2016	10.89	657.29	0.00	0.00	26.45	18.32	712.95	7.81	0.00	360.47	101.41	25.12	106.66	127.28
2017	10.95	796.58	0.00	0.00	38.71	25.50	871.74	12.17	0.00	376.02	99.42	26.85	109.69	140.06
2018	13.02	561.68	0.00	0.00	40.69	149.24	764.63	15.99	0.00	358.99	97.25	27.44	110.84	123.46
2019	13.09	401.73	0.00	0.00	48.21	102.80	565.83	18.82	13.29	386.62	97.19	26.09	110.60	152.74
2020	13.17	164.04	0.00	0.00	0.01	284.21	461.44	21.13	49.02	635.47	104.49	20.68	125.83	384.47
2021	16.66	56.92	0.00	0.00	0.00	0.00	73.58	21.50	47.22	718.04	105.06	22.82	135.77	454.39
2022	168.48	0.00	0.00	0.00	0.00	0.00	168.48	22.34	45.88	716.31	103.87	22.71	138.09	451.65
2023	257.00	0.00	0.00	0.00	0.00	0.00	257.00	23.63	43.85	681.41	100.87	24.45	143.26	412.84
2024	279.20	0.00	0.00	0.00	0.00	0.00	279.20	25.02	42.12	661.38	98.72	27.19	149.80	385.67
2025	284.55	0.00	0.00	0.00	3.61	0.00	288.16	26.46	40.31	583.48	98.63	19.60	142.41	322.85
2026	769.74	0.00	0.00	0.00	3.61	0.00	773.35	30.33	38.38	563.70	96.69	20.23	156.22	290.55
2027	1222.24	0.00	0.00	0.00	43.84	0.00	1266.08	36.66	36.95	516.80	94.72	19.04	154.65	248.39
2028	1097.38	0.00	0.00	0.00	22.74	0.00	1120.12	42.26	35.58	494.62	93.11	19.78	168.13	213.60
2029	783.65	0.00	0.00	0.00	38.26	0.00	821.91	46.37	36.97	478.39	91.46	20.36	185.26	181.31
2030	542.72	0.00	0.00	0.00	66.25	0.00	608.98	49.41	31.62	474.25	90.10	20.82	199.46	163.88
2031	356.48	0.00	0.00	0.00	88.77	0.00	445.24	51.64	44.95	556.85	94.23	24.05	124.77	313.80
2032	131.29	0.00	0.00	0.00	104.61	0.00	235.91	52.82	43.93	740.96	101.62	23.62	120.48	495.24
2033	41.43	0.00	0.00	0.00	0.00	0.00	41.43	53.03	42.59	800.09	102.10	23.10	138.26	536.63
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	41.65	777.10	100.26	22.64	142.69	511.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	39.90	705.45	98.59	22.62	126.50	457.74
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	39.21	675.93	96.88	23.12	128.13	427.80
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	53.03	38.42	652.96	95.21	23.06	131.98	402.71
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	37.46	627.93	93.54	22.97	136.57	374.85
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	53.43	39.92	604.97	91.90	23.00	148.49	341.58
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	54.02	36.52	601.22	90.59	21.84	158.83	329.97
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	54.10	42.83	582.08	88.54	38.96	160.80	293.78
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	54.51	39.35	567.45	86.97	43.45	167.10	269.94
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	55.11	38.85	556.38	85.58	45.86	175.11	249.83
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	55.61	44.21	552.68	84.34	52.59	184.20	231.55
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	56.54	43.73	527.68	82.45	68.05	185.41	191.76
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	56.62	47.36	515.79	80.99	82.58	191.11	161.12
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	45.35	501.95	79.68	86.30	199.99	135.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	44.04	515.14	81.04	78.98	192.17	162.95
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	56.62	46.58	515.14	81.04	78.98	192.17	162.95
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	56.62	43.22	515.14	81.04	78.98	192.17	162.95
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	56.62	45.80	515.14	81.04	78.98	192.17	162.95
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	56.62	42.47	515.14	81.04	78.98	192.17	162.95
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	56.62	42.11	515.14	81.04	78.98	192.17	162.95
2054	0.00	0.00	0.00	0.00	17.12	18.89	36.02	56.62	41.76	515.14	81.04	78.98	192.17	162.95
2055	0.00	0.00	0.00	0.00	0.00	19.59	19.59	56.62	41.42	515.14	81.04	78.98	192.17	162.95
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	58.69	515.14	81.04	78.98	192.17	162.95
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	42.55	515.14	81.04	78.98	192.17	162.95
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	58.07	515.14	81.04	78.98	192.17	162.95
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	44.90	515.14	81.04	78.98	192.17	162.95
2060	0.00	0.00	0.00	0.00	0.89	0.00	0.89	56.62	54.15	515.14	81.04	78.98	192.17	162.95
2061	0.00	0.00	0.00	0.00	0.89	0.00	0.89	56.62	39.50	515.14	81.04	78.98	192.17	162.95
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2063	0.00	0.00	0.00	0.00	5.35	0.00	5.35	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2064	0.00	0.00	0.00	0.00	19.55	2.13	21.69	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2065	0.00	0.00	0.00	0.00	23.98	4.27	28.25	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2066	0.00	0.00	0.00	0.00	22.45	12.80	35.25	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2067	0.00	0.00	0.00	0.00	35.05	19.20	54.25	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	56.62	68.20	515.14	81.04	78.98	192.17	162.95
2069	0.00	0.00	80.00	0.00	31.08	57.59	168.68	56.62	39.50	515.14	81.04	78.98	192.17	162.95
2070	0.00	0.00	109.27	0.00	0.01	59.73	169.00	56.62	54.15	515.14	81.04	78.98	192.17	162.95
2071	0.00	0.00	16.58	0.00	0.00	0.00	16.58	56.62	41.28	515.14	81.04	78.98	192.17	162.95
2072	0.00	0.00	81.21	0.00	0.00	0.00	81.21	56.62	54.15	515.14	81.04	78.98	192.17	162.95
2073	0.00	0.00	110.91	0.00	0.00	0.00	110.91	56.62	37.43	515.14	81.04	78.98	192.17	162.95
2074	0.00	0.00	98.85	0.00	0.00	0.00	98.85	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2075	0.00	0.00	112.03	0.00	12.20	0.00	124.22	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2076	0.00	0.00	16.99	0.00	2.72	0.00	19.71	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2077	0.00	0.00	0.00	0.00	33.14	0.00	33.14	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2078	0.00	0.00	0.00	0.00	26.87	0.00	26.87	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2079	0.00	0.00	0.00	0.00	29.35	0.00	29.35	56.62	39.50	515.14	81.04	78.98	192.17	162.95
2080	0.00	0.00	0.00	0.00	107.10	0.00	107.10	56.62	52.37	515.14	81.04	78.98	192.17	162.95
2081	0.00	0.00	0.00	0.00	67.38	0.00	67.38	56.62	39.50	515.14	81.04	78.98	192.17	162.95
2082	0.00	0.00	0.00	0.00	78.77	0.00	78.77	56.62	54.15	515.14	81.04	78.98	192.17	162.95
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	38.32	515.14	81.04	78.98	192.17	162.95
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	56.62	54.15	515.14	81.04	78.98	192.17	162.95
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	56.62	38.32	515.14	81.04	78.98	192.17	162.95
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	56.62	54.15	515.14	81.04	78.98	192.17	162.95
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	56.62	36.54	515.14	81.04	78.98	192.17	162.95
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	56.62	39.50	515.14	81.04	78.98	192.17	162.95
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	56.62	39.50	515.14	81.04	78.98	192.17	162.95
Salvage Value	6.45	0.00	2.40	0.00	4.26	1.76	14.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2694.54	2810.14	128.68	0.00	330.78	448.31	6412.45	514.15	479.28	8548.39	1566.01	513.78	2283.75	4184.85

Net Present Value -3221

K19/Gas31/750MW

TABLE 095
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	5.40	253.08	1.27	0.00	319.00	105.22	20.25	100.07	93.45
2015	0.00	496.39	0.00	0.00	19.33	8.74	524.46	3.89	0.00	350.53	103.30	24.03	104.27	118.93
2016	0.00	657.29	0.00	0.00	26.45	18.32	702.06	7.40	0.00	360.47	101.41	25.12	106.66	127.28
2017	0.00	796.58	0.00	0.00	38.71	25.50	860.79	11.70	0.00	376.02	99.42	26.85	109.69	140.06
2018	0.00	561.68	0.00	0.00	40.69	149.24	751.61	15.46	0.00	358.99	97.25	27.44	110.84	123.46
2019	0.00	401.73	0.00	0.00	48.21	102.80	552.73	18.22	13.29	386.62	97.19	26.09	110.60	152.74
2020	0.00	164.04	0.00	0.00	0.01	284.21	448.27	20.46	49.02	635.47	104.49	20.68	125.83	384.47
2021	0.00	56.92	0.00	0.00	0.00	0.00	56.92	20.75	47.22	718.04	105.06	22.82	135.77	454.39
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	45.88	716.26	103.87	22.73	138.12	451.54
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	43.85	681.97	100.87	24.45	143.23	413.42
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	42.12	662.28	98.72	27.21	149.73	386.63
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	40.31	585.76	98.62	19.62	142.78	324.74
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	38.38	568.08	96.68	20.36	157.09	293.95
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	20.75	36.95	522.33	94.70	19.11	155.36	253.15
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	20.75	35.58	502.87	93.09	19.78	169.95	220.05
2029	0.00	0.00	174.50	0.00	0.00	0.00	174.50	21.51	36.97	485.09	91.52	20.05	185.10	188.41
2030	0.00	0.00	306.68	0.00	18.96	0.00	325.64	23.03	31.62	487.54	90.92	17.86	195.13	183.64
2031	0.00	0.00	138.13	0.00	74.66	0.00	212.80	24.08	38.48	475.81	88.71	41.13	158.30	187.67
2032	0.00	0.00	93.11	0.00	0.00	0.00	93.11	24.55	41.32	465.18	87.10	52.23	163.08	162.78
2033	0.00	0.00	105.52	0.00	0.00	0.00	105.52	25.07	40.12	450.64	85.62	57.42	168.78	138.81
2034	0.00	0.00	16.01	0.00	0.00	0.00	16.01	25.15	43.03	450.86	84.82	62.26	175.24	128.54
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.15	41.46	374.31	82.65	75.42	156.16	60.08
2036	0.00	0.00	162.47	0.00	0.00	0.00	162.47	25.97	40.82	347.94	81.19	82.39	157.77	26.60
2037	0.00	0.00	234.72	0.00	0.00	0.00	234.72	27.14	40.22	332.79	79.84	90.12	162.65	0.18
2038	0.00	0.00	105.13	0.00	62.81	0.00	167.94	27.98	39.63	340.55	79.71	83.33	172.62	4.88
2039	0.00	0.00	7.73	0.00	0.00	0.00	7.73	28.02	49.10	388.92	77.38	162.17	173.61	-24.24
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.02	45.59	365.52	75.46	175.55	181.39	-66.87
2041	0.00	0.00	80.81	0.00	0.00	0.00	80.81	28.42	45.05	347.86	73.96	188.16	187.59	-101.86
2042	0.00	0.00	277.77	0.00	0.00	0.00	277.77	29.81	44.53	331.60	72.58	202.31	193.65	-136.94
2043	0.00	0.00	258.60	0.00	0.00	0.00	258.60	31.10	48.10	326.52	71.70	215.01	199.32	-159.51
2044	0.00	0.00	108.32	0.00	62.81	0.00	171.13	31.96	49.39	325.00	71.38	206.11	210.02	-162.51
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	32.00	56.01	375.43	69.35	296.28	199.80	-189.99
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	55.55	360.71	68.13	310.43	205.54	-223.38
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	54.22	338.28	66.84	323.08	211.42	-263.07
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	52.90	358.14	68.11	309.93	205.59	-225.48
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	32.00	55.45	358.14	68.11	309.93	205.59	-225.48
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	32.00	52.10	358.14	68.11	309.93	205.59	-225.48
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	32.00	51.71	358.14	68.11	309.93	205.59	-225.48
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	32.00	51.34	358.14	68.11	309.93	205.59	-225.48
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	32.00	50.98	358.14	68.11	309.93	205.59	-225.48
2054	0.00	0.00	0.00	0.00	17.12	18.89	36.02	32.00	50.63	358.14	68.11	309.93	205.59	-225.48
2055	0.00	0.00	0.00	0.00	0.00	19.59	19.59	32.00	50.28	358.14	68.11	309.93	205.59	-225.48
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	65.79	358.14	68.11	309.93	205.59	-225.48
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	49.64	358.14	68.11	309.93	205.59	-225.48
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	65.16	358.14	68.11	309.93	205.59	-225.48
2059	0.00	0.00	152.22	0.00	0.00	0.00	152.22	32.00	51.99	358.14	68.11	309.93	205.59	-225.48
2060	0.00	0.00	284.40	0.00	0.00	0.00	284.40	32.00	61.24	358.14	68.11	309.93	205.59	-225.48
2061	0.00	0.00	136.01	0.00	0.00	0.00	136.01	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2062	0.00	0.00	93.11	0.00	0.00	0.00	93.11	32.00	61.24	358.14	68.11	309.93	205.59	-225.48
2063	0.00	0.00	105.52	0.00	0.00	0.00	105.52	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2064	0.00	0.00	16.01	0.00	10.64	2.13	28.78	32.00	61.24	358.14	68.11	309.93	205.59	-225.48
2065	0.00	0.00	0.00	0.00	27.80	4.27	32.06	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2066	0.00	0.00	162.47	0.00	57.06	12.80	232.33	32.00	61.24	358.14	68.11	309.93	205.59	-225.48
2067	0.00	0.00	234.72	0.00	9.21	19.20	263.13	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2068	0.00	0.00	105.13	0.00	19.70	57.59	182.42	32.00	61.24	358.14	68.11	309.93	205.59	-225.48
2069	0.00	0.00	7.73	0.00	31.08	57.59	96.41	32.00	48.37	358.14	68.11	309.93	205.59	-225.48
2070	0.00	0.00	0.00	0.00	0.01	59.73	59.73	32.00	47.18	358.14	68.11	309.93	205.59	-225.48
2071	0.00	0.00	80.81	0.00	0.00	0.00	80.81	32.00	47.18	358.14	68.11	309.93	205.59	-225.48
2072	0.00	0.00	277.77	0.00	0.00	0.00	277.77	32.00	47.18	358.14	68.11	309.93	205.59	-225.48
2073	0.00	0.00	258.60	0.00	47.11	0.00	305.71	32.00	46.30	358.14	68.11	309.93	205.59	-225.48
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2075	0.00	0.00	7.97	0.00	0.00	0.00	7.97	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	32.00	48.37	358.14	68.11	309.93	205.59	-225.48
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2081	0.00	0.00	0.00	0.00	18.67	0.00	18.67	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2088	0.00	0.00	0.00	0.00	36.69	18.89	55.59	32.00	45.41	358.14	68.11	309.93	205.59	-225.48
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	32.00	48.37	358.14	68.11	309.93	205.59	-225.48
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	32.00	48.37	358.14	68.11	309.93	205.59	-225.48
Salvage Value	0.00	0.00	4.63	0.00	2.27	1.76	8.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	609.60	0.00	235.24	448.31	4103.30	322.16	500.27	7351.81	1491.84	1278.48	2414.24	2167.25

Net Present Value -2758

K19/C25/250MW

TABLE 096
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	4.06	284.13	1.43	0.00	319.00	105.22	20.25	100.07	93.45
2015	89.38	496.39	0.00	0.00	19.33	2.78	607.88	4.47	0.00	350.53	103.30	24.03	104.27	118.93
2016	186.20	657.29	0.00	0.00	26.45	4.05	873.99	8.84	0.00	360.47	101.41	25.12	106.66	127.28
2017	216.63	796.58	0.00	0.00	38.71	6.07	1057.99	14.13	0.00	375.60	99.42	26.85	109.69	139.65
2018	260.39	561.68	0.00	0.00	40.69	18.21	880.97	18.54	0.00	354.68	96.67	29.46	111.73	116.82
2019	266.64	401.73	0.00	0.00	51.81	18.21	738.39	22.23	13.29	378.93	96.30	29.57	111.86	141.21
2020	734.99	164.04	0.00	0.00	3.62	18.88	921.52	26.84	13.51	595.93	104.83	21.21	113.27	356.62
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	33.24	13.26	662.71	105.44	21.71	120.03	415.53
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	38.65	13.48	650.49	103.50	22.71	123.68	400.60
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	42.63	13.31	634.20	101.26	22.74	132.03	378.17
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	45.58	13.26	622.32	98.90	25.24	142.74	355.44
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	47.74	27.65	628.80	103.74	22.49	102.81	399.75
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	48.90	27.45	791.03	111.57	22.06	98.74	558.66
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	49.10	27.33	788.07	110.98	20.86	101.81	554.41
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.62	773.67	109.21	21.70	104.23	538.53
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	30.20	753.82	107.39	21.88	105.60	518.94
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	26.13	744.25	106.09	21.62	106.07	510.47
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.96	730.17	104.43	22.08	108.05	495.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.58	712.00	102.77	22.25	110.44	476.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.65	689.13	101.06	22.34	112.34	453.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.77	667.02	99.38	22.52	114.88	430.22
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.88	628.06	97.74	22.69	112.41	395.21
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	49.10	24.92	599.49	96.13	23.02	113.87	366.48
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	24.92	573.99	94.53	22.97	116.13	340.36
2038	0.00	0.00	101.89	0.00	0.00	0.00	101.89	49.50	24.92	547.01	92.94	22.94	119.14	311.99
2039	0.00	0.00	131.00	0.00	9.48	0.00	140.49	50.09	27.88	538.45	91.73	21.68	131.74	293.29
2040	0.00	0.00	16.49	0.00	0.00	0.00	16.49	50.17	28.99	521.26	89.68	38.04	135.52	258.02
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	28.32	507.57	88.13	42.72	141.08	235.65
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	50.58	28.32	496.45	86.77	45.45	147.11	217.12
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	51.18	28.32	483.66	85.35	45.17	156.50	196.65
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	51.67	34.16	471.68	83.76	68.32	156.32	163.29
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	52.61	37.12	456.85	82.31	75.22	162.51	136.80
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	52.69	38.25	448.17	80.91	85.42	171.63	110.21
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	37.36	433.60	79.48	86.41	184.77	82.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.47	446.21	80.90	82.35	172.97	109.98
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	52.69	39.43	446.21	80.90	82.35	172.97	109.98
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	52.69	38.25	446.21	80.90	82.35	172.97	109.98
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	52.69	38.26	446.21	80.90	82.35	172.97	109.98
2052	0.00	0.00	0.00	0.00	29.50	1.50	30.99	52.69	38.27	446.21	80.90	82.35	172.97	109.98
2053	0.00	0.00	0.00	0.00	20.99	4.50	25.49	52.69	38.27	446.21	80.90	82.35	172.97	109.98
2054	0.00	0.00	0.00	0.00	18.01	4.50	22.51	52.69	38.27	446.21	80.90	82.35	172.97	109.98
2055	0.00	0.00	0.00	0.00	0.89	4.66	5.56	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	52.69	52.33	446.21	80.90	82.35	172.97	109.98
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	52.69	52.33	446.21	80.90	82.35	172.97	109.98
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	52.69	52.33	446.21	80.90	82.35	172.97	109.98
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	68.16	446.21	80.90	82.35	172.97	109.98
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2064	0.00	0.00	0.00	0.00	10.64	3.89	14.53	52.69	68.16	446.21	80.90	82.35	172.97	109.98
2065	0.00	0.00	0.00	0.00	8.83	2.45	11.28	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2066	0.00	0.00	0.00	0.00	1.06	3.05	4.11	52.69	68.16	446.21	80.90	82.35	172.97	109.98
2067	0.00	0.00	0.00	0.00	9.21	4.57	13.78	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2068	0.00	0.00	79.61	0.00	19.70	13.71	113.01	52.69	68.16	446.21	80.90	82.35	172.97	109.98
2069	0.00	0.00	108.72	0.00	33.80	13.71	156.23	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2070	0.00	0.00	16.49	0.00	2.73	14.22	33.44	52.69	54.10	446.21	80.90	82.35	172.97	109.98
2071	0.00	0.00	0.00	0.00	33.14	0.00	33.14	52.69	38.27	446.21	80.90	82.35	172.97	109.98
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	52.69	54.10	446.21	80.90	82.35	172.97	109.98
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	52.69	37.38	446.21	80.90	82.35	172.97	109.98
2074	0.00	0.00	98.85	0.00	60.58	0.00	159.43	52.69	52.33	446.21	80.90	82.35	172.97	109.98
2075	0.00	0.00	112.03	0.00	67.38	0.00	179.41	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	52.69	54.10	446.21	80.90	82.35	172.97	109.98
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	38.27	446.21	80.90	82.35	172.97	109.98
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	52.69	54.10	446.21	80.90	82.35	172.97	109.98
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	41.23	446.21	80.90	82.35	172.97	109.98
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	52.69	54.10	446.21	80.90	82.35	172.97	109.98
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2084	0.00	0.00	0.00	0.00	10.82	0.17	10.99	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2087	0.00	0.00	0.00	0.00	29.50	1.50	30.99	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2088	0.00	0.00	0.00	0.00	20.99	4.50	25.49	52.69	36.50	446.21	80.90	82.35	172.97	109.98
2089	0.00	0.00	0.00	0.00	17.12	4.50	21.62	52.69	39.46	446.21	80.90	82.35	172.97	109.98
2090	0.00	0.00	0.00	0.00	0.00	4.66	4.66	52.69	39.46	446.21	80.90	82.35	172.97	109.98
Salvage Value	0.87	0.00	2.34	0.00	3.80	0.47	7.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	132.14	0.00	397.23	61.74	7117.98	572.28	303.25	8637.89	1602.74	532.56	1982.08	4520.51

Net Present Value -3473

K19/Gas24/250MW

TABLE 097
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	4.06	251.74	1.27	0.00	319.00	105.22	20.25	100.07	93.45
2015	0.00	496.39	0.00	0.00	19.33	2.78	518.50	3.87	0.00	350.53	103.30	24.03	104.29	118.92
2016	0.00	657.29	0.00	0.00	26.45	4.05	687.79	7.30	0.00	360.47	101.41	25.12	106.66	127.28
2017	0.00	796.58	0.00	0.00	38.71	6.07	841.36	11.51	0.00	376.02	99.42	26.85	109.69	140.06
2018	0.00	561.68	0.00	0.00	40.69	18.21	620.58	14.61	0.00	355.24	96.67	29.42	111.67	117.48
2019	0.00	401.73	0.00	0.00	48.21	18.21	468.14	16.95	13.29	379.85	96.30	29.57	111.83	142.15
2020	0.00	164.04	0.37	0.00	0.01	18.88	183.30	17.87	13.51	597.49	104.83	21.22	113.20	358.25
2021	0.00	56.92	0.00	0.00	0.00	0.00	56.92	18.15	13.26	665.23	105.42	21.72	119.85	418.24
2022	0.00	0.00	95.78	0.00	0.00	0.00	95.78	18.52	13.48	657.13	103.95	21.44	122.06	409.68
2023	0.00	0.00	122.67	0.00	9.48	0.00	132.15	19.07	13.31	649.71	102.84	18.07	124.53	404.27
2024	0.00	0.00	15.23	0.00	0.00	0.00	15.23	19.15	17.33	642.97	100.96	29.41	126.88	385.71
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	19.15	17.11	528.85	98.67	22.28	120.59	287.31
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.15	16.68	504.53	96.34	25.28	125.14	257.76
2027	0.00	0.00	75.36	0.00	0.00	0.00	75.36	19.52	16.71	469.89	94.24	27.48	127.45	220.73
2028	0.00	0.00	105.04	0.00	74.66	0.00	179.71	20.41	16.77	452.45	92.39	31.79	131.98	196.30
2029	0.00	0.00	172.51	0.00	0.00	0.00	172.51	21.27	23.61	442.78	90.62	43.96	136.52	171.68
2030	0.00	0.00	226.67	0.00	0.00	0.00	226.67	22.41	19.59	441.70	89.69	47.72	139.21	165.08
2031	0.00	0.00	101.52	0.00	9.48	0.00	111.00	22.96	19.59	456.14	90.28	40.88	138.66	186.32
2032	0.00	0.00	7.47	0.00	0.00	0.00	7.47	23.00	26.66	483.42	87.66	99.42	134.22	162.13
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.00	26.66	471.14	86.12	107.47	138.38	139.17
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.00	26.67	459.76	84.60	116.70	143.22	115.23
2035	0.00	0.00	161.67	0.00	0.00	0.00	161.67	23.81	26.00	393.98	82.56	116.85	141.21	53.37
2036	0.00	0.00	233.56	0.00	0.00	0.00	233.56	24.98	26.01	367.70	81.05	125.14	142.01	19.49
2037	0.00	0.00	104.61	0.00	0.00	0.00	104.61	25.50	26.01	377.38	81.50	120.52	139.38	35.98
2038	0.00	0.00	171.80	0.00	0.00	0.00	171.80	26.36	33.08	404.11	79.01	187.66	137.83	-0.39
2039	0.00	0.00	237.08	0.00	0.00	0.00	237.08	27.54	36.03	391.56	77.60	200.48	148.91	-35.43
2040	0.00	0.00	106.18	0.00	62.81	0.00	168.99	28.39	33.08	388.03	77.01	206.34	151.16	-46.48
2041	0.00	0.00	7.81	0.00	0.00	0.00	7.81	28.43	40.15	419.37	75.09	272.58	146.86	-75.16
2042	0.00	0.00	167.41	0.00	0.00	0.00	167.41	29.26	40.15	405.09	73.26	294.83	152.66	-115.66
2043	0.00	0.00	241.85	0.00	0.00	0.00	241.85	30.47	40.15	394.58	71.91	311.42	157.24	-145.99
2044	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.02	41.93	378.50	71.41	308.94	158.61	-160.45
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	31.06	49.00	403.15	69.05	387.25	156.97	-210.13
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	49.01	408.62	69.24	385.28	155.19	-201.09
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	48.12	378.13	67.24	409.18	161.63	-259.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	31.06	50.20	396.63	68.51	393.91	157.93	-223.71
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2052	0.00	0.00	73.50	0.00	29.50	1.50	104.50	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2053	0.00	0.00	100.38	0.00	20.99	4.50	125.87	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2054	0.00	0.00	15.23	0.00	17.12	4.50	36.85	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2055	0.00	0.00	0.00	0.00	0.00	4.66	4.66	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2057	0.00	0.00	75.36	0.00	0.00	0.00	75.36	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2058	0.00	0.00	102.92	0.00	9.48	0.00	112.40	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2059	0.00	0.00	172.51	0.00	0.00	0.00	172.51	31.06	50.20	396.63	68.51	393.91	157.93	-223.71
2060	0.00	0.00	226.67	0.00	0.00	0.00	226.67	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2061	0.00	0.00	101.52	0.00	0.00	0.00	101.52	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2062	0.00	0.00	7.47	0.00	0.00	0.00	7.47	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2063	0.00	0.00	0.00	0.00	56.00	2.86	58.86	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2064	0.00	0.00	0.00	0.00	10.64	3.89	14.53	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2065	0.00	0.00	161.67	0.00	8.83	2.45	172.95	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2066	0.00	0.00	233.56	0.00	10.54	3.05	247.15	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2067	0.00	0.00	104.61	0.00	9.21	4.57	118.39	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2068	0.00	0.00	171.80	0.00	19.70	13.71	205.20	31.06	63.07	396.63	68.51	393.91	157.93	-223.71
2069	0.00	0.00	237.08	0.00	31.08	13.71	281.87	31.06	50.20	396.63	68.51	393.91	157.93	-223.71
2070	0.00	0.00	106.18	0.00	0.01	14.22	120.41	31.06	49.02	396.63	68.51	393.91	157.93	-223.71
2071	0.00	0.00	7.81	0.00	0.00	0.00	7.81	31.06	49.02	396.63	68.51	393.91	157.93	-223.71
2072	0.00	0.00	167.41	0.00	0.00	0.00	167.41	31.06	49.02	396.63	68.51	393.91	157.93	-223.71
2073	0.00	0.00	241.85	0.00	0.00	0.00	241.85	31.06	48.13	396.63	68.51	393.91	157.93	-223.71
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2075	0.00	0.00	7.97	0.00	47.11	0.00	55.07	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2078	0.00	0.00	0.00	0.00	18.67	0.00	18.67	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	50.20	396.63	68.51	393.91	157.93	-223.71
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2082	0.00	0.00	73.50	0.00	0.00	0.00	73.50	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2083	0.00	0.00	100.38	0.00	0.00	0.00	100.38	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2084	0.00	0.00	15.23	0.00	10.82	0.17	26.22	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2087	0.00	0.00	75.36	0.00	29.50	1.50	106.35	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2088	0.00	0.00	102.92	0.00	20.99	4.50	128.41	31.06	47.24	396.63	68.51	393.91	157.93	-223.71
2089	0.00	0.00	15.61	0.00	17.12	4.50	37.23	31.06	50.20	396.63	68.51	393.91	157.93	-223.71
2090	0.00	0.00	0.00	0.00	15.70	4.66	20.37	31.06	50.20	396.63	68.51	393.91	157.93	-223.71
Salvage Value	0.00	0.00	8.21	0.00	1.97	0.47	10.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	820.85	0.00	231.19	61.74	3923.92	305.28	309.00	7260.78	1494.71	1669.94	2070.92	2025.21

Net Present Value -2513

K19/C31/250MW | **TABLE 098** | **Energy Price** Reference
ECONOMIC SUMMARY | **Discount Rate** High
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	226.22	0.00	0.00	21.46	4.06	283.49	1.43	0.00	319.00	105.22	20.25	100.07	93.45
2015	40.08	496.39	0.00	0.00	19.33	2.78	558.57	4.22	0.00	350.53	103.30	24.03	104.29	118.92
2016	10.89	657.29	0.00	0.00	26.45	4.05	698.68	7.72	0.00	360.47	101.41	25.12	106.66	127.28
2017	10.95	796.58	0.00	0.00	38.71	6.07	852.31	11.98	0.00	376.02	99.42	26.85	109.69	140.06
2018	13.02	561.68	0.00	0.00	40.69	18.21	633.60	15.15	0.00	355.24	96.67	29.42	111.67	117.48
2019	13.09	401.73	0.00	0.00	48.21	18.21	481.24	17.55	13.29	379.85	96.30	29.57	111.83	142.15
2020	13.17	164.04	0.37	0.00	0.01	18.88	196.47	18.53	13.51	597.49	104.83	21.22	113.20	358.25
2021	16.66	56.92	0.00	0.00	0.00	0.00	73.58	18.90	13.26	665.23	105.42	21.72	119.85	418.24
2022	168.48	0.00	95.78	0.00	0.00	0.00	264.26	20.11	13.48	657.01	103.94	21.47	122.09	409.51
2023	257.00	0.00	122.67	0.00	9.48	0.00	389.14	21.95	13.31	649.11	102.81	18.22	124.73	403.35
2024	279.20	0.00	15.23	0.00	0.00	0.00	294.43	23.42	17.33	642.27	100.93	29.60	127.20	384.54
2025	284.55	0.00	0.00	0.00	3.61	0.00	288.16	24.86	17.11	527.50	98.64	22.36	120.89	285.61
2026	769.74	0.00	0.00	0.00	3.61	0.00	773.35	28.73	16.68	503.42	96.33	25.50	125.51	256.09
2027	1222.24	0.00	75.36	0.00	43.84	0.00	1341.44	35.43	16.71	468.14	94.24	27.86	127.77	218.28
2028	1097.38	0.00	102.92	0.00	32.22	0.00	1232.52	41.60	16.77	449.94	92.32	32.64	132.64	192.35
2029	783.65	0.00	15.61	0.00	38.26	0.00	837.53	45.78	23.60	439.45	90.58	44.91	137.21	166.76
2030	542.72	0.00	0.00	0.00	66.25	0.00	608.98	48.83	19.58	459.53	91.66	39.17	132.79	195.90
2031	356.48	0.00	0.00	0.00	88.77	0.00	445.24	51.05	34.19	519.71	94.83	32.39	107.90	284.58
2032	131.29	0.00	0.00	0.00	104.61	0.00	235.91	52.23	34.42	686.46	102.03	31.69	103.32	449.43
2033	41.43	0.00	0.00	0.00	0.00	0.00	41.43	52.44	34.27	714.48	102.01	32.70	111.65	468.11
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	34.50	687.63	100.20	33.52	113.76	440.15
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.65	647.70	98.47	34.04	111.91	403.27
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.60	619.72	96.84	34.80	112.50	375.58
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.42	589.32	94.93	36.02	115.35	343.02
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.05	556.06	92.93	37.52	119.30	306.31
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	36.08	533.39	90.99	41.62	131.20	269.58
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.24	518.87	89.26	47.13	136.97	245.50
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	36.02	502.66	87.57	53.29	142.64	219.15
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	52.44	33.06	499.45	86.70	54.26	145.97	212.52
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.06	487.73	85.34	53.79	154.81	193.79
2044	0.00	0.00	82.02	0.00	0.00	0.00	82.02	52.85	34.84	471.79	83.77	68.29	156.22	163.52
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	53.78	34.84	456.89	82.31	75.19	162.45	136.93
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	53.87	38.92	448.21	80.91	85.40	171.62	110.28
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	37.36	433.61	79.49	86.41	184.77	82.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	36.47	446.23	80.90	82.33	172.95	110.05
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	53.87	39.43	446.23	80.90	82.33	172.95	110.05
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	53.87	36.48	446.23	80.90	82.33	172.95	110.05
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	53.87	39.44	446.23	80.90	82.33	172.95	110.05
2052	0.00	0.00	73.50	0.00	29.50	1.50	104.50	53.87	36.49	446.23	80.90	82.33	172.95	110.05
2053	0.00	0.00	100.38	0.00	20.99	4.50	125.87	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2054	0.00	0.00	15.23	0.00	17.12	4.50	36.85	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2055	0.00	0.00	0.00	0.00	0.00	4.66	4.66	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2057	0.00	0.00	75.36	0.00	0.00	0.00	75.36	53.87	38.27	446.23	80.90	82.33	172.95	110.05
2058	0.00	0.00	102.92	0.00	9.48	0.00	112.40	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2059	0.00	0.00	15.61	0.00	0.00	0.00	15.61	53.87	41.23	446.23	80.90	82.33	172.95	110.05
2060	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2061	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.87	39.46	446.23	80.90	82.33	172.95	110.05
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2063	0.00	0.00	0.00	0.00	14.83	2.86	17.69	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2064	0.00	0.00	0.00	0.00	19.55	3.89	23.45	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2065	0.00	0.00	0.00	0.00	23.98	2.45	26.43	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2066	0.00	0.00	0.00	0.00	22.45	3.05	25.50	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2067	0.00	0.00	0.00	0.00	35.05	4.57	39.62	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2068	0.00	0.00	0.00	0.00	19.70	13.71	33.41	53.87	68.16	446.23	80.90	82.33	172.95	110.05
2069	0.00	0.00	0.00	0.00	31.08	13.71	44.79	53.87	39.46	446.23	80.90	82.33	172.95	110.05
2070	0.00	0.00	0.00	0.00	0.01	14.22	14.23	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	41.23	446.23	80.90	82.33	172.95	110.05
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	37.38	446.23	80.90	82.33	172.95	110.05
2074	0.00	0.00	82.02	0.00	0.00	0.00	82.02	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2075	0.00	0.00	112.03	0.00	2.72	0.00	114.74	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2076	0.00	0.00	16.99	0.00	2.72	0.00	19.71	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2077	0.00	0.00	0.00	0.00	33.14	0.00	33.14	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2078	0.00	0.00	0.00	0.00	17.39	0.00	17.39	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2079	0.00	0.00	0.00	0.00	29.35	0.00	29.35	53.87	39.46	446.23	80.90	82.33	172.95	110.05
2080	0.00	0.00	0.00	0.00	107.10	0.00	107.10	53.87	52.33	446.23	80.90	82.33	172.95	110.05
2081	0.00	0.00	0.00	0.00	67.38	0.00	67.38	53.87	39.46	446.23	80.90	82.33	172.95	110.05
2082	0.00	0.00	73.50	0.00	78.77	0.00	152.27	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2083	0.00	0.00	100.38	0.00	0.00	0.00	100.38	53.87	38.27	446.23	80.90	82.33	172.95	110.05
2084	0.00	0.00	15.23	0.00	10.82	0.17	26.22	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	53.87	38.27	446.23	80.90	82.33	172.95	110.05
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	53.87	54.10	446.23	80.90	82.33	172.95	110.05
2087	0.00	0.00	75.36	0.00	29.50	1.50	106.35	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2088	0.00	0.00	102.92	0.00	20.99	4.50	128.41	53.87	36.50	446.23	80.90	82.33	172.95	110.05
2089	0.00	0.00	15.61	0.00	17.12	4.50	37.23	53.87	39.46	446.23	80.90	82.33	172.95	110.05
2090	0.00	0.00	0.00	0.00	0.00	4.66	4.66	53.87	39.46	446.23	80.90	82.33	172.95	110.05
Salvage Value	6.45	0.00	3.91	0.00	4.19	0.47	15.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2694.54	2810.14	282.66	0.00	337.44	61.74	6186.51	493.54	302.94	7925.86	1566.17	591.84	2031.77	3736.07

Net Present Value: -3247

All Gas

TABLE 099
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	362.42	101.40	25.15	106.58	129.29
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	381.33	99.79	25.80	108.52	147.22
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	360.54	96.94	28.23	111.33	124.03
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	351.76	94.96	25.49	112.81	118.51
2020	0.00	0.00	95.05	0.00	0.00	0.00	95.05	0.89	0.00	387.25	94.88	20.11	122.82	149.44
2021	0.00	0.00	121.71	0.00	9.48	0.00	131.20	1.43	0.00	389.18	93.02	18.94	133.47	143.75
2022	0.00	0.00	15.08	0.00	0.00	0.00	15.08	1.51	4.07	376.47	90.75	35.31	135.74	114.67
2023	0.00	0.00	73.87	0.00	0.00	0.00	73.87	1.88	4.07	361.08	88.51	43.72	141.95	86.90
2024	0.00	0.00	103.01	0.00	74.66	0.00	177.67	2.75	4.07	352.57	87.02	50.05	147.18	68.32
2025	0.00	0.00	15.30	0.00	0.00	0.00	15.30	2.83	8.16	278.44	86.52	41.86	133.57	16.49
2026	0.00	0.00	74.98	0.00	0.00	0.00	74.98	3.21	8.16	260.03	85.20	42.96	135.89	-4.02
2027	0.00	0.00	102.41	0.00	0.00	0.00	102.41	3.72	8.16	242.78	83.30	43.15	147.67	-31.34
2028	0.00	0.00	171.65	0.00	0.00	0.00	171.65	4.58	12.23	225.54	81.35	66.39	146.62	-68.82
2029	0.00	0.00	225.54	0.00	0.00	0.00	225.54	5.70	12.23	209.73	79.87	75.59	151.06	-96.79
2030	0.00	0.00	101.02	0.00	9.48	0.00	110.50	6.26	12.24	222.88	80.81	70.04	147.17	-75.13
2031	0.00	0.00	7.43	0.00	0.00	0.00	7.43	6.29	19.31	240.37	78.35	124.12	139.83	-101.93
2032	0.00	0.00	77.26	0.00	0.00	0.00	77.26	6.68	19.32	219.92	76.41	137.34	146.56	-140.38
2033	0.00	0.00	105.52	0.00	62.81	0.00	168.33	7.52	19.32	199.53	74.64	150.70	152.19	-178.00
2034	0.00	0.00	176.87	0.00	0.00	0.00	176.87	8.41	23.40	185.38	73.21	169.46	155.83	-213.12
2035	0.00	0.00	232.39	0.00	0.00	0.00	232.39	9.57	23.40	174.16	72.30	179.39	158.84	-236.37
2036	0.00	0.00	104.08	0.00	0.00	0.00	104.08	10.09	23.40	172.27	72.24	174.66	165.02	-239.65
2037	0.00	0.00	170.94	0.00	0.00	0.00	170.94	10.94	30.46	179.44	70.21	231.56	150.80	-273.13
2038	0.00	0.00	235.90	0.00	0.00	0.00	235.90	12.12	30.47	164.05	68.98	245.59	157.14	-307.66
2039	0.00	0.00	105.65	0.00	0.00	0.00	105.65	12.65	30.48	158.88	68.90	249.06	164.10	-323.18
2040	0.00	0.00	7.77	0.00	0.00	0.00	7.77	12.69	37.55	169.01	66.95	301.77	157.69	-357.40
2041	0.00	0.00	166.58	0.00	0.00	0.00	166.58	13.52	37.55	158.78	65.15	332.54	166.13	-405.04
2042	0.00	0.00	240.65	0.00	0.00	0.00	240.65	14.73	37.55	152.94	64.07	354.86	172.34	-438.33
2043	0.00	0.00	107.78	0.00	62.81	0.00	170.60	15.58	37.55	154.23	64.04	359.96	173.55	-443.33
2044	0.00	0.00	7.93	0.00	0.00	0.00	7.93	15.62	44.63	162.81	62.46	410.88	165.34	-475.87
2045	0.00	0.00	36.26	0.00	0.00	0.00	36.26	15.80	44.63	153.90	60.89	444.13	172.69	-523.81
2046	0.00	0.00	49.52	0.00	0.00	0.00	49.52	16.05	44.63	148.03	59.77	471.25	178.53	-561.52
2047	0.00	0.00	7.51	0.00	0.00	0.00	7.51	16.08	46.11	138.76	58.90	491.24	183.51	-594.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.11	146.89	59.85	468.88	178.24	-560.08
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	16.08	46.12	146.89	59.85	468.88	178.24	-560.08
2050	0.00	0.00	72.77	0.00	10.08	0.00	82.85	16.08	46.12	146.89	59.85	468.88	178.24	-560.08
2051	0.00	0.00	99.39	0.00	10.08	0.00	109.47	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2052	0.00	0.00	15.08	0.00	10.08	0.00	25.16	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2053	0.00	0.00	73.87	0.00	0.00	0.00	73.87	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2054	0.00	0.00	100.89	0.00	0.00	0.00	100.89	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2055	0.00	0.00	15.30	0.00	0.00	0.00	15.30	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2056	0.00	0.00	74.98	0.00	9.48	0.00	84.46	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2057	0.00	0.00	102.41	0.00	0.00	0.00	102.41	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2058	0.00	0.00	171.65	0.00	0.00	0.00	171.65	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2059	0.00	0.00	225.54	0.00	56.00	0.00	281.54	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2060	0.00	0.00	101.02	0.00	0.00	0.00	101.02	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2061	0.00	0.00	7.43	0.00	0.00	0.00	7.43	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2062	0.00	0.00	77.26	0.00	0.00	0.00	77.26	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2063	0.00	0.00	105.52	0.00	0.00	0.00	105.52	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2064	0.00	0.00	176.87	0.00	0.00	0.00	176.87	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2065	0.00	0.00	232.39	0.00	9.48	0.00	241.88	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2066	0.00	0.00	104.08	0.00	0.00	0.00	104.08	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2067	0.00	0.00	170.94	0.00	0.00	0.00	170.94	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2068	0.00	0.00	235.90	0.00	47.11	0.00	283.01	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2069	0.00	0.00	105.65	0.00	0.00	0.00	105.65	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2070	0.00	0.00	7.77	0.00	0.00	0.00	7.77	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2071	0.00	0.00	166.58	0.00	0.00	0.00	166.58	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2072	0.00	0.00	240.65	0.00	0.00	0.00	240.65	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2073	0.00	0.00	107.78	0.00	0.00	0.00	107.78	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2074	0.00	0.00	7.93	0.00	18.67	0.00	26.59	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2075	0.00	0.00	36.26	0.00	0.00	0.00	36.26	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2076	0.00	0.00	49.52	0.00	0.00	0.00	49.52	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2077	0.00	0.00	7.51	0.00	0.00	0.00	7.51	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2078	0.00	0.00	0.00	0.00	47.11	0.00	47.11	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2080	0.00	0.00	72.77	0.00	0.00	0.00	72.77	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2081	0.00	0.00	99.39	0.00	0.00	0.00	99.39	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2082	0.00	0.00	15.08	0.00	0.00	0.00	15.08	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2083	0.00	0.00	73.87	0.00	15.70	0.00	89.57	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2084	0.00	0.00	100.89	0.00	10.08	0.00	110.97	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2085	0.00	0.00	15.30	0.00	10.08	0.00	25.38	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2086	0.00	0.00	74.98	0.00	10.08	0.00	85.06	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2087	0.00	0.00	102.41	0.00	10.08	0.00	112.49	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2088	0.00	0.00	15.54	0.00	0.00	0.00	15.54	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	146.89	59.85	468.88	178.24	-560.08
Salvage Value	0.00	0.00	25.89	0.00	0.99	0.00	26.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1069.44	0.00	126.11	0.00	1259.87	87.87	224.68	4511.07	1374.75	2130.65	2238.71	-1233.05

Net Present Value: -2805

Wind/Gas

TABLE 100
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	362.42	101.40	25.15	106.58	129.29
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	381.33	99.79	25.80	108.52	147.22
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	360.53	96.94	28.23	111.33	124.02
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	351.76	94.95	25.49	112.81	118.52
2020	0.00	0.00	0.00	9.79	13.83	0.00	23.61	0.64	0.00	383.53	94.42	21.69	124.06	143.36
2021	0.00	0.00	0.37	298.83	23.04	0.00	322.24	2.25	0.00	384.94	92.55	21.07	133.99	137.32
2022	0.00	0.00	0.00	304.42	27.82	0.00	332.24	3.91	6.34	389.32	90.90	21.20	134.51	142.71
2023	0.00	0.00	170.02	294.63	14.49	0.00	479.14	6.20	12.69	386.16	88.37	24.41	138.45	134.93
2024	0.00	0.00	224.10	5.59	25.56	0.00	255.25	7.36	19.03	390.50	86.58	24.81	142.21	136.91
2025	0.00	0.00	30.61	4.89	3.97	0.00	39.48	7.56	27.18	326.88	86.63	28.83	125.12	86.30
2026	0.00	0.00	74.98	149.41	9.99	0.00	234.39	8.73	27.18	314.16	85.62	27.63	125.86	75.05
2027	0.00	0.00	104.53	152.21	90.53	0.00	347.27	10.46	30.35	299.18	83.24	33.76	130.06	52.13
2028	0.00	0.00	15.54	152.21	22.00	0.00	189.74	11.40	37.60	293.87	81.46	43.64	133.19	35.59
2029	0.00	0.00	76.11	152.21	22.08	0.00	250.40	12.66	40.78	285.87	79.85	47.21	136.92	21.89
2030	0.00	0.00	103.95	152.21	22.08	0.00	278.24	14.05	43.95	288.87	78.94	49.41	138.28	22.24
2031	0.00	0.00	92.64	152.21	22.08	0.00	266.93	15.38	51.19	290.85	77.70	58.78	140.28	14.09
2032	0.00	0.00	104.99	152.21	84.89	0.00	342.09	17.09	54.37	287.43	76.57	59.30	143.74	7.82
2033	0.00	0.00	15.93	152.21	22.08	0.00	190.22	18.04	61.63	292.87	75.90	62.66	146.22	8.08
2034	0.00	0.00	78.03	152.21	22.08	0.00	252.32	19.31	64.81	279.89	74.09	72.99	149.12	-16.31
2035	0.00	0.00	106.58	152.21	22.08	0.00	280.87	20.71	67.99	267.22	72.39	79.12	153.74	-38.03
2036	0.00	0.00	94.98	152.21	22.08	0.00	269.27	22.06	75.23	262.03	71.02	90.98	156.70	-56.67
2037	0.00	0.00	107.64	152.21	22.08	0.00	281.93	23.47	78.41	253.08	69.73	96.24	161.00	-73.89
2038	0.00	0.00	95.94	152.21	22.08	0.00	270.22	24.82	85.66	252.01	68.68	105.96	165.06	-87.69
2039	0.00	0.00	108.72	152.21	84.89	0.00	345.82	26.55	88.84	245.51	67.51	106.21	180.51	-108.71
2040	0.00	0.00	16.49	162.00	22.08	0.00	200.57	27.55	96.10	248.26	66.72	111.89	186.78	-117.12
2041	0.00	0.00	80.81	451.04	22.08	0.00	553.92	30.32	99.28	234.84	65.18	133.34	184.77	-148.44
2042	0.00	0.00	110.36	456.63	22.08	0.00	589.07	33.26	102.45	223.63	63.80	142.62	191.44	-174.23
2043	0.00	0.00	98.36	446.84	21.91	0.00	567.11	36.10	109.69	218.49	62.61	157.72	195.65	-197.48
2044	0.00	0.00	111.47	157.80	21.42	0.00	290.69	37.55	112.87	213.70	61.67	163.72	201.02	-212.71
2045	0.00	0.00	53.17	157.10	20.09	0.00	230.37	38.70	120.12	210.44	60.57	173.36	209.89	-233.38
2046	0.00	0.00	49.52	296.73	18.10	0.00	364.36	40.53	123.30	205.77	59.53	174.30	223.77	-251.84
2047	0.00	0.00	7.51	155.01	12.09	0.00	174.61	41.40	127.95	199.47	58.46	180.03	227.31	-266.33
2048	0.00	0.00	0.00	152.21	6.21	0.00	158.42	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2049	0.00	0.00	0.00	152.21	10.16	0.00	162.37	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2050	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2051	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2052	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2053	0.00	0.00	147.74	152.21	0.00	0.00	299.95	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2054	0.00	0.00	201.77	152.21	0.00	0.00	353.98	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2055	0.00	0.00	30.61	152.21	3.46	0.00	186.28	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2056	0.00	0.00	74.98	152.21	5.76	0.00	232.95	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2057	0.00	0.00	102.41	152.21	7.00	0.00	261.61	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2058	0.00	0.00	15.54	152.21	3.87	0.00	171.62	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2059	0.00	0.00	76.11	152.21	20.86	0.00	249.18	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2060	0.00	0.00	103.95	162.00	1.74	0.00	267.69	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2061	0.00	0.00	92.64	451.04	2.79	0.00	546.47	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2062	0.00	0.00	104.99	456.63	60.03	0.00	621.65	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2063	0.00	0.00	15.93	446.84	5.52	0.00	468.29	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2064	0.00	0.00	78.03	157.80	5.52	0.00	241.36	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2065	0.00	0.00	106.58	157.10	5.52	0.00	269.20	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2066	0.00	0.00	94.98	296.73	5.52	0.00	397.23	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2067	0.00	0.00	107.64	155.01	52.63	0.00	315.28	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2068	0.00	0.00	95.94	152.21	5.52	0.00	253.67	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2069	0.00	0.00	108.72	152.21	5.52	0.00	266.45	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2070	0.00	0.00	16.49	152.21	15.89	0.00	184.59	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2071	0.00	0.00	80.81	152.21	22.80	0.00	255.82	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2072	0.00	0.00	110.36	152.21	26.34	0.00	288.92	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2073	0.00	0.00	98.36	152.21	16.14	0.00	266.71	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2074	0.00	0.00	111.47	152.21	57.33	0.00	321.01	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2075	0.00	0.00	53.17	152.21	7.76	0.00	213.14	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2076	0.00	0.00	49.52	152.21	12.72	0.00	214.46	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2077	0.00	0.00	7.51	152.21	36.03	0.00	195.75	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2078	0.00	0.00	0.00	152.21	21.91	0.00	174.12	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2079	0.00	0.00	0.00	152.21	21.66	0.00	173.87	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2080	0.00	0.00	0.00	162.00	21.33	0.00	183.33	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2081	0.00	0.00	0.00	451.04	20.34	0.00	471.38	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2082	0.00	0.00	0.00	456.63	34.99	0.00	491.62	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2083	0.00	0.00	147.74	446.84	18.05	0.00	612.63	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2084	0.00	0.00	201.77	157.80	26.56	0.00	386.13	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2085	0.00	0.00	30.61	157.10	26.39	0.00	214.10	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2086	0.00	0.00	74.98	296.73	25.40	0.00	397.11	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2087	0.00	0.00	102.41	155.01	24.40	0.00	281.82	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2088	0.00	0.00	15.54	152.21	9.36	0.00	177.10	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2089	0.00	0.00	0.00	147.32	20.42	0.00	167.74	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
2090	0.00	0.00	0.00	2.80	0.08	0.00	2.88	41.40	127.95	205.23	59.52	175.90	220.32	-250.52
Salvage Value	0.00	0.00	7.84	19.15	3.53	0.00	30.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	783.56	1927.44	302.91	0.00	3078.23	209.16	641.69	5088.10	1372.04	989.85	2316.85	409.37

Net Present Value -3520

K22/Gas

TABLE 101
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	107.18	0.00	0.00	10.08	0.00	117.26	0.59	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	32.53	0.00	0.00	11.02	0.00	43.55	0.80	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	28.86	0.00	0.00	11.10	0.00	39.96	1.00	0.00	362.00	101.40	25.15	106.58	128.88
2017	0.00	215.40	0.00	0.00	27.74	0.00	243.14	2.22	0.00	380.29	99.79	25.81	108.55	146.14
2018	0.00	420.08	0.00	0.00	9.06	0.00	429.13	4.37	0.00	358.44	96.95	28.25	111.40	121.82
2019	0.00	685.17	0.00	0.00	15.77	0.00	700.94	7.87	0.00	349.59	94.96	25.50	112.89	116.24
2020	0.00	763.03	0.00	0.00	28.69	0.00	791.72	11.83	0.00	378.46	94.25	22.39	124.78	137.04
2021	0.00	623.77	0.00	0.00	40.71	0.00	664.48	15.15	0.00	382.45	92.50	21.50	135.42	133.04
2022	0.00	362.26	0.00	0.00	48.21	0.00	410.47	17.20	13.29	389.41	92.48	24.52	128.94	143.47
2023	0.00	168.41	0.00	0.00	0.01	0.00	168.42	18.05	13.51	510.63	98.27	24.32	117.53	270.51
2024	0.00	58.23	0.00	0.00	0.00	0.00	58.23	18.34	13.21	526.88	98.16	27.63	122.55	278.54
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	18.34	13.43	468.49	98.11	19.38	113.14	237.85
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.34	13.26	449.44	96.21	19.68	115.98	217.57
2027	0.00	0.00	97.64	0.00	0.00	0.00	97.64	18.71	13.21	406.63	94.34	18.83	115.22	178.23
2028	0.00	0.00	125.25	0.00	9.48	0.00	134.73	19.28	12.96	385.36	92.75	19.60	118.29	154.73
2029	0.00	0.00	15.61	0.00	0.00	0.00	15.61	19.35	16.59	378.68	91.90	24.53	118.73	143.52
2030	0.00	0.00	76.49	0.00	0.00	0.00	76.49	19.74	16.59	367.79	90.12	30.14	122.78	124.75
2031	0.00	0.00	265.07	0.00	74.66	0.00	339.73	21.42	16.64	356.20	88.44	35.20	127.67	104.88
2032	0.00	0.00	244.79	0.00	0.00	0.00	244.79	22.65	23.48	346.61	86.82	47.60	132.12	80.07
2033	0.00	0.00	102.54	0.00	9.48	0.00	112.02	23.21	19.46	353.39	87.00	41.57	132.87	91.95
2034	0.00	0.00	7.54	0.00	0.00	0.00	7.54	23.25	26.52	376.12	84.51	99.47	126.80	65.35
2035	0.00	0.00	161.67	0.00	0.00	0.00	161.67	24.05	26.52	358.78	82.43	111.72	133.02	31.61
2036	0.00	0.00	233.56	0.00	0.00	0.00	233.56	25.22	26.53	345.15	80.89	121.68	137.46	5.12
2037	0.00	0.00	104.61	0.00	0.00	0.00	104.61	25.74	26.53	354.10	81.34	115.92	135.14	21.70
2038	0.00	0.00	171.80	0.00	0.00	0.00	171.80	26.60	32.93	375.71	78.91	178.53	132.87	-14.60
2039	0.00	0.00	237.08	0.00	0.00	0.00	237.08	27.79	32.94	363.47	77.52	191.61	143.77	-49.42
2040	0.00	0.00	106.18	0.00	62.81	0.00	168.99	28.63	32.94	362.97	77.06	196.44	145.82	-56.36
2041	0.00	0.00	7.81	0.00	0.00	0.00	7.81	28.67	40.02	388.48	75.03	259.88	141.88	-88.31
2042	0.00	0.00	167.41	0.00	0.00	0.00	167.41	29.51	42.97	374.60	73.18	283.17	147.80	-129.55
2043	0.00	0.00	241.85	0.00	0.00	0.00	241.85	30.72	40.02	364.34	71.83	300.20	152.36	-160.05
2044	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.26	40.02	352.34	71.47	297.42	153.03	-169.58
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	31.30	47.09	380.03	69.82	361.39	149.21	-200.39
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.09	370.83	68.57	382.90	152.47	-233.11
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	48.87	347.83	67.18	397.29	156.82	-273.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	48.88	366.23	68.53	380.53	152.83	-235.65
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	48.88	366.23	68.53	380.53	152.83	-235.65
2050	0.00	0.00	0.00	0.00	10.49	0.00	10.49	31.30	47.99	366.23	68.53	380.53	152.83	-235.65
2051	0.00	0.00	0.00	0.00	10.55	0.00	10.55	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2052	0.00	0.00	0.00	0.00	10.56	0.00	10.56	31.30	50.06	366.23	68.53	380.53	152.83	-235.65
2053	0.00	0.00	0.00	0.00	0.45	0.00	0.45	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2054	0.00	0.00	0.00	0.00	14.64	0.00	14.64	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2055	0.00	0.00	0.00	0.00	19.42	0.00	19.42	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2056	0.00	0.00	0.00	0.00	20.99	0.00	20.99	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2057	0.00	0.00	75.36	0.00	17.12	0.00	92.48	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2058	0.00	0.00	102.92	0.00	0.00	0.00	102.92	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2059	0.00	0.00	15.61	0.00	0.00	0.00	15.61	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2060	0.00	0.00	76.49	0.00	0.00	0.00	76.49	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2061	0.00	0.00	262.94	0.00	0.00	0.00	262.94	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2062	0.00	0.00	244.79	0.00	0.00	0.00	244.79	31.30	50.06	366.23	68.53	380.53	152.83	-235.65
2063	0.00	0.00	102.54	0.00	9.48	0.00	112.02	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2064	0.00	0.00	7.54	0.00	0.00	0.00	7.54	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2065	0.00	0.00	161.67	0.00	0.52	0.00	162.19	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2066	0.00	0.00	233.56	0.00	56.55	0.00	290.11	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2067	0.00	0.00	104.61	0.00	17.18	0.00	121.79	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2068	0.00	0.00	171.80	0.00	18.09	0.00	189.89	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2069	0.00	0.00	237.08	0.00	1.13	0.00	238.21	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2070	0.00	0.00	106.18	0.00	9.28	0.00	115.46	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2071	0.00	0.00	7.81	0.00	19.72	0.00	27.52	31.30	62.94	366.23	68.53	380.53	152.83	-235.65
2072	0.00	0.00	167.41	0.00	31.08	0.00	198.49	31.30	50.06	366.23	68.53	380.53	152.83	-235.65
2073	0.00	0.00	241.85	0.00	0.01	0.00	241.86	31.30	48.88	366.23	68.53	380.53	152.83	-235.65
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.30	48.88	366.23	68.53	380.53	152.83	-235.65
2075	0.00	0.00	7.97	0.00	47.12	0.00	55.08	31.30	48.88	366.23	68.53	380.53	152.83	-235.65
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.99	366.23	68.53	380.53	152.83	-235.65
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2081	0.00	0.00	0.00	0.00	18.67	0.00	18.67	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	50.06	366.23	68.53	380.53	152.83	-235.65
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2087	0.00	0.00	75.36	0.00	10.08	0.00	85.44	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2088	0.00	0.00	102.92	0.00	0.00	0.00	102.92	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2089	0.00	0.00	15.61	0.00	0.00	0.00	15.61	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
2090	0.00	0.00	0.00	0.00	15.70	0.00	15.70	31.30	47.10	366.23	68.53	380.53	152.83	-235.65
Salvage Value	0.00	0.00	7.27	0.00	1.51	0.00	8.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2437.90	742.42	0.00	206.65	0.00	3386.98	263.17	263.16	6188.84	1467.38	1553.48	2021.31	1146.67

Net Present Value: -2767

K22/C29

TABLE 102
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	107.18	0.00	0.00	10.08	0.00	149.01	0.75	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.61	32.53	0.00	0.00	11.02	0.00	84.16	1.17	0.00	352.45	103.29	24.03	104.25	120.88
2016	11.43	28.86	0.00	0.00	11.10	0.00	51.39	1.42	0.00	362.00	101.40	25.15	106.58	128.88
2017	12.17	215.40	0.00	0.00	27.74	0.00	255.31	2.70	0.00	380.29	99.79	25.81	108.55	146.14
2018	12.25	420.08	0.00	0.00	9.06	0.00	441.38	4.91	0.00	358.44	96.95	28.25	111.40	121.82
2019	14.64	685.17	0.00	0.00	15.77	0.00	715.58	8.48	0.00	349.59	94.96	25.50	112.89	116.24
2020	169.77	763.03	0.00	0.00	28.69	0.00	961.49	13.29	0.00	378.47	94.25	22.39	124.78	137.05
2021	257.27	623.77	0.00	0.00	40.71	0.00	921.75	17.90	0.00	382.20	92.50	21.51	135.56	132.64
2022	275.94	362.26	0.00	0.00	48.21	0.00	686.41	21.33	13.29	389.11	92.49	24.47	129.12	143.03
2023	281.23	168.41	0.00	0.00	3.62	0.00	453.26	23.60	13.51	509.67	98.27	24.37	117.65	269.38
2024	760.76	58.23	0.00	0.00	3.61	0.00	822.60	27.71	13.21	524.88	98.15	27.64	122.65	276.43
2025	1207.98	0.00	0.00	0.00	43.84	0.00	1251.81	33.97	13.43	466.05	98.13	19.42	113.33	235.18
2026	1084.57	0.00	0.00	0.00	22.74	0.00	1107.31	39.51	13.26	446.37	96.22	19.73	116.20	214.22
2027	774.50	0.00	0.00	0.00	38.26	0.00	812.77	43.57	13.21	404.65	94.58	18.07	115.13	176.88
2028	536.39	0.00	0.00	0.00	66.25	0.00	602.64	46.58	12.96	378.33	92.66	19.84	119.12	146.71
2029	352.31	0.00	0.00	0.00	88.77	0.00	441.08	48.79	27.13	489.42	96.54	22.67	102.44	267.76
2030	129.76	0.00	0.00	0.00	104.61	0.00	234.38	49.96	27.36	647.71	103.83	22.11	94.28	427.49
2031	40.95	0.00	0.00	0.00	0.00	0.00	40.95	50.17	27.26	667.61	103.61	22.60	98.06	443.35
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	30.24	646.37	101.89	22.32	99.60	422.56
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	26.04	623.22	100.23	22.27	100.96	399.75
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.99	603.10	98.61	22.73	103.20	378.56
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.82	581.71	97.04	22.84	104.51	357.32
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	50.17	25.44	556.99	95.47	22.78	105.85	332.90
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.52	532.05	93.91	22.86	107.80	307.48
2038	0.00	0.00	101.89	0.00	0.00	0.00	101.89	50.56	24.96	508.15	92.37	22.90	111.32	281.57
2039	0.00	0.00	131.00	0.00	9.48	0.00	140.49	51.16	27.74	500.53	90.98	22.41	126.08	261.06
2040	0.00	0.00	16.49	0.00	0.00	0.00	16.49	51.24	28.85	488.38	89.23	39.30	127.85	232.00
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.24	28.85	476.28	87.76	43.93	133.37	211.23
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	51.64	31.81	464.64	86.32	45.33	141.39	191.61
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	52.25	28.85	450.93	84.83	46.02	151.37	168.72
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	52.74	32.92	440.58	83.34	70.90	148.83	137.52
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	53.67	32.25	428.87	82.08	75.78	154.67	116.34
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	53.76	36.33	440.64	81.70	74.95	161.37	122.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.11	411.30	79.46	99.97	166.48	65.39
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.11	426.93	81.08	83.56	160.84	101.45
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	41.07	426.93	81.08	83.56	160.84	101.45
2050	0.00	0.00	0.00	0.00	10.49	0.00	10.49	53.76	37.23	426.93	81.08	83.56	160.84	101.45
2051	0.00	0.00	0.00	0.00	10.55	0.00	10.55	53.76	36.35	426.93	81.08	83.56	160.84	101.45
2052	0.00	0.00	0.00	0.00	10.56	0.00	10.56	53.76	39.31	426.93	81.08	83.56	160.84	101.45
2053	0.00	0.00	0.00	0.00	0.45	0.00	0.45	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2054	0.00	0.00	0.00	0.00	14.64	0.00	14.64	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2055	0.00	0.00	0.00	0.00	19.42	0.00	19.42	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2056	0.00	0.00	0.00	0.00	20.99	0.00	20.99	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2057	0.00	0.00	0.00	0.00	17.12	0.00	17.12	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2058	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2059	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.76	55.15	426.93	81.08	83.56	160.84	101.45
2060	0.00	0.00	0.00	0.00	10.69	0.00	10.69	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2061	0.00	0.00	0.00	0.00	5.35	0.00	5.35	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2062	0.00	0.00	0.00	0.00	8.91	0.00	8.91	53.76	39.32	426.93	81.08	83.56	160.84	101.45
2063	0.00	0.00	0.00	0.00	15.15	0.00	15.15	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2064	0.00	0.00	0.00	0.00	21.39	0.00	21.39	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2065	0.00	0.00	0.00	0.00	26.37	0.00	26.37	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2066	0.00	0.00	0.00	0.00	0.55	0.00	0.55	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2067	0.00	0.00	0.00	0.00	17.18	0.00	17.18	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2068	0.00	0.00	79.61	0.00	8.61	0.00	88.22	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2069	0.00	0.00	108.72	0.00	1.13	0.00	109.86	53.76	55.15	426.93	81.08	83.56	160.84	101.45
2070	0.00	0.00	16.49	0.00	9.28	0.00	25.77	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2071	0.00	0.00	0.00	0.00	19.72	0.00	19.72	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2072	0.00	0.00	81.21	0.00	31.08	0.00	112.29	53.76	55.15	426.93	81.08	83.56	160.84	101.45
2073	0.00	0.00	110.91	0.00	2.73	0.00	113.64	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2074	0.00	0.00	98.85	0.00	12.20	0.00	111.05	53.76	53.96	426.93	81.08	83.56	160.84	101.45
2075	0.00	0.00	112.03	0.00	33.14	0.00	145.17	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2076	0.00	0.00	16.99	0.00	17.39	0.00	34.39	53.76	53.08	426.93	81.08	83.56	160.84	101.45
2077	0.00	0.00	0.00	0.00	29.35	0.00	29.35	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2078	0.00	0.00	0.00	0.00	60.58	0.00	60.58	53.76	52.19	426.93	81.08	83.56	160.84	101.45
2079	0.00	0.00	0.00	0.00	67.38	0.00	67.38	53.76	39.32	426.93	81.08	83.56	160.84	101.45
2080	0.00	0.00	0.00	0.00	134.77	0.00	134.77	53.76	53.96	426.93	81.08	83.56	160.84	101.45
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	56.92	426.93	81.08	83.56	160.84	101.45
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.13	426.93	81.08	83.56	160.84	101.45
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	53.96	426.93	81.08	83.56	160.84	101.45
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	36.36	426.93	81.08	83.56	160.84	101.45
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	39.32	426.93	81.08	83.56	160.84	101.45
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	36.36	426.93	81.08	83.56	160.84	101.45
Salvage Value	4.51	0.00	2.34	0.00	3.58	0.00	10.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2994.94	2437.90	132.14	0.00	333.71	0.00	5898.70	473.16	248.53	7103.18	1546.98	531.45	1948.72	3076.04

Net Present Value -3544

SCGT/C26

TABLE 103
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	352.45	103.29	24.03	104.25	120.88
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	362.42	101.40	25.15	106.58	129.29
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	381.33	99.79	25.80	108.52	147.22
2018	217.91	0.00	0.37	0.00	0.00	0.00	218.28	3.36	0.00	360.10	96.94	28.24	111.34	123.57
2019	261.93	0.00	0.00	0.00	0.00	0.00	261.93	4.67	0.00	351.08	94.96	25.50	112.83	117.80
2020	268.21	0.00	95.05	0.00	0.00	0.00	363.27	6.37	0.00	386.00	94.86	20.21	122.96	147.97
2021	739.32	0.00	121.67	0.00	9.48	0.00	870.47	10.62	0.00	388.11	92.99	19.19	133.93	142.00
2022	1186.89	0.00	15.08	0.00	0.55	0.00	1202.51	16.63	4.07	375.04	90.77	35.71	136.13	112.43
2023	1065.64	0.00	0.00	0.00	1.09	0.00	1066.73	21.96	4.07	357.94	88.37	45.20	142.74	81.63
2024	760.98	0.00	0.00	0.00	2.19	0.00	763.17	25.78	4.07	352.56	87.19	49.67	147.47	68.23
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	28.44	4.07	282.65	87.70	30.36	137.78	26.81
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	30.18	18.69	355.93	91.71	22.78	112.46	128.99
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	30.82	18.91	502.98	99.64	21.60	100.74	280.99
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	31.02	18.61	530.77	99.73	23.67	109.37	298.00
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.83	506.65	97.99	24.36	110.77	273.52
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.65	490.83	96.77	24.07	110.76	259.22
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.60	468.26	94.79	26.22	114.85	232.40
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.36	440.64	92.83	27.83	118.35	201.63
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.92	421.32	90.85	32.77	123.00	174.69
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.92	410.32	89.26	37.87	128.73	154.46
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.96	400.13	87.94	42.00	131.62	138.58
2036	0.00	0.00	78.82	0.00	0.00	0.00	78.82	31.41	20.74	392.81	86.85	42.48	136.36	127.12
2037	0.00	0.00	107.69	0.00	9.48	0.00	117.17	32.00	17.78	380.77	85.33	43.23	147.03	105.19
2038	0.00	0.00	16.33	0.00	0.00	0.00	16.33	32.08	21.85	370.72	83.82	66.52	145.80	74.58
2039	0.00	0.00	80.00	0.00	0.00	0.00	80.00	32.48	21.85	359.47	82.55	72.06	158.07	46.79
2040	0.00	0.00	111.39	0.00	74.66	0.00	186.05	33.40	21.85	349.69	81.18	71.57	171.43	25.52
2041	0.00	0.00	97.38	0.00	0.00	0.00	97.38	33.89	25.94	335.73	79.51	100.53	169.90	-14.21
2042	0.00	0.00	110.36	0.00	0.00	0.00	110.36	34.44	25.27	322.25	78.14	112.73	175.59	-44.22
2043	0.00	0.00	98.36	0.00	0.00	0.00	98.36	34.93	29.34	314.44	76.82	126.47	184.62	-73.47
2044	0.00	0.00	111.47	0.00	62.81	0.00	174.28	35.80	29.34	303.64	75.49	128.07	201.44	-101.37
2045	0.00	0.00	16.91	0.00	0.00	0.00	16.91	35.89	33.43	295.01	74.13	175.98	189.26	-144.36
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.39	285.33	72.94	194.06	194.04	-175.70
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.44	274.94	71.61	197.31	213.99	-207.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.45	285.09	72.89	189.12	199.10	-176.01
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.45	285.09	72.89	189.12	199.10	-176.01
2050	0.00	0.00	72.77	0.00	10.08	0.00	82.85	35.89	33.46	285.09	72.89	189.12	199.10	-176.01
2051	0.00	0.00	99.39	0.00	10.08	0.00	109.47	35.89	35.24	285.09	72.89	189.12	199.10	-176.01
2052	0.00	0.00	15.08	0.00	10.08	0.00	25.16	35.89	35.25	285.09	72.89	189.12	199.10	-176.01
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	285.09	72.89	189.12	199.10	-176.01
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	285.09	72.89	189.12	199.10	-176.01
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	285.09	72.89	189.12	199.10	-176.01
2056	0.00	0.00	0.00	0.00	9.48	0.00	9.48	35.89	36.43	285.09	72.89	189.12	199.10	-176.01
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2066	0.00	0.00	78.82	0.00	0.00	0.00	78.82	35.89	36.43	285.09	72.89	189.12	199.10	-176.01
2067	0.00	0.00	107.64	0.00	0.00	0.00	107.64	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2068	0.00	0.00	16.33	0.00	0.00	0.00	16.33	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2069	0.00	0.00	80.00	0.00	0.00	0.00	80.00	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2070	0.00	0.00	109.27	0.00	0.00	0.00	109.27	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2071	0.00	0.00	97.38	0.00	0.00	0.00	97.38	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2072	0.00	0.00	110.36	0.00	10.03	0.00	120.39	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2073	0.00	0.00	98.36	0.00	1.09	0.00	99.45	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2074	0.00	0.00	111.47	0.00	2.19	0.00	113.66	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2075	0.00	0.00	16.91	0.00	60.92	0.00	77.83	35.89	49.30	285.09	72.89	189.12	199.10	-176.01
2076	0.00	0.00	0.00	0.00	2.19	0.00	2.19	35.89	36.43	285.09	72.89	189.12	199.10	-176.01
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	51.08	285.09	72.89	189.12	199.10	-176.01
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	285.09	72.89	189.12	199.10	-176.01
2079	0.00	0.00	0.00	0.00	47.12	0.00	47.12	35.89	51.08	285.09	72.89	189.12	199.10	-176.01
2080	0.00	0.00	72.77	0.00	0.00	0.00	72.77	35.89	35.25	285.09	72.89	189.12	199.10	-176.01
2081	0.00	0.00	99.39	0.00	0.00	0.00	99.39	35.89	51.08	285.09	72.89	189.12	199.10	-176.01
2082	0.00	0.00	15.08	0.00	0.00	0.00	15.08	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	36.43	285.09	72.89	189.12	199.10	-176.01
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
2090	0.00	0.00	0.00	0.00	18.67	0.00	18.67	35.89	33.47	285.09	72.89	189.12	199.10	-176.01
Salvage Value	1.77	0.00	3.88	0.00	1.11	0.00	6.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	352.93	0.00	81.43	0.00	4047.37	320.68	196.32	5984.81	1484.44	897.18	2169.62	1433.58

Net Present Value: -3131

CCGT/C26

TABLE 104
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	352.45	103.29	24.03	104.25	120.88
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	362.42	101.40	25.15	106.58	129.29
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	381.33	99.79	25.80	108.52	147.22
2018	217.91	0.00	0.37	0.00	0.00	0.00	218.28	3.36	0.00	360.10	96.94	28.24	111.34	123.57
2019	261.93	0.00	149.27	0.00	0.00	0.00	411.20	5.42	0.00	351.08	94.96	25.50	112.83	117.80
2020	268.21	0.00	237.92	0.00	0.00	0.00	506.14	7.84	0.00	386.00	94.86	20.21	122.96	147.97
2021	739.32	0.00	118.86	0.00	9.48	0.00	867.67	12.06	0.00	394.93	93.74	16.84	131.69	152.67
2022	1186.89	0.00	7.10	0.00	0.55	0.00	1194.54	18.03	7.06	415.43	91.28	69.96	117.82	136.37
2023	1065.64	0.00	0.00	0.00	1.09	0.00	1066.73	23.37	7.06	404.30	89.19	78.27	123.10	113.75
2024	760.98	0.00	0.00	0.00	2.19	0.00	763.17	27.18	7.06	402.46	88.18	83.83	125.87	104.58
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	29.84	7.06	328.74	87.84	69.73	120.83	50.34
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	31.59	21.68	389.16	91.63	57.75	102.85	136.93
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	32.22	21.90	525.33	99.62	42.73	94.87	288.11
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	32.42	21.60	554.51	99.86	43.19	102.84	308.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.82	533.14	98.12	47.47	103.21	284.34
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.65	506.81	95.97	51.00	106.08	253.76
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.60	510.50	95.91	47.41	103.78	263.40
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.35	474.42	93.00	54.81	109.48	217.13
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.91	459.95	91.28	59.79	113.53	195.36
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.91	444.36	89.23	66.08	120.51	168.54
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.95	435.66	87.76	71.69	124.69	151.52
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	23.74	422.56	86.10	81.55	127.78	127.14
2037	0.00	0.00	79.21	0.00	0.00	0.00	79.21	32.82	20.78	421.86	85.36	85.07	130.22	121.22
2038	0.00	0.00	108.23	0.00	9.48	0.00	117.71	33.41	20.78	414.97	84.16	88.57	136.96	105.27
2039	0.00	0.00	16.41	0.00	0.00	0.00	16.41	33.49	24.85	402.35	82.37	109.99	146.01	63.98
2040	0.00	0.00	80.40	0.00	0.00	0.00	80.40	33.89	24.85	390.32	80.92	120.13	150.92	38.36
2041	0.00	0.00	111.94	0.00	74.66	0.00	186.60	34.82	24.85	379.04	79.59	127.03	157.67	14.75
2042	0.00	0.00	97.87	0.00	0.00	0.00	97.87	35.30	28.26	370.64	78.23	139.58	165.76	-12.93
2043	0.00	0.00	110.91	0.00	0.00	0.00	110.91	35.86	28.26	357.45	76.82	161.18	164.80	-45.35
2044	0.00	0.00	16.83	0.00	0.00	0.00	16.83	35.94	32.33	346.27	75.48	178.87	169.54	-77.62
2045	0.00	0.00	82.43	0.00	0.00	0.00	82.43	36.36	32.33	334.80	74.13	185.72	181.37	-106.42
2046	0.00	0.00	112.59	0.00	62.81	0.00	175.40	37.23	35.30	330.40	73.22	185.91	193.77	-122.49
2047	0.00	0.00	17.08	0.00	0.00	0.00	17.08	37.32	36.43	306.84	71.63	221.24	187.53	-173.56
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.43	324.01	72.99	197.62	187.56	-134.16
2049	0.00	0.00	149.27	0.00	10.08	0.00	159.35	37.32	36.44	324.01	72.99	197.62	187.56	-134.16
2050	0.00	0.00	215.64	0.00	10.08	0.00	225.72	37.32	36.44	324.01	72.99	197.62	187.56	-134.16
2051	0.00	0.00	96.58	0.00	10.08	0.00	106.66	37.32	38.22	324.01	72.99	197.62	187.56	-134.16
2052	0.00	0.00	7.10	0.00	10.08	0.00	17.18	37.32	38.23	324.01	72.99	197.62	187.56	-134.16
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.23	324.01	72.99	197.62	187.56	-134.16
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	324.01	72.99	197.62	187.56	-134.16
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	324.01	72.99	197.62	187.56	-134.16
2056	0.00	0.00	0.00	0.00	9.48	0.00	9.48	37.32	39.42	324.01	72.99	197.62	187.56	-134.16
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	39.42	324.01	72.99	197.62	187.56	-134.16
2067	0.00	0.00	79.21	0.00	0.00	0.00	79.21	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2068	0.00	0.00	108.18	0.00	0.00	0.00	108.18	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2069	0.00	0.00	16.41	0.00	0.00	0.00	16.41	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2070	0.00	0.00	80.40	0.00	0.00	0.00	80.40	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2071	0.00	0.00	109.81	0.00	0.00	0.00	109.81	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2072	0.00	0.00	97.87	0.00	0.55	0.00	98.42	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2073	0.00	0.00	110.91	0.00	10.58	0.00	121.49	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2074	0.00	0.00	16.83	0.00	2.19	0.00	19.01	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2075	0.00	0.00	82.43	0.00	4.93	0.00	87.36	37.32	52.29	324.01	72.99	197.62	187.56	-134.16
2076	0.00	0.00	112.59	0.00	58.19	0.00	170.77	37.32	39.42	324.01	72.99	197.62	187.56	-134.16
2077	0.00	0.00	17.08	0.00	0.00	0.00	17.08	37.32	54.07	324.01	72.99	197.62	187.56	-134.16
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	324.01	72.99	197.62	187.56	-134.16
2079	0.00	0.00	149.27	0.00	0.00	0.00	149.27	37.32	54.07	324.01	72.99	197.62	187.56	-134.16
2080	0.00	0.00	215.64	0.00	0.00	0.00	215.64	37.32	38.24	324.01	72.99	197.62	187.56	-134.16
2081	0.00	0.00	96.58	0.00	47.11	0.00	143.69	37.32	54.07	324.01	72.99	197.62	187.56	-134.16
2082	0.00	0.00	7.10	0.00	0.00	0.00	7.10	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	39.42	324.01	72.99	197.62	187.56	-134.16
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	324.01	72.99	197.62	187.56	-134.16
Salvage Value	1.77	0.00	6.15	0.00	1.00	0.00	8.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	573.48	0.00	79.06	0.00	4265.54	335.86	222.15	6355.96	1486.61	1148.75	2046.17	1674.43

Net Present Value: -3149

Wind/C26

TABLE 105
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	352.45	103.29	24.03	104.25	120.88
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	362.42	101.40	25.15	106.58	129.29
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	381.33	99.79	25.80	108.51	147.23
2018	217.91	0.00	0.00	0.00	0.00	0.00	217.91	3.36	0.00	360.10	96.94	28.24	111.34	123.57
2019	261.93	0.00	0.00	0.00	0.00	0.00	261.93	4.67	0.00	351.08	94.96	25.50	112.83	117.80
2020	268.21	0.00	0.00	9.79	13.83	0.00	291.83	6.13	0.00	382.58	94.43	21.68	124.08	142.40
2021	739.32	0.00	0.00	298.83	23.04	0.00	1061.19	11.43	0.00	384.13	92.55	21.15	134.42	136.02
2022	1186.89	0.00	0.00	304.42	28.20	0.00	1519.51	19.03	6.34	388.08	90.90	21.21	135.37	140.60
2023	1065.64	0.00	0.00	294.63	14.92	0.00	1375.19	25.91	12.69	384.93	88.39	24.37	139.33	132.84
2024	760.98	0.00	0.00	5.59	6.80	0.00	773.37	29.77	19.03	387.39	86.48	25.10	144.27	131.53
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	32.43	19.03	313.57	86.37	16.53	160.24	50.43
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	34.18	33.65	412.95	90.48	19.67	110.87	191.92
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	34.81	33.87	560.80	98.39	17.73	99.03	345.65
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	35.02	33.57	583.74	98.27	19.41	107.10	358.97
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.79	560.07	96.58	19.71	108.29	335.49
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.62	547.08	95.50	19.20	107.85	324.53
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.57	532.93	94.04	19.84	110.48	308.57
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	35.02	33.32	512.93	92.58	19.78	112.74	287.83
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	32.88	486.44	91.03	19.65	114.33	261.42
2034	0.00	0.00	100.31	0.00	0.00	0.00	100.31	35.41	32.88	461.96	89.55	19.75	116.24	236.42
2035	0.00	0.00	128.86	0.00	9.48	0.00	138.34	35.99	32.92	453.61	88.52	18.24	119.80	227.05
2036	0.00	0.00	94.98	0.00	0.00	0.00	94.98	36.46	39.78	436.42	86.40	33.50	123.78	192.75
2037	0.00	0.00	107.69	0.00	9.48	0.00	117.17	37.05	36.82	422.50	84.92	37.85	128.97	170.76
2038	0.00	0.00	16.33	0.00	0.00	0.00	16.33	37.13	40.89	415.35	83.64	49.13	133.21	149.37
2039	0.00	0.00	80.00	0.00	0.00	0.00	80.00	37.53	40.89	405.33	82.45	48.36	147.80	126.73
2040	0.00	0.00	111.39	9.79	74.66	0.00	195.84	38.50	40.89	388.76	80.74	62.20	151.51	94.31
2041	0.00	0.00	97.38	298.83	0.00	0.00	396.21	40.48	44.97	378.09	79.33	76.13	156.67	65.96
2042	0.00	0.00	110.36	304.42	0.00	0.00	414.78	42.55	44.30	366.60	78.02	79.59	166.33	42.66
2043	0.00	0.00	98.36	294.63	0.00	0.00	392.99	44.52	48.37	359.01	76.70	88.87	177.61	15.83
2044	0.00	0.00	111.47	5.59	62.81	0.00	179.87	45.42	48.37	342.75	75.32	111.15	175.29	-19.00
2045	0.00	0.00	16.91	0.00	0.00	0.00	16.91	45.50	52.46	332.91	74.03	129.63	180.62	-51.37
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	55.43	321.16	72.73	132.31	195.53	-79.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.47	309.94	71.47	134.07	213.45	-109.05
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.48	321.34	72.74	132.00	196.54	-79.94
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.49	321.34	72.74	132.00	196.54	-79.94
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.49	321.34	72.74	132.00	196.54	-79.94
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	54.27	321.34	72.74	132.00	196.54	-79.94
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	54.28	321.34	72.74	132.00	196.54	-79.94
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	321.34	72.74	132.00	196.54	-79.94
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	321.34	72.74	132.00	196.54	-79.94
2055	0.00	0.00	0.00	0.00	3.46	0.00	3.46	45.50	54.28	321.34	72.74	132.00	196.54	-79.94
2056	0.00	0.00	0.00	0.00	5.76	0.00	5.76	45.50	55.46	321.34	72.74	132.00	196.54	-79.94
2057	0.00	0.00	0.00	0.00	6.91	0.00	6.91	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2058	0.00	0.00	0.00	0.00	3.46	0.00	3.46	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2059	0.00	0.00	0.00	0.00	1.15	0.00	1.15	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2060	0.00	0.00	0.00	9.79	0.00	0.00	9.79	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2061	0.00	0.00	0.00	298.83	0.00	0.00	298.83	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2062	0.00	0.00	0.00	304.42	0.00	0.00	304.42	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2063	0.00	0.00	0.00	294.63	0.00	0.00	294.63	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2064	0.00	0.00	78.03	5.59	0.00	0.00	83.63	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2065	0.00	0.00	106.58	0.00	0.00	0.00	106.58	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2066	0.00	0.00	94.98	0.00	0.00	0.00	94.98	45.50	55.46	321.34	72.74	132.00	196.54	-79.94
2067	0.00	0.00	107.64	0.00	0.00	0.00	107.64	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2068	0.00	0.00	16.33	0.00	0.00	0.00	16.33	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2069	0.00	0.00	80.00	0.00	0.00	0.00	80.00	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2070	0.00	0.00	109.27	0.00	19.85	0.00	129.12	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2071	0.00	0.00	97.38	0.00	17.28	0.00	114.67	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2072	0.00	0.00	110.36	0.00	30.77	0.00	141.13	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2073	0.00	0.00	98.36	0.00	11.46	0.00	109.82	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2074	0.00	0.00	111.47	0.00	5.65	0.00	117.12	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2075	0.00	0.00	16.91	0.00	60.92	0.00	77.83	45.50	68.33	321.34	72.74	132.00	196.54	-79.94
2076	0.00	0.00	0.00	0.00	2.19	0.00	2.19	45.50	55.46	321.34	72.74	132.00	196.54	-79.94
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	70.11	321.34	72.74	132.00	196.54	-79.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	321.34	72.74	132.00	196.54	-79.94
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	45.50	70.11	321.34	72.74	132.00	196.54	-79.94
2080	0.00	0.00	0.00	9.79	0.00	0.00	9.79	45.50	54.28	321.34	72.74	132.00	196.54	-79.94
2081	0.00	0.00	0.00	298.83	0.00	0.00	298.83	45.50	70.11	321.34	72.74	132.00	196.54	-79.94
2082	0.00	0.00	0.00	304.42	0.00	0.00	304.42	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2083	0.00	0.00	0.00	294.63	0.00	0.00	294.63	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2084	0.00	0.00	0.00	5.59	10.08	0.00	15.67	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	55.46	321.34	72.74	132.00	196.54	-79.94
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
2090	0.00	0.00	0.00	0.00	18.67	0.00	18.67	45.50	52.50	321.34	72.74	132.00	196.54	-79.94
Salvage Value	1.77	0.00	3.00	4.87	1.51	0.00	11.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	254.81	762.36	131.44	0.00	4761.62	375.93	347.44	6402.43	1479.32	671.91	2129.81	2121.40

Net Present Value -3364

K19/C25/750MW (WPS Sale &Inv)

TABLE 106
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	4.96	320.64	1.60	0.00	317.99	105.22	20.25	100.48	92.04
2015	90.00	558.63	0.00	0.00	22.21	8.93	679.78	5.00	0.00	348.51	103.30	24.00	104.33	116.88
2016	203.55	742.67	0.00	0.00	31.55	23.00	1000.77	10.01	0.00	359.24	101.42	25.17	106.74	125.92
2017	240.87	900.50	0.00	0.00	47.62	33.55	1222.53	16.12	0.00	375.35	99.42	26.89	109.76	139.29
2018	289.99	641.80	0.00	0.00	53.35	135.56	1120.71	21.72	0.00	359.55	97.28	27.52	110.94	123.81
2019	297.44	450.39	0.00	0.00	67.54	113.27	928.64	26.37	13.29	387.12	97.21	26.08	110.63	153.20
2020	821.32	186.45	0.00	0.00	4.34	202.72	1214.83	32.44	45.83	630.53	104.50	20.66	126.35	379.02
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	39.63	43.92	712.36	105.07	22.72	136.16	448.42
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	45.71	42.55	709.65	103.86	22.73	138.69	444.37
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	50.19	40.67	678.49	101.48	22.60	142.98	411.42
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	53.54	39.07	655.15	99.24	25.11	148.68	382.13
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	56.02	52.00	675.40	103.96	22.29	116.05	433.10
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	57.36	50.42	880.89	112.24	22.23	116.82	629.61
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	57.59	48.96	918.60	112.29	21.75	127.77	656.80
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	47.93	908.61	110.58	22.48	131.02	644.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	49.25	887.77	108.61	22.51	134.16	622.48
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	43.96	877.91	107.25	22.04	135.90	612.73
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	42.61	865.34	105.56	22.51	139.61	597.66
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	41.09	846.22	103.83	22.57	142.94	576.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	40.06	821.64	102.00	22.59	146.18	550.86
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	39.10	798.51	100.24	22.76	150.40	525.11
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	40.40	757.86	98.52	22.55	146.95	489.84
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	36.88	687.57	96.88	22.96	131.34	436.39
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	57.59	36.35	654.72	95.22	23.07	132.66	403.77
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	35.83	629.12	93.54	23.02	137.41	375.15
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	58.16	38.28	605.30	91.89	22.97	149.37	341.07
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	59.01	34.83	601.80	90.59	21.84	159.70	329.67
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	59.13	37.76	582.50	88.54	38.96	161.45	293.55
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	59.71	37.30	567.69	86.97	43.45	167.63	269.64
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	60.57	36.85	556.85	85.58	45.86	175.75	249.66
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	61.29	42.27	552.99	84.34	52.59	184.75	231.31
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.59	44.81	527.89	82.45	68.05	185.82	191.56
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.71	45.53	516.14	80.99	82.58	191.65	160.93
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	44.25	502.27	79.68	86.30	200.51	135.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	42.98	515.43	81.04	78.98	192.66	162.76
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	62.71	45.58	515.43	81.04	78.98	192.66	162.76
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	62.71	44.04	515.43	81.04	78.98	192.66	162.76
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	62.71	43.70	515.43	81.04	78.98	192.66	162.76
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	62.71	43.38	515.43	81.04	78.98	192.66	162.76
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	62.71	43.06	515.43	81.04	78.98	192.66	162.76
2054	0.00	0.00	0.00	0.00	23.52	24.86	48.38	62.71	42.75	515.43	81.04	78.98	192.66	162.76
2055	0.00	0.00	0.00	0.00	1.07	25.78	26.85	62.71	43.63	515.43	81.04	78.98	192.66	162.76
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.71	56.21	515.43	81.04	78.98	192.66	162.76
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	62.71	40.10	515.43	81.04	78.98	192.66	162.76
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.71	55.66	515.43	81.04	78.98	192.66	162.76
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	62.71	42.53	515.43	81.04	78.98	192.66	162.76
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	62.71	52.37	515.43	81.04	78.98	192.66	162.76
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	68.20	515.43	81.04	78.98	192.66	162.76
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	62.71	68.20	515.43	81.04	78.98	192.66	162.76
2065	0.00	0.00	0.00	0.00	11.58	5.61	17.20	62.71	39.50	515.43	81.04	78.98	192.66	162.76
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	62.71	68.20	515.43	81.04	78.98	192.66	162.76
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	62.71	68.20	515.43	81.04	78.98	192.66	162.76
2069	0.00	0.00	114.57	0.00	44.02	75.78	234.37	62.71	39.50	515.43	81.04	78.98	192.66	162.76
2070	0.00	0.00	156.79	0.00	3.27	78.59	238.65	62.71	54.15	515.43	81.04	78.98	192.66	162.76
2071	0.00	0.00	23.83	0.00	39.94	0.00	63.77	62.71	38.32	515.43	81.04	78.98	192.66	162.76
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	62.71	54.15	515.43	81.04	78.98	192.66	162.76
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	62.71	37.43	515.43	81.04	78.98	192.66	162.76
2074	0.00	0.00	142.97	0.00	62.80	0.00	205.78	62.71	52.37	515.43	81.04	78.98	192.66	162.76
2075	0.00	0.00	162.36	0.00	93.85	0.00	256.21	62.71	39.50	515.43	81.04	78.98	192.66	162.76
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	62.71	54.15	515.43	81.04	78.98	192.66	162.76
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	38.32	515.43	81.04	78.98	192.66	162.76
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	62.71	54.15	515.43	81.04	78.98	192.66	162.76
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	41.28	515.43	81.04	78.98	192.66	162.76
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	62.71	54.15	515.43	81.04	78.98	192.66	162.76
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	62.71	39.50	515.43	81.04	78.98	192.66	162.76
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	62.71	36.54	515.43	81.04	78.98	192.66	162.76
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	62.71	39.50	515.43	81.04	78.98	192.66	162.76
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	62.71	39.50	515.43	81.04	78.98	192.66	162.76
Salvage Value	0.97	0.00	3.46	0.00	4.67	2.32	11.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	181.29	0.00	486.59	403.67	8397.11	673.97	494.22	9549.58	1609.11	516.49	2207.98	5215.99

Net Present Value -4349

K19/C25/750MW

TABLE 107
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	6.80	322.48	1.61	0.00	319.00	105.22	20.25	100.07	93.45
2015	90.00	558.63	0.00	0.00	22.21	11.15	681.99	5.02	0.00	350.53	103.30	24.03	104.27	118.93
2016	203.55	742.67	0.00	0.00	31.55	23.95	1001.73	10.03	0.00	360.47	101.41	25.12	106.66	127.28
2017	240.87	900.50	0.00	0.00	47.62	33.55	1222.53	16.14	0.00	375.60	99.42	26.85	109.69	139.65
2018	289.99	641.80	0.00	0.00	53.35	187.94	1173.09	22.01	0.00	358.53	97.27	27.45	110.91	122.91
2019	297.44	450.39	0.00	0.00	67.54	132.21	947.59	26.75	13.29	385.79	97.20	26.05	110.63	151.91
2020	821.32	186.45	0.00	0.00	4.34	350.24	1362.36	33.56	49.02	633.93	104.50	20.63	125.96	382.85
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	40.75	47.22	715.88	105.08	22.86	136.07	451.86
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	46.83	45.88	713.16	103.86	22.73	138.43	448.14
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	51.31	43.85	682.66	101.48	22.60	142.80	415.77
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	54.66	42.12	659.53	99.21	25.17	148.52	386.63
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	57.14	54.92	679.74	103.95	22.32	115.75	437.71
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	58.48	53.22	864.56	112.23	22.32	113.37	616.64
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	58.71	51.65	879.75	112.30	21.59	118.84	627.02
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	50.50	868.20	110.59	22.44	121.42	613.75
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	51.71	849.84	108.61	22.51	124.78	593.92
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	46.31	842.65	107.23	22.06	126.62	586.74
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	44.86	833.11	105.55	22.62	130.36	574.57
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	43.24	817.34	103.82	22.62	134.13	556.77
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	42.11	796.35	102.01	22.52	137.90	533.91
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	41.06	776.94	100.25	22.65	142.79	511.24
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	42.27	706.57	98.59	22.77	126.58	458.64
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	38.67	676.00	96.88	22.99	128.14	428.00
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	58.71	38.06	652.52	95.20	23.00	131.95	402.37
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	37.47	627.87	93.54	22.98	136.57	374.78
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	59.28	39.86	604.88	91.89	23.01	148.49	341.49
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	60.13	36.34	601.22	90.59	21.84	158.82	329.98
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	60.25	39.20	582.08	88.54	38.96	160.82	293.77
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	60.83	38.68	567.45	86.97	43.45	167.09	269.95
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	61.69	38.18	556.38	85.58	45.86	175.10	249.84
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	62.41	43.53	552.68	84.34	52.59	184.21	231.54
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	63.71	46.02	527.68	82.45	68.05	185.41	191.76
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	63.83	46.69	515.79	80.99	82.58	191.10	161.13
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	45.35	501.95	79.68	86.30	199.99	135.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	44.04	515.14	81.04	78.98	192.16	162.96
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	63.83	46.58	515.14	81.04	78.98	192.16	162.96
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	63.83	45.00	515.14	81.04	78.98	192.16	162.96
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	63.83	44.62	515.14	81.04	78.98	192.16	162.96
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	63.83	44.24	515.14	81.04	78.98	192.16	162.96
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	63.83	43.89	515.14	81.04	78.98	192.16	162.96
2054	0.00	0.00	0.00	0.00	23.52	24.86	48.38	63.83	43.53	515.14	81.04	78.98	192.16	162.96
2055	0.00	0.00	0.00	0.00	1.07	25.78	26.85	63.83	44.38	515.14	81.04	78.98	192.16	162.96
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	63.83	56.92	515.14	81.04	78.98	192.16	162.96
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	63.83	40.77	515.14	81.04	78.98	192.16	162.96
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	63.83	56.29	515.14	81.04	78.98	192.16	162.96
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	63.83	43.13	515.14	81.04	78.98	192.16	162.96
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	63.83	52.37	515.14	81.04	78.98	192.16	162.96
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	68.20	515.14	81.04	78.98	192.16	162.96
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	63.83	68.20	515.14	81.04	78.98	192.16	162.96
2065	0.00	0.00	0.00	0.00	11.58	5.61	17.20	63.83	39.50	515.14	81.04	78.98	192.16	162.96
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	63.83	68.20	515.14	81.04	78.98	192.16	162.96
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	63.83	68.20	515.14	81.04	78.98	192.16	162.96
2069	0.00	0.00	114.57	0.00	44.02	75.78	234.37	63.83	39.50	515.14	81.04	78.98	192.16	162.96
2070	0.00	0.00	156.79	0.00	3.27	78.59	238.65	63.83	54.15	515.14	81.04	78.98	192.16	162.96
2071	0.00	0.00	23.83	0.00	39.94	0.00	63.77	63.83	38.32	515.14	81.04	78.98	192.16	162.96
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	63.83	54.15	515.14	81.04	78.98	192.16	162.96
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	63.83	37.43	515.14	81.04	78.98	192.16	162.96
2074	0.00	0.00	142.97	0.00	62.80	0.00	205.78	63.83	52.37	515.14	81.04	78.98	192.16	162.96
2075	0.00	0.00	162.36	0.00	93.85	0.00	256.21	63.83	39.50	515.14	81.04	78.98	192.16	162.96
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	63.83	54.15	515.14	81.04	78.98	192.16	162.96
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	38.32	515.14	81.04	78.98	192.16	162.96
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	63.83	54.15	515.14	81.04	78.98	192.16	162.96
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	41.28	515.14	81.04	78.98	192.16	162.96
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	63.83	54.15	515.14	81.04	78.98	192.16	162.96
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	63.83	39.50	515.14	81.04	78.98	192.16	162.96
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	63.83	36.54	515.14	81.04	78.98	192.16	162.96
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	63.83	39.50	515.14	81.04	78.98	192.16	162.96
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	63.83	39.50	515.14	81.04	78.98	192.16	162.96
Salvage Value	0.97	0.00	3.46	0.00	4.67	2.32	11.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	181.29	0.00	486.59	564.08	8557.52	686.96	518.00	9443.90	1609.09	516.51	2170.91	5147.39

Net Present Value -4615

K19/Gas25/750MW (WPS Sale & INV)

TABLE 108
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	4.96	288.02	1.44	0.00	317.99	105.22	20.25	100.48	92.04
2015	0.00	558.63	0.00	0.00	22.21	8.93	589.77	4.39	0.00	348.53	103.31	23.99	104.33	116.90
2016	0.00	742.67	0.00	0.00	31.55	23.00	797.22	8.38	0.00	359.26	101.42	25.16	106.73	125.96
2017	0.00	900.50	0.00	0.00	47.62	33.55	981.66	13.28	0.00	375.66	99.42	26.86	109.72	139.66
2018	0.00	641.80	0.00	0.00	53.35	135.56	830.72	17.44	0.00	360.04	97.27	27.47	110.88	124.41
2019	0.00	450.39	0.00	0.00	63.21	113.27	626.87	20.57	13.29	388.02	97.21	26.06	110.61	154.14
2020	0.00	186.45	0.00	0.00	0.01	202.72	389.18	22.52	45.83	631.97	104.50	20.63	126.23	380.62
2021	0.00	64.80	0.37	0.00	0.00	0.00	65.17	22.84	43.92	714.94	105.07	22.71	135.91	451.25
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	22.84	42.55	712.46	103.86	22.68	138.41	447.51
2023	0.00	0.00	124.75	0.00	0.00	0.00	124.75	23.35	40.67	678.76	100.98	24.18	143.17	410.44
2024	0.00	0.00	265.70	0.00	12.34	0.00	278.04	24.63	39.07	659.37	98.91	26.54	148.82	385.11
2025	0.00	0.00	164.65	0.00	97.19	0.00	261.84	25.93	41.46	582.59	98.61	25.74	135.02	323.22
2026	0.00	0.00	126.10	0.00	0.00	0.00	126.10	26.56	43.74	595.87	97.27	30.83	141.55	326.21
2027	0.00	0.00	143.20	0.00	0.00	0.00	143.20	27.28	42.42	583.00	95.25	30.23	151.67	305.85
2028	0.00	0.00	21.77	0.00	0.00	0.00	21.77	27.39	45.24	565.42	92.87	45.20	156.31	271.04
2029	0.00	0.00	106.85	0.00	0.00	0.00	106.85	27.92	46.73	549.20	91.03	50.28	162.63	245.26
2030	0.00	0.00	146.23	0.00	81.76	0.00	227.99	29.06	41.50	546.50	89.93	55.39	167.14	234.03
2031	0.00	0.00	130.58	0.00	0.00	0.00	130.58	29.71	44.41	554.25	89.56	60.33	169.98	234.38
2032	0.00	0.00	148.28	0.00	0.00	0.00	148.28	30.45	43.28	532.94	87.13	72.46	179.06	194.29
2033	0.00	0.00	22.54	0.00	0.00	0.00	22.54	30.57	46.25	523.32	85.56	86.81	185.60	165.35
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	45.18	519.69	84.81	91.52	190.31	153.05
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	43.70	445.24	82.62	87.79	183.17	91.66
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	43.15	364.29	81.13	89.50	161.88	31.79
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	42.62	336.42	79.68	97.77	163.31	-4.34
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	42.10	332.64	78.94	96.23	173.32	-15.85
2039	0.00	0.00	240.03	0.00	0.00	0.00	240.03	31.77	44.56	306.29	76.94	118.08	180.95	-69.69
2040	0.00	0.00	347.45	0.00	0.00	0.00	347.45	33.50	41.11	291.39	75.57	130.62	186.86	-101.66
2041	0.00	0.00	155.93	0.00	12.34	0.00	168.27	34.35	40.64	303.51	75.86	129.79	186.67	-88.82
2042	0.00	0.00	11.49	0.00	0.00	0.00	11.49	34.40	47.24	349.60	73.54	200.50	188.68	-113.11
2043	0.00	0.00	117.81	0.00	0.00	0.00	117.81	34.99	46.80	326.74	71.77	217.49	196.21	-158.73
2044	0.00	0.00	161.23	0.00	81.76	0.00	242.99	36.21	48.14	302.60	70.11	232.66	203.89	-204.06
2045	0.00	0.00	77.06	0.00	0.00	0.00	77.06	36.59	51.81	291.36	68.76	256.18	209.92	-243.50
2046	0.00	0.00	71.92	0.00	0.00	0.00	71.92	36.95	51.40	278.72	67.54	275.73	216.33	-280.88
2047	0.00	0.00	10.93	0.00	0.00	0.00	10.93	37.01	51.60	272.61	66.72	283.67	227.16	-304.93
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	50.33	280.90	67.67	271.86	217.80	-276.44
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	37.01	52.93	280.90	67.67	271.86	217.80	-276.44
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	37.01	49.62	280.90	67.67	271.86	217.80	-276.44
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	37.01	49.28	280.90	67.67	271.86	217.80	-276.44
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	37.01	48.95	280.90	67.67	271.86	217.80	-276.44
2053	0.00	0.00	102.47	0.00	27.52	24.86	154.86	37.01	48.63	280.90	67.67	271.86	217.80	-276.44
2054	0.00	0.00	243.42	0.00	22.45	24.86	290.74	37.01	48.32	280.90	67.67	271.86	217.80	-276.44
2055	0.00	0.00	162.53	0.00	0.00	25.78	188.31	37.01	48.02	280.90	67.67	271.86	217.80	-276.44
2056	0.00	0.00	126.10	0.00	0.00	0.00	126.10	37.01	63.56	280.90	67.67	271.86	217.80	-276.44
2057	0.00	0.00	143.20	0.00	0.00	0.00	143.20	37.01	47.45	280.90	67.67	271.86	217.80	-276.44
2058	0.00	0.00	21.77	0.00	0.00	0.00	21.77	37.01	63.01	280.90	67.67	271.86	217.80	-276.44
2059	0.00	0.00	106.85	0.00	12.34	0.00	119.19	37.01	49.87	280.90	67.67	271.86	217.80	-276.44
2060	0.00	0.00	146.23	0.00	72.89	0.00	219.12	37.01	59.72	280.90	67.67	271.86	217.80	-276.44
2061	0.00	0.00	130.58	0.00	0.00	0.00	130.58	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2062	0.00	0.00	148.28	0.00	0.00	0.00	148.28	37.01	59.72	280.90	67.67	271.86	217.80	-276.44
2063	0.00	0.00	22.54	0.00	0.00	0.00	22.54	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	37.01	59.72	280.90	67.67	271.86	217.80	-276.44
2065	0.00	0.00	0.00	0.00	72.90	5.61	78.52	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	37.01	59.72	280.90	67.67	271.86	217.80	-276.44
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	37.01	59.72	280.90	67.67	271.86	217.80	-276.44
2069	0.00	0.00	240.03	0.00	40.76	75.78	356.56	37.01	46.85	280.90	67.67	271.86	217.80	-276.44
2070	0.00	0.00	347.45	0.00	0.01	78.59	426.05	37.01	45.66	280.90	67.67	271.86	217.80	-276.44
2071	0.00	0.00	155.93	0.00	0.00	0.00	155.93	37.01	45.66	280.90	67.67	271.86	217.80	-276.44
2072	0.00	0.00	11.49	0.00	0.00	0.00	11.49	37.01	45.66	280.90	67.67	271.86	217.80	-276.44
2073	0.00	0.00	117.81	0.00	0.00	0.00	117.81	37.01	44.77	280.90	67.67	271.86	217.80	-276.44
2074	0.00	0.00	161.23	0.00	0.00	0.00	161.23	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2075	0.00	0.00	77.06	0.00	24.30	0.00	101.36	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2076	0.00	0.00	71.92	0.00	12.34	0.00	84.26	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2077	0.00	0.00	10.93	0.00	0.00	0.00	10.93	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	37.01	46.85	280.90	67.67	271.86	217.80	-276.44
2080	0.00	0.00	0.00	0.00	20.44	0.00	20.44	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2083	0.00	0.00	102.47	0.00	0.00	0.00	102.47	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2084	0.00	0.00	243.42	0.00	11.05	0.92	255.40	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2085	0.00	0.00	162.53	0.00	10.63	1.84	175.00	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2086	0.00	0.00	126.10	0.00	30.15	5.52	161.78	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2087	0.00	0.00	143.20	0.00	35.54	8.29	187.02	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2088	0.00	0.00	21.77	0.00	27.52	24.86	74.15	37.01	43.89	280.90	67.67	271.86	217.80	-276.44
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	37.01	46.85	280.90	67.67	271.86	217.80	-276.44
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	37.01	46.85	280.90	67.67	271.86	217.80	-276.44
Salvage Value	0.00	0.00	10.87	0.00	2.61	2.32	15.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	953.97	0.00	324.85	403.67	4862.43	378.36	507.22	7352.42	1491.29	1258.59	2431.40	2171.14

Net Present Value -3577

K19/C31/750MW

TABLE 109
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	258.05	0.00	0.00	25.01	6.80	321.81	1.61	0.00	319.00	105.22	20.25	100.07	93.45
2015	40.34	558.63	0.00	0.00	22.21	11.15	632.33	4.77	0.00	350.53	103.30	24.03	104.27	118.93
2016	10.98	742.67	0.00	0.00	31.55	23.95	809.16	8.82	0.00	360.47	101.41	25.12	106.66	127.28
2017	11.07	900.50	0.00	0.00	47.62	33.55	992.73	13.78	0.00	376.02	99.42	26.85	109.69	140.06
2018	13.18	641.80	0.00	0.00	53.35	187.94	896.27	18.26	0.00	358.99	97.25	27.44	110.84	123.46
2019	13.28	450.39	0.00	0.00	63.21	132.21	659.09	21.56	13.29	386.62	97.19	26.09	110.60	152.74
2020	13.38	186.45	0.00	0.00	0.01	350.24	550.09	24.31	49.02	635.47	104.49	20.68	125.83	384.47
2021	16.96	64.80	0.00	0.00	0.00	0.00	81.76	24.72	47.22	718.04	105.06	22.82	135.77	454.39
2022	188.48	0.00	0.00	0.00	0.00	0.00	188.48	25.66	45.88	716.31	103.87	22.71	138.09	451.65
2023	285.89	0.00	0.00	0.00	0.00	0.00	285.89	27.09	43.85	681.41	100.87	24.45	143.26	412.84
2024	313.80	0.00	0.00	0.00	0.00	0.00	313.80	28.66	42.12	661.38	98.72	27.19	149.80	385.67
2025	320.45	0.00	0.00	0.00	4.33	0.00	324.78	30.28	40.31	583.48	98.63	19.60	142.41	322.85
2026	869.95	0.00	0.00	0.00	4.33	0.00	874.28	34.65	38.38	563.70	96.69	20.23	156.22	290.55
2027	1385.33	0.00	0.00	0.00	52.77	0.00	1438.09	41.84	36.95	516.80	94.72	19.04	154.65	248.39
2028	1246.13	0.00	0.00	0.00	27.62	0.00	1273.74	48.21	35.58	494.62	93.11	19.78	168.13	213.60
2029	891.53	0.00	0.00	0.00	46.57	0.00	938.11	52.90	36.97	478.39	91.46	20.36	185.26	181.31
2030	618.59	0.00	0.00	0.00	80.98	0.00	699.57	56.40	31.62	474.25	90.10	20.82	199.46	163.88
2031	407.07	0.00	0.00	0.00	107.18	0.00	514.25	58.97	44.95	556.85	94.23	24.05	124.77	313.80
2032	150.21	0.00	0.00	0.00	125.54	0.00	275.74	60.35	43.93	740.96	101.62	23.62	120.48	495.24
2033	47.49	0.00	0.00	0.00	0.00	0.00	47.49	60.59	42.59	800.09	102.10	23.10	138.26	536.63
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	41.65	777.10	100.26	22.64	142.69	511.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	39.90	705.45	98.59	22.62	126.50	457.74
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	39.21	675.93	96.88	23.12	128.13	427.80
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	60.59	38.42	652.96	95.21	23.06	131.98	402.71
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	37.46	627.93	93.54	22.97	136.57	374.85
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	61.16	39.92	604.97	91.90	23.00	148.49	341.58
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	62.01	36.52	601.22	90.59	21.84	158.83	329.97
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	62.12	42.83	582.08	88.54	38.96	160.80	293.78
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	62.71	39.35	567.45	86.97	43.45	167.10	269.94
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	63.57	38.85	556.38	85.58	45.86	175.11	249.83
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	64.29	44.21	552.68	84.34	52.59	184.20	231.55
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	65.58	43.73	527.68	82.45	68.05	185.41	191.76
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	65.71	47.36	515.79	80.99	82.58	191.11	161.12
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	45.35	501.95	79.68	86.30	199.99	135.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	44.04	515.14	81.04	78.98	192.17	162.95
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	65.71	46.58	515.14	81.04	78.98	192.17	162.95
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	65.71	43.22	515.14	81.04	78.98	192.17	162.95
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	65.71	45.80	515.14	81.04	78.98	192.17	162.95
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	65.71	42.47	515.14	81.04	78.98	192.17	162.95
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	65.71	42.11	515.14	81.04	78.98	192.17	162.95
2054	0.00	0.00	0.00	0.00	22.45	24.86	47.31	65.71	41.76	515.14	81.04	78.98	192.17	162.95
2055	0.00	0.00	0.00	0.00	0.00	25.78	25.78	65.71	41.42	515.14	81.04	78.98	192.17	162.95
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	58.69	515.14	81.04	78.98	192.17	162.95
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	42.55	515.14	81.04	78.98	192.17	162.95
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	58.07	515.14	81.04	78.98	192.17	162.95
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	44.90	515.14	81.04	78.98	192.17	162.95
2060	0.00	0.00	0.00	0.00	1.07	0.00	1.07	65.71	54.15	515.14	81.04	78.98	192.17	162.95
2061	0.00	0.00	0.00	0.00	1.07	0.00	1.07	65.71	39.50	515.14	81.04	78.98	192.17	162.95
2062	0.00	0.00	0.00	0.00	12.83	0.00	12.83	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2063	0.00	0.00	0.00	0.00	6.42	0.00	6.42	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2064	0.00	0.00	0.00	0.00	24.65	2.81	27.45	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2065	0.00	0.00	0.00	0.00	29.76	5.61	35.37	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2066	0.00	0.00	0.00	0.00	27.06	16.84	43.90	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2067	0.00	0.00	0.00	0.00	43.09	25.26	68.35	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	65.71	68.20	515.14	81.04	78.98	192.17	162.95
2069	0.00	0.00	114.57	0.00	40.76	75.78	231.11	65.71	39.50	515.14	81.04	78.98	192.17	162.95
2070	0.00	0.00	156.79	0.00	0.01	78.59	235.39	65.71	54.15	515.14	81.04	78.98	192.17	162.95
2071	0.00	0.00	23.83	0.00	0.00	0.00	23.83	65.71	41.28	515.14	81.04	78.98	192.17	162.95
2072	0.00	0.00	116.99	0.00	0.00	0.00	116.99	65.71	54.15	515.14	81.04	78.98	192.17	162.95
2073	0.00	0.00	160.11	0.00	0.00	0.00	160.11	65.71	37.43	515.14	81.04	78.98	192.17	162.95
2074	0.00	0.00	142.97	0.00	0.00	0.00	142.97	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2075	0.00	0.00	162.36	0.00	15.60	0.00	177.96	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2076	0.00	0.00	24.68	0.00	3.26	0.00	27.94	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2077	0.00	0.00	0.00	0.00	39.94	0.00	39.94	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2078	0.00	0.00	0.00	0.00	33.54	0.00	33.54	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2079	0.00	0.00	0.00	0.00	35.88	0.00	35.88	65.71	39.50	515.14	81.04	78.98	192.17	162.95
2080	0.00	0.00	0.00	0.00	135.69	0.00	135.69	65.71	52.37	515.14	81.04	78.98	192.17	162.95
2081	0.00	0.00	0.00	0.00	81.51	0.00	81.51	65.71	39.50	515.14	81.04	78.98	192.17	162.95
2082	0.00	0.00	0.00	0.00	94.53	0.00	94.53	65.71	54.15	515.14	81.04	78.98	192.17	162.95
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	38.32	515.14	81.04	78.98	192.17	162.95
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	65.71	54.15	515.14	81.04	78.98	192.17	162.95
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	65.71	38.32	515.14	81.04	78.98	192.17	162.95
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	65.71	54.15	515.14	81.04	78.98	192.17	162.95
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	65.71	36.54	515.14	81.04	78.98	192.17	162.95
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	65.71	39.50	515.14	81.04	78.98	192.17	162.95
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	65.71	39.50	515.14	81.04	78.98	192.17	162.95
Salvage Value	7.27	0.00	3.46	0.00	5.23	2.32	18.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3035.28	3179.95	181.29	0.00	406.42	564.08	7367.03	590.12	479.28	8548.39	1566.01	513.78	2283.75	4184.85

Net Present Value -4252

K19/Gas31/750MW

TABLE 110
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	6.80	289.87	1.45	0.00	319.00	105.22	20.25	100.07	93.45
2015	0.00	558.63	0.00	0.00	22.21	11.15	591.99	4.41	0.00	350.53	103.30	24.03	104.27	118.93
2016	0.00	742.67	0.00	0.00	31.55	23.95	798.17	8.40	0.00	360.47	101.41	25.12	106.66	127.28
2017	0.00	900.50	0.00	0.00	47.62	33.55	981.66	13.31	0.00	376.02	99.42	26.85	109.69	140.06
2018	0.00	641.80	0.00	0.00	53.35	187.94	883.10	17.72	0.00	358.99	97.25	27.44	110.84	123.46
2019	0.00	450.39	0.00	0.00	63.21	132.21	645.81	20.95	13.29	386.62	97.19	26.09	110.60	152.74
2020	0.00	186.45	0.00	0.00	0.01	350.24	536.70	23.64	49.02	635.47	104.49	20.68	125.83	384.47
2021	0.00	64.80	0.00	0.00	0.00	0.00	64.80	23.96	47.22	718.04	105.06	22.82	135.77	454.39
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	45.88	716.26	103.87	22.73	138.12	451.54
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	43.85	681.97	100.87	24.45	143.23	413.42
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	42.12	662.28	98.72	27.21	149.73	386.63
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	40.31	585.76	98.62	19.62	142.78	324.74
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	38.38	568.08	96.68	20.36	157.09	293.95
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	23.96	36.95	522.33	94.70	19.11	155.36	253.15
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	23.96	35.58	502.87	93.09	19.78	169.95	220.05
2029	0.00	0.00	235.99	0.00	0.00	0.00	235.99	25.03	36.97	485.09	91.52	20.05	185.10	188.41
2030	0.00	0.00	422.33	0.00	24.68	0.00	447.02	27.15	31.62	487.54	90.92	17.86	195.13	183.64
2031	0.00	0.00	193.82	0.00	97.19	0.00	291.01	28.60	38.48	475.81	88.71	41.13	158.30	187.67
2032	0.00	0.00	131.49	0.00	0.00	0.00	131.49	29.25	41.32	465.18	87.10	52.23	163.08	162.78
2033	0.00	0.00	149.32	0.00	0.00	0.00	149.32	30.00	40.12	450.64	85.62	57.42	168.78	138.81
2034	0.00	0.00	22.70	0.00	0.00	0.00	22.70	30.11	43.03	450.86	84.82	62.26	175.24	128.54
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.11	41.46	374.31	82.65	75.42	156.16	60.08
2036	0.00	0.00	235.06	0.00	0.00	0.00	235.06	31.29	40.82	347.94	81.19	82.39	157.77	26.60
2037	0.00	0.00	340.26	0.00	0.00	0.00	340.26	32.99	40.22	332.79	79.84	90.12	162.65	0.18
2038	0.00	0.00	152.70	0.00	81.76	0.00	234.46	34.16	39.63	340.55	79.71	83.33	172.62	4.88
2039	0.00	0.00	11.25	0.00	0.00	0.00	11.25	34.22	49.10	388.92	77.38	162.17	173.61	-24.24
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.22	45.59	365.52	75.46	175.55	181.39	-66.87
2041	0.00	0.00	116.18	0.00	0.00	0.00	116.18	34.80	45.05	347.86	73.96	188.16	187.59	-101.86
2042	0.00	0.00	404.09	0.00	0.00	0.00	404.09	36.82	44.53	331.60	72.58	202.31	193.65	-136.94
2043	0.00	0.00	378.97	0.00	0.00	0.00	378.97	38.72	48.10	326.52	71.70	215.01	199.32	-159.51
2044	0.00	0.00	159.22	0.00	81.76	0.00	240.99	39.92	49.39	325.00	71.38	206.11	210.02	-162.51
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.98	56.01	375.43	69.35	296.28	199.80	-189.99
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	55.55	360.71	68.13	310.43	205.54	-223.38
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	54.22	338.28	66.84	323.08	211.42	-263.07
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	52.90	358.14	68.11	309.93	205.59	-225.48
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	39.98	55.45	358.14	68.11	309.93	205.59	-225.48
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	39.98	52.10	358.14	68.11	309.93	205.59	-225.48
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	39.98	51.71	358.14	68.11	309.93	205.59	-225.48
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	39.98	51.34	358.14	68.11	309.93	205.59	-225.48
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	39.98	50.98	358.14	68.11	309.93	205.59	-225.48
2054	0.00	0.00	0.00	0.00	22.45	24.86	47.31	39.98	50.63	358.14	68.11	309.93	205.59	-225.48
2055	0.00	0.00	0.00	0.00	0.00	25.78	25.78	39.98	50.28	358.14	68.11	309.93	205.59	-225.48
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	65.79	358.14	68.11	309.93	205.59	-225.48
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	49.64	358.14	68.11	309.93	205.59	-225.48
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	65.16	358.14	68.11	309.93	205.59	-225.48
2059	0.00	0.00	213.70	0.00	0.00	0.00	213.70	39.98	51.99	358.14	68.11	309.93	205.59	-225.48
2060	0.00	0.00	400.05	0.00	0.00	0.00	400.05	39.98	61.24	358.14	68.11	309.93	205.59	-225.48
2061	0.00	0.00	191.70	0.00	0.00	0.00	191.70	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2062	0.00	0.00	131.49	0.00	0.00	0.00	131.49	39.98	61.24	358.14	68.11	309.93	205.59	-225.48
2063	0.00	0.00	149.32	0.00	0.00	0.00	149.32	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2064	0.00	0.00	22.70	0.00	13.95	2.81	39.46	39.98	61.24	358.14	68.11	309.93	205.59	-225.48
2065	0.00	0.00	0.00	0.00	36.27	5.61	41.88	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2066	0.00	0.00	235.06	0.00	74.29	16.84	326.18	39.98	61.24	358.14	68.11	309.93	205.59	-225.48
2067	0.00	0.00	340.26	0.00	12.08	25.26	377.59	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2068	0.00	0.00	152.70	0.00	25.83	75.78	254.31	39.98	61.24	358.14	68.11	309.93	205.59	-225.48
2069	0.00	0.00	11.25	0.00	40.76	75.78	127.79	39.98	48.37	358.14	68.11	309.93	205.59	-225.48
2070	0.00	0.00	0.00	0.00	0.01	78.59	78.60	39.98	47.18	358.14	68.11	309.93	205.59	-225.48
2071	0.00	0.00	116.18	0.00	0.00	0.00	116.18	39.98	47.18	358.14	68.11	309.93	205.59	-225.48
2072	0.00	0.00	404.09	0.00	0.00	0.00	404.09	39.98	47.18	358.14	68.11	309.93	205.59	-225.48
2073	0.00	0.00	378.97	0.00	61.32	0.00	440.29	39.98	46.30	358.14	68.11	309.93	205.59	-225.48
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2075	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	39.98	48.37	358.14	68.11	309.93	205.59	-225.48
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2081	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2088	0.00	0.00	0.00	0.00	47.96	24.86	72.82	39.98	45.41	358.14	68.11	309.93	205.59	-225.48
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	39.98	48.37	358.14	68.11	309.93	205.59	-225.48
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	39.98	48.37	358.14	68.11	309.93	205.59	-225.48
Salvage Value	0.00	0.00	6.73	0.00	2.86	2.32	11.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	863.78	0.00	295.15	564.08	4902.96	383.43	500.27	7351.81	1491.84	1278.48	2414.24	2167.25

Net Present Value -3619

K19/C25/250MW

TABLE 111
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	4.27	319.95	1.61	0.00	319.00	105.22	20.25	100.07	93.45
2015	90.00	558.63	0.00	0.00	22.21	3.20	674.05	4.98	0.00	350.53	103.30	24.03	104.27	118.93
2016	203.55	742.67	0.00	0.00	31.55	5.31	983.08	9.90	0.00	360.47	101.41	25.12	106.66	127.28
2017	240.87	900.50	0.00	0.00	47.62	7.97	1196.94	15.88	0.00	375.60	99.42	26.85	109.69	139.65
2018	289.99	641.80	0.00	0.00	53.35	23.90	1009.05	20.93	0.00	354.68	96.67	29.46	111.73	116.82
2019	297.44	450.39	0.00	0.00	67.54	23.90	839.27	25.13	13.29	378.93	96.30	29.57	111.86	141.21
2020	821.32	186.45	0.00	0.00	4.34	24.78	1036.89	30.31	13.51	595.93	104.83	21.21	113.27	356.62
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	37.50	13.26	662.71	105.44	21.71	120.03	415.53
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	43.58	13.48	650.49	103.50	22.71	123.68	400.60
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	48.06	13.31	634.20	101.26	22.74	132.03	378.17
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	51.41	13.26	622.32	98.90	25.24	142.74	355.44
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	53.89	27.65	628.80	103.74	22.49	102.81	399.75
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	55.23	27.45	791.03	111.57	22.06	98.74	558.66
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	55.46	27.33	788.07	110.98	20.86	101.81	554.41
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	27.62	773.67	109.21	21.70	104.23	538.53
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	30.20	753.82	107.39	21.88	105.60	518.94
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	26.13	744.25	106.09	21.62	106.07	510.47
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.96	730.17	104.43	22.08	108.05	495.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.58	712.00	102.77	22.25	110.44	476.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.65	689.13	101.06	22.34	112.34	453.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.77	667.02	99.38	22.52	114.88	430.22
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	27.88	628.06	97.74	22.69	112.41	395.21
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	55.46	24.92	599.49	96.13	23.02	113.87	366.48
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	24.92	573.99	94.53	22.97	116.13	340.36
2038	0.00	0.00	136.06	0.00	0.00	0.00	136.06	56.03	24.92	547.01	92.94	22.94	119.14	311.99
2039	0.00	0.00	177.98	0.00	12.34	0.00	190.32	56.87	27.88	538.45	91.73	21.68	131.74	293.29
2040	0.00	0.00	23.67	0.00	0.00	0.00	23.67	56.99	28.99	521.26	89.68	38.04	135.52	258.02
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.99	28.32	507.57	88.13	42.72	141.08	235.65
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	57.57	28.32	496.45	86.77	45.45	147.11	217.12
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	58.43	28.32	483.66	85.35	45.17	156.50	196.65
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	59.15	34.16	471.68	83.76	68.32	156.32	163.29
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	60.45	37.12	456.85	82.31	75.22	162.51	136.80
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	60.57	38.25	448.17	80.91	85.42	171.63	110.21
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	37.36	433.60	79.48	86.41	184.77	82.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.47	446.21	80.90	82.35	172.97	109.98
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	60.57	39.43	446.21	80.90	82.35	172.97	109.98
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	60.57	38.25	446.21	80.90	82.35	172.97	109.98
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	60.57	38.26	446.21	80.90	82.35	172.97	109.98
2052	0.00	0.00	0.00	0.00	35.54	1.97	37.51	60.57	38.27	446.21	80.90	82.35	172.97	109.98
2053	0.00	0.00	0.00	0.00	27.52	5.90	33.43	60.57	38.27	446.21	80.90	82.35	172.97	109.98
2054	0.00	0.00	0.00	0.00	23.52	5.90	29.42	60.57	38.27	446.21	80.90	82.35	172.97	109.98
2055	0.00	0.00	0.00	0.00	1.07	6.12	7.19	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	60.57	52.33	446.21	80.90	82.35	172.97	109.98
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	60.57	52.33	446.21	80.90	82.35	172.97	109.98
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	60.57	52.33	446.21	80.90	82.35	172.97	109.98
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	68.16	446.21	80.90	82.35	172.97	109.98
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2064	0.00	0.00	0.00	0.00	13.95	4.05	18.00	60.57	68.16	446.21	80.90	82.35	172.97	109.98
2065	0.00	0.00	0.00	0.00	11.58	2.77	14.35	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2066	0.00	0.00	0.00	0.00	1.39	4.00	5.39	60.57	68.16	446.21	80.90	82.35	172.97	109.98
2067	0.00	0.00	0.00	0.00	12.08	6.00	18.07	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2068	0.00	0.00	113.78	0.00	25.83	17.99	157.60	60.57	68.16	446.21	80.90	82.35	172.97	109.98
2069	0.00	0.00	155.70	0.00	44.02	17.99	217.71	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2070	0.00	0.00	23.67	0.00	3.27	18.66	45.60	60.57	54.10	446.21	80.90	82.35	172.97	109.98
2071	0.00	0.00	0.00	0.00	39.94	0.00	39.94	60.57	38.27	446.21	80.90	82.35	172.97	109.98
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	60.57	54.10	446.21	80.90	82.35	172.97	109.98
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	60.57	37.38	446.21	80.90	82.35	172.97	109.98
2074	0.00	0.00	142.97	0.00	75.14	0.00	218.12	60.57	52.33	446.21	80.90	82.35	172.97	109.98
2075	0.00	0.00	162.36	0.00	81.51	0.00	243.87	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	60.57	54.10	446.21	80.90	82.35	172.97	109.98
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	38.27	446.21	80.90	82.35	172.97	109.98
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	60.57	54.10	446.21	80.90	82.35	172.97	109.98
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	41.23	446.21	80.90	82.35	172.97	109.98
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	60.57	54.10	446.21	80.90	82.35	172.97	109.98
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2084	0.00	0.00	0.00	0.00	11.05	0.22	11.27	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2087	0.00	0.00	0.00	0.00	35.54	1.97	37.51	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2088	0.00	0.00	0.00	0.00	27.52	5.90	33.43	60.57	36.50	446.21	80.90	82.35	172.97	109.98
2089	0.00	0.00	0.00	0.00	22.45	5.90	28.36	60.57	39.46	446.21	80.90	82.35	172.97	109.98
2090	0.00	0.00	0.00	0.00	0.00	6.12	6.12	60.57	39.46	446.21	80.90	82.35	172.97	109.98
Salvage Value	0.97	0.00	3.37	0.00	4.67	0.61	9.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	185.86	0.00	486.76	78.51	8076.70	648.82	303.25	8637.89	1602.74	532.56	1982.08	4520.51

Net Present Value -4508

K19/Gas24/250MW

TABLE 112
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	4.27	287.33	1.45	0.00	319.00	105.22	20.25	100.07	93.45
2015	0.00	558.63	0.00	0.00	22.21	3.20	584.04	4.37	0.00	350.53	103.30	24.03	104.29	118.92
2016	0.00	742.67	0.00	0.00	31.55	5.31	779.53	8.27	0.00	360.47	101.41	25.12	106.66	127.28
2017	0.00	900.50	0.00	0.00	47.62	7.97	956.08	13.05	0.00	376.02	99.42	26.85	109.69	140.06
2018	0.00	641.80	0.00	0.00	53.35	23.90	719.05	16.64	0.00	355.24	96.67	29.42	111.67	117.48
2019	0.00	450.39	0.00	0.00	63.21	23.90	537.50	19.33	13.29	379.85	96.30	29.57	111.83	142.15
2020	0.00	186.45	0.37	0.00	0.01	24.78	211.61	20.39	13.51	597.49	104.83	21.22	113.20	358.25
2021	0.00	64.80	0.00	0.00	0.00	0.00	64.80	20.71	13.26	665.23	105.42	21.72	119.85	418.24
2022	0.00	0.00	124.04	0.00	0.00	0.00	124.04	21.22	13.48	657.13	103.95	21.44	122.06	409.68
2023	0.00	0.00	161.54	0.00	12.34	0.00	173.88	21.98	13.31	649.71	102.84	18.07	124.53	404.27
2024	0.00	0.00	21.17	0.00	0.00	0.00	21.17	22.08	17.33	642.97	100.96	29.41	126.88	385.71
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	22.08	17.11	528.85	98.67	22.28	120.59	287.31
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.08	16.68	504.53	96.34	25.28	125.14	257.76
2027	0.00	0.00	105.37	0.00	0.00	0.00	105.37	22.61	16.71	469.89	94.24	27.48	127.45	220.73
2028	0.00	0.00	146.32	0.00	97.19	0.00	243.51	23.82	16.77	452.45	92.39	31.79	131.98	196.30
2029	0.00	0.00	245.77	0.00	0.00	0.00	245.77	25.05	23.61	442.78	90.62	43.96	136.52	171.68
2030	0.00	0.00	324.04	0.00	0.00	0.00	324.04	26.67	19.59	441.70	89.69	47.72	139.21	165.08
2031	0.00	0.00	145.42	0.00	12.34	0.00	157.76	27.46	19.59	456.14	90.28	40.88	138.66	186.32
2032	0.00	0.00	10.72	0.00	0.00	0.00	10.72	27.51	26.66	483.42	87.66	99.42	134.22	162.13
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51	26.66	471.14	86.12	107.47	138.38	139.17
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51	26.67	459.76	84.60	116.70	143.22	115.23
2035	0.00	0.00	233.42	0.00	0.00	0.00	233.42	28.68	26.00	393.98	82.56	116.85	141.21	53.37
2036	0.00	0.00	337.89	0.00	0.00	0.00	337.89	30.37	26.01	367.70	81.05	125.14	142.01	19.49
2037	0.00	0.00	151.64	0.00	0.00	0.00	151.64	31.12	26.01	377.38	81.50	120.52	139.38	35.98
2038	0.00	0.00	249.53	0.00	0.00	0.00	249.53	32.37	33.08	404.11	79.01	187.66	137.83	-0.39
2039	0.00	0.00	345.04	0.00	0.00	0.00	345.04	34.10	36.03	391.56	77.60	200.48	148.91	-35.43
2040	0.00	0.00	154.84	0.00	81.76	0.00	236.61	35.28	33.08	388.03	77.01	206.34	151.16	-46.48
2041	0.00	0.00	11.41	0.00	0.00	0.00	11.41	35.34	40.15	419.37	75.09	272.58	146.86	-75.16
2042	0.00	0.00	245.10	0.00	0.00	0.00	245.10	36.56	40.15	405.09	73.26	294.83	152.66	-115.66
2043	0.00	0.00	354.80	0.00	0.00	0.00	354.80	38.34	40.15	394.58	71.91	311.42	157.24	-145.99
2044	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.13	41.93	378.50	71.41	308.94	158.61	-160.45
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.19	49.00	403.15	69.05	387.25	156.97	-210.13
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	49.01	408.62	69.24	385.28	155.19	-201.09
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	48.12	378.13	67.24	409.18	161.63	-259.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	39.19	50.20	396.63	68.51	393.91	157.93	-223.71
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2052	0.00	0.00	101.76	0.00	35.54	1.97	139.27	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2053	0.00	0.00	139.26	0.00	27.52	5.90	172.68	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2054	0.00	0.00	21.17	0.00	22.45	5.90	49.52	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2055	0.00	0.00	0.00	0.00	0.00	6.12	6.12	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2057	0.00	0.00	105.37	0.00	0.00	0.00	105.37	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2058	0.00	0.00	144.20	0.00	12.34	0.00	156.54	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2059	0.00	0.00	245.77	0.00	0.00	0.00	245.77	39.19	50.20	396.63	68.51	393.91	157.93	-223.71
2060	0.00	0.00	324.04	0.00	0.00	0.00	324.04	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2061	0.00	0.00	145.42	0.00	0.00	0.00	145.42	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2062	0.00	0.00	10.72	0.00	0.00	0.00	10.72	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2063	0.00	0.00	0.00	0.00	72.89	2.86	75.76	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2064	0.00	0.00	0.00	0.00	13.95	4.05	18.00	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2065	0.00	0.00	233.42	0.00	11.58	2.77	247.77	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2066	0.00	0.00	337.89	0.00	13.73	4.00	355.62	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2067	0.00	0.00	151.64	0.00	12.08	6.00	169.71	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2068	0.00	0.00	249.53	0.00	25.83	17.99	293.35	39.19	63.07	396.63	68.51	393.91	157.93	-223.71
2069	0.00	0.00	345.04	0.00	40.76	17.99	403.79	39.19	50.20	396.63	68.51	393.91	157.93	-223.71
2070	0.00	0.00	154.84	0.00	0.01	18.66	173.51	39.19	49.02	396.63	68.51	393.91	157.93	-223.71
2071	0.00	0.00	11.41	0.00	0.00	0.00	11.41	39.19	49.02	396.63	68.51	393.91	157.93	-223.71
2072	0.00	0.00	245.10	0.00	0.00	0.00	245.10	39.19	49.02	396.63	68.51	393.91	157.93	-223.71
2073	0.00	0.00	354.80	0.00	0.00	0.00	354.80	39.19	48.13	396.63	68.51	393.91	157.93	-223.71
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2075	0.00	0.00	11.73	0.00	61.32	0.00	73.05	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2078	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	50.20	396.63	68.51	393.91	157.93	-223.71
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2082	0.00	0.00	101.76	0.00	0.00	0.00	101.76	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2083	0.00	0.00	139.26	0.00	0.00	0.00	139.26	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2084	0.00	0.00	21.17	0.00	11.05	0.22	32.44	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2087	0.00	0.00	105.37	0.00	35.54	1.97	142.88	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2088	0.00	0.00	144.20	0.00	27.52	5.90	177.63	39.19	47.24	396.63	68.51	393.91	157.93	-223.71
2089	0.00	0.00	21.92	0.00	22.45	5.90	50.27	39.19	50.20	396.63	68.51	393.91	157.93	-223.71
2090	0.00	0.00	0.00	0.00	20.44	6.12	26.56	39.19	50.20	396.63	68.51	393.91	157.93	-223.71
Salvage Value	0.00	0.00	11.78	0.00	2.47	0.61	14.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	1162.52	0.00	289.86	78.51	4710.84	364.75	309.00	7260.78	1494.71	1669.94	2070.92	2025.21

Net Present Value -3359

K19/C31/250MW

TABLE 113
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	258.05	0.00	0.00	25.01	4.27	319.28	1.61	0.00	319.00	105.22	20.25	100.07	93.45
2015	40.34	558.63	0.00	0.00	22.21	3.20	624.38	4.73	0.00	350.53	103.30	24.03	104.29	118.92
2016	10.98	742.67	0.00	0.00	31.55	5.31	790.51	8.69	0.00	360.47	101.41	25.12	106.66	127.28
2017	11.07	900.50	0.00	0.00	47.62	7.97	967.14	13.52	0.00	376.02	99.42	26.85	109.69	140.06
2018	13.18	641.80	0.00	0.00	53.35	23.90	732.23	17.18	0.00	355.24	96.67	29.42	111.67	117.48
2019	13.28	450.39	0.00	0.00	63.21	23.90	550.78	19.94	13.29	379.85	96.30	29.57	111.83	142.15
2020	13.38	186.45	0.37	0.00	0.01	24.78	224.99	21.06	13.51	597.49	104.83	21.22	113.20	358.25
2021	16.96	64.80	0.00	0.00	0.00	0.00	81.76	21.47	13.26	665.23	105.42	21.72	119.85	418.24
2022	188.48	0.00	124.04	0.00	0.00	0.00	312.52	22.92	13.48	657.01	103.94	21.47	122.09	409.51
2023	285.89	0.00	161.54	0.00	12.34	0.00	459.77	25.11	13.31	649.11	102.81	18.22	124.73	403.35
2024	313.80	0.00	21.17	0.00	0.00	0.00	334.97	26.78	17.33	642.27	100.93	29.60	127.20	384.54
2025	320.45	0.00	0.00	0.00	4.33	0.00	324.78	28.41	17.11	527.50	98.64	22.36	120.89	285.61
2026	869.95	0.00	0.00	0.00	4.33	0.00	874.28	32.78	16.68	503.42	96.33	25.50	125.51	256.09
2027	1385.33	0.00	105.37	0.00	52.77	0.00	1543.46	40.49	16.71	468.14	94.24	27.86	127.77	218.28
2028	1246.13	0.00	144.20	0.00	39.96	0.00	1430.29	47.65	16.77	449.94	92.32	32.64	132.64	192.35
2029	891.53	0.00	21.92	0.00	46.57	0.00	960.02	52.45	23.60	439.45	90.58	44.91	137.21	166.76
2030	618.59	0.00	0.00	0.00	80.98	0.00	699.57	55.94	19.58	459.53	91.66	39.17	132.79	195.90
2031	407.07	0.00	0.00	0.00	107.18	0.00	514.25	58.51	34.19	519.71	94.83	32.39	107.90	284.58
2032	150.21	0.00	0.00	0.00	125.54	0.00	275.74	59.89	34.42	686.46	102.03	31.69	103.32	449.43
2033	47.49	0.00	0.00	0.00	0.00	0.00	47.49	60.13	34.27	714.48	102.01	32.70	111.65	468.11
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	34.50	687.63	100.20	33.52	113.76	440.15
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.65	647.70	98.47	34.04	111.91	403.27
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.60	619.72	96.84	34.80	112.50	375.58
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.42	589.32	94.93	36.02	115.35	343.02
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.05	556.06	92.93	37.52	119.30	306.31
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	36.08	533.39	90.99	41.62	131.20	269.58
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.24	518.87	89.26	47.13	136.97	245.50
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	36.02	502.66	87.57	53.29	142.64	219.15
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	60.13	33.06	499.45	86.70	54.26	145.97	212.52
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.06	487.73	85.34	53.79	154.81	193.79
2044	0.00	0.00	118.64	0.00	0.00	0.00	118.64	60.72	34.84	471.79	83.77	68.29	156.22	163.52
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.02	34.84	456.89	82.31	75.19	162.45	136.93
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.15	38.92	448.21	80.91	85.40	171.62	110.28
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	37.36	433.61	79.49	86.41	184.77	82.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	36.47	446.23	80.90	82.33	172.95	110.05
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	62.15	39.43	446.23	80.90	82.33	172.95	110.05
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	62.15	36.48	446.23	80.90	82.33	172.95	110.05
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	62.15	39.44	446.23	80.90	82.33	172.95	110.05
2052	0.00	0.00	101.76	0.00	35.54	1.97	139.27	62.15	36.49	446.23	80.90	82.33	172.95	110.05
2053	0.00	0.00	139.26	0.00	27.52	5.90	172.68	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2054	0.00	0.00	21.17	0.00	22.45	5.90	49.52	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2055	0.00	0.00	0.00	0.00	0.00	6.12	6.12	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2057	0.00	0.00	105.37	0.00	0.00	0.00	105.37	62.15	38.27	446.23	80.90	82.33	172.95	110.05
2058	0.00	0.00	144.20	0.00	12.34	0.00	156.54	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2059	0.00	0.00	21.92	0.00	0.00	0.00	21.92	62.15	41.23	446.23	80.90	82.33	172.95	110.05
2060	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2061	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.15	39.46	446.23	80.90	82.33	172.95	110.05
2062	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2063	0.00	0.00	0.00	0.00	18.76	2.86	21.62	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2064	0.00	0.00	0.00	0.00	24.65	4.05	28.70	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2065	0.00	0.00	0.00	0.00	29.76	2.77	32.53	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2066	0.00	0.00	0.00	0.00	27.06	4.00	31.06	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2067	0.00	0.00	0.00	0.00	43.09	6.00	49.09	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2068	0.00	0.00	0.00	0.00	25.83	17.99	43.82	62.15	68.16	446.23	80.90	82.33	172.95	110.05
2069	0.00	0.00	0.00	0.00	40.76	17.99	58.75	62.15	39.46	446.23	80.90	82.33	172.95	110.05
2070	0.00	0.00	0.00	0.00	0.01	18.66	18.67	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	41.23	446.23	80.90	82.33	172.95	110.05
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	37.38	446.23	80.90	82.33	172.95	110.05
2074	0.00	0.00	118.64	0.00	0.00	0.00	118.64	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2075	0.00	0.00	162.36	0.00	3.26	0.00	165.61	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2076	0.00	0.00	24.68	0.00	3.26	0.00	27.94	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2077	0.00	0.00	0.00	0.00	39.94	0.00	39.94	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2078	0.00	0.00	0.00	0.00	21.20	0.00	21.20	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2079	0.00	0.00	0.00	0.00	35.88	0.00	35.88	62.15	39.46	446.23	80.90	82.33	172.95	110.05
2080	0.00	0.00	0.00	0.00	135.69	0.00	135.69	62.15	52.33	446.23	80.90	82.33	172.95	110.05
2081	0.00	0.00	0.00	0.00	81.51	0.00	81.51	62.15	39.46	446.23	80.90	82.33	172.95	110.05
2082	0.00	0.00	101.76	0.00	94.53	0.00	196.29	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2083	0.00	0.00	139.26	0.00	0.00	0.00	139.26	62.15	38.27	446.23	80.90	82.33	172.95	110.05
2084	0.00	0.00	21.17	0.00	11.05	0.22	32.44	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	62.15	38.27	446.23	80.90	82.33	172.95	110.05
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	62.15	54.10	446.23	80.90	82.33	172.95	110.05
2087	0.00	0.00	105.37	0.00	35.54	1.97	142.88	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2088	0.00	0.00	144.20	0.00	27.52	5.90	177.63	62.15	36.50	446.23	80.90	82.33	172.95	110.05
2089	0.00	0.00	21.92	0.00	22.45	5.90	50.27	62.15	39.46	446.23	80.90	82.33	172.95	110.05
2090	0.00	0.00	0.00	0.00	0.00	6.12	6.12	62.15	39.46	446.23	80.90	82.33	172.95	110.05
Salvage Value	7.27	0.00	5.51	0.00	5.14	0.61	18.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3035.28	3179.95	384.98	0.00	415.09	78.51	7093.82	565.34	302.94	7925.86	1566.17	591.84	2031.77	3736.07

Net Present Value -4226

All Gas

TABLE 114
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	362.42	101.40	25.15	106.58	129.29
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	381.33	99.79	25.80	108.52	147.22
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	360.54	96.94	28.23	111.33	124.03
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	351.76	94.96	25.49	112.81	118.51
2020	0.00	0.00	122.63	0.00	0.00	0.00	122.63	1.02	0.00	387.25	94.88	20.11	122.82	149.44
2021	0.00	0.00	159.65	0.00	12.34	0.00	172.00	1.77	0.00	389.18	93.02	18.94	133.47	143.75
2022	0.00	0.00	20.87	0.00	0.00	0.00	20.87	1.88	4.07	376.47	90.75	35.31	135.74	114.67
2023	0.00	0.00	102.47	0.00	0.00	0.00	102.47	2.39	4.07	361.08	88.51	43.72	141.95	86.90
2024	0.00	0.00	142.35	0.00	97.19	0.00	239.54	3.58	4.07	352.57	87.02	50.05	147.18	68.32
2025	0.00	0.00	21.32	0.00	0.00	0.00	21.32	3.68	8.16	278.44	86.52	41.86	133.57	16.49
2026	0.00	0.00	104.64	0.00	0.00	0.00	104.64	4.21	8.16	260.03	85.20	42.96	135.89	-4.02
2027	0.00	0.00	143.20	0.00	0.00	0.00	143.20	4.92	8.16	242.78	83.30	43.15	147.67	-31.34
2028	0.00	0.00	244.06	0.00	0.00	0.00	244.06	6.14	12.23	225.54	81.35	66.39	146.62	-68.82
2029	0.00	0.00	321.79	0.00	0.00	0.00	321.79	7.75	12.23	209.73	79.87	75.59	151.06	-96.79
2030	0.00	0.00	144.41	0.00	12.34	0.00	156.75	8.54	12.24	222.88	80.81	70.04	147.17	-75.13
2031	0.00	0.00	10.64	0.00	0.00	0.00	10.64	8.59	19.31	240.37	78.35	124.12	139.83	-101.93
2032	0.00	0.00	109.11	0.00	0.00	0.00	109.11	9.13	19.32	219.92	76.41	137.34	146.56	-140.38
2033	0.00	0.00	149.32	0.00	81.76	0.00	231.08	10.29	19.32	199.53	74.64	150.70	152.19	-178.00
2034	0.00	0.00	254.50	0.00	0.00	0.00	254.50	11.56	23.40	185.38	73.21	169.46	155.83	-213.12
2035	0.00	0.00	335.54	0.00	0.00	0.00	335.54	13.24	23.40	174.16	72.30	179.39	158.84	-236.37
2036	0.00	0.00	150.58	0.00	0.00	0.00	150.58	13.99	23.40	172.27	72.24	174.66	165.02	-239.65
2037	0.00	0.00	247.80	0.00	0.00	0.00	247.80	15.23	30.46	179.44	70.21	231.56	150.80	-273.13
2038	0.00	0.00	342.64	0.00	0.00	0.00	342.64	16.95	30.47	164.05	68.98	245.59	157.14	-307.66
2039	0.00	0.00	153.77	0.00	0.00	0.00	153.77	17.71	30.48	158.88	68.90	249.06	164.10	-323.18
2040	0.00	0.00	11.33	0.00	0.00	0.00	11.33	17.77	37.55	169.01	66.95	301.77	157.69	-357.40
2041	0.00	0.00	243.40	0.00	0.00	0.00	243.40	18.99	37.55	158.78	65.15	332.54	166.13	-405.04
2042	0.00	0.00	352.33	0.00	0.00	0.00	352.33	20.75	37.55	152.94	64.07	354.86	172.34	-438.33
2043	0.00	0.00	158.12	0.00	81.76	0.00	239.88	21.95	37.55	154.23	64.04	359.96	173.55	-443.33
2044	0.00	0.00	11.65	0.00	0.00	0.00	11.65	22.01	44.63	162.81	62.46	410.88	165.34	-475.87
2045	0.00	0.00	52.55	0.00	0.00	0.00	52.55	22.27	44.63	153.90	60.89	444.13	172.69	-523.81
2046	0.00	0.00	71.92	0.00	0.00	0.00	71.92	22.63	44.63	148.03	59.77	471.25	178.53	-561.52
2047	0.00	0.00	10.93	0.00	0.00	0.00	10.93	22.68	46.11	138.76	58.90	491.24	183.51	-594.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.11	146.89	59.85	468.88	178.24	-560.08
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	22.68	46.12	146.89	59.85	468.88	178.24	-560.08
2050	0.00	0.00	100.35	0.00	10.08	0.00	110.43	22.68	46.12	146.89	59.85	468.88	178.24	-560.08
2051	0.00	0.00	137.33	0.00	10.08	0.00	147.41	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2052	0.00	0.00	20.87	0.00	10.08	0.00	30.95	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2053	0.00	0.00	102.47	0.00	0.00	0.00	102.47	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2054	0.00	0.00	140.23	0.00	0.00	0.00	140.23	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2055	0.00	0.00	21.32	0.00	0.00	0.00	21.32	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2056	0.00	0.00	104.64	0.00	12.34	0.00	116.98	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2057	0.00	0.00	143.20	0.00	0.00	0.00	143.20	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2058	0.00	0.00	244.06	0.00	0.00	0.00	244.06	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2059	0.00	0.00	321.79	0.00	72.89	0.00	394.68	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2060	0.00	0.00	144.41	0.00	0.00	0.00	144.41	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2061	0.00	0.00	10.64	0.00	0.00	0.00	10.64	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2062	0.00	0.00	109.11	0.00	0.00	0.00	109.11	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2063	0.00	0.00	149.32	0.00	0.00	0.00	149.32	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2064	0.00	0.00	254.50	0.00	0.00	0.00	254.50	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2065	0.00	0.00	335.54	0.00	12.34	0.00	347.88	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2066	0.00	0.00	150.58	0.00	0.00	0.00	150.58	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2067	0.00	0.00	247.80	0.00	0.00	0.00	247.80	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2068	0.00	0.00	342.64	0.00	61.32	0.00	403.96	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2069	0.00	0.00	153.77	0.00	0.00	0.00	153.77	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2070	0.00	0.00	11.33	0.00	0.00	0.00	11.33	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2071	0.00	0.00	243.40	0.00	0.00	0.00	243.40	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2072	0.00	0.00	352.33	0.00	0.00	0.00	352.33	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2073	0.00	0.00	158.12	0.00	0.00	0.00	158.12	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2074	0.00	0.00	11.65	0.00	24.30	0.00	35.95	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2075	0.00	0.00	52.55	0.00	0.00	0.00	52.55	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2076	0.00	0.00	71.92	0.00	0.00	0.00	71.92	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2077	0.00	0.00	10.93	0.00	0.00	0.00	10.93	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2078	0.00	0.00	0.00	0.00	61.32	0.00	61.32	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2080	0.00	0.00	100.35	0.00	0.00	0.00	100.35	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2081	0.00	0.00	137.33	0.00	0.00	0.00	137.33	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2082	0.00	0.00	20.87	0.00	0.00	0.00	20.87	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2083	0.00	0.00	102.47	0.00	20.44	0.00	122.91	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2084	0.00	0.00	140.23	0.00	10.08	0.00	150.31	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2085	0.00	0.00	21.32	0.00	10.08	0.00	31.39	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2086	0.00	0.00	104.64	0.00	10.08	0.00	114.72	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2087	0.00	0.00	143.20	0.00	10.08	0.00	153.28	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2088	0.00	0.00	21.77	0.00	0.00	0.00	21.77	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	146.89	59.85	468.88	178.24	-560.08
Salvage Value	0.00	0.00	29.88	0.00	1.19	0.00	31.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1514.62	0.00	151.81	0.00	1730.75	120.73	224.68	4511.07	1374.75	2130.65	2238.71	-1233.05

Net Present Value -3309

Wind/Gas

TABLE 115
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	362.42	101.40	25.15	106.58	129.29
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	381.33	99.79	25.80	108.52	147.22
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	360.53	96.94	28.23	111.33	124.02
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	351.76	94.95	25.49	112.81	118.52
2020	0.00	0.00	0.00	13.09	21.21	0.00	34.30	0.69	0.00	383.53	94.42	21.69	124.06	143.36
2021	0.00	0.00	0.37	399.71	35.35	0.00	435.43	2.87	0.00	384.94	92.55	21.07	133.99	137.32
2022	0.00	0.00	0.00	407.19	42.70	0.00	449.89	5.12	6.34	389.32	90.90	21.20	134.51	142.71
2023	0.00	0.00	227.23	394.10	22.34	0.00	643.67	8.23	12.69	386.16	88.37	24.41	138.45	134.93
2024	0.00	0.00	302.79	7.48	35.16	0.00	345.43	9.84	19.03	390.50	86.58	24.81	142.21	136.91
2025	0.00	0.00	42.63	6.55	6.81	0.00	55.99	10.12	27.18	326.88	86.63	28.83	125.12	86.30
2026	0.00	0.00	104.64	199.85	17.12	0.00	321.61	11.73	27.18	314.16	85.62	27.63	125.86	75.05
2027	0.00	0.00	145.32	203.59	124.38	0.00	473.30	14.09	30.35	299.18	83.24	33.76	130.06	52.13
2028	0.00	0.00	21.77	203.59	37.69	0.00	263.05	15.40	37.60	293.87	81.46	43.64	133.19	35.59
2029	0.00	0.00	106.85	203.59	37.83	0.00	348.28	17.14	40.78	285.87	79.85	47.21	136.92	21.89
2030	0.00	0.00	146.23	203.59	37.83	0.00	387.65	19.08	43.95	288.87	78.94	49.41	138.28	22.24
2031	0.00	0.00	130.58	203.59	37.83	0.00	372.01	20.94	51.19	290.85	77.70	58.78	140.28	14.09
2032	0.00	0.00	148.28	203.59	119.59	0.00	471.47	23.30	54.37	287.43	76.57	59.30	143.74	7.82
2033	0.00	0.00	22.54	203.59	37.83	0.00	263.97	24.62	61.63	292.87	75.90	62.66	146.22	8.08
2034	0.00	0.00	110.64	203.59	37.83	0.00	352.07	26.38	64.81	279.89	74.09	72.99	149.12	-16.31
2035	0.00	0.00	151.42	203.59	37.83	0.00	392.84	28.34	67.99	267.22	72.39	79.12	153.74	-38.03
2036	0.00	0.00	135.21	203.59	37.83	0.00	376.64	30.23	75.23	262.03	71.02	90.98	156.70	-56.67
2037	0.00	0.00	153.54	203.59	37.83	0.00	394.97	32.20	78.41	253.08	69.73	96.24	161.00	-73.89
2038	0.00	0.00	137.11	203.59	37.83	0.00	378.54	34.09	85.66	252.01	68.68	105.96	165.06	-87.69
2039	0.00	0.00	155.70	203.59	119.59	0.00	478.89	36.49	88.84	245.51	67.51	106.21	180.51	-108.71
2040	0.00	0.00	23.67	216.69	37.83	0.00	278.19	37.88	96.10	248.26	66.72	111.89	186.78	-117.12
2041	0.00	0.00	116.18	603.30	37.83	0.00	757.32	41.67	99.28	234.84	65.18	133.34	184.77	-148.44
2042	0.00	0.00	158.99	610.78	37.83	0.00	807.61	45.70	102.45	223.63	63.80	142.62	191.44	-174.23
2043	0.00	0.00	141.98	597.69	37.55	0.00	777.22	49.59	109.69	218.49	62.61	157.72	195.65	-197.48
2044	0.00	0.00	161.23	211.08	36.70	0.00	409.00	51.63	112.87	213.70	61.67	163.72	201.02	-212.71
2045	0.00	0.00	77.06	210.14	34.43	0.00	321.63	53.24	120.12	210.44	60.57	173.36	209.89	-233.38
2046	0.00	0.00	71.92	396.90	31.02	0.00	499.84	55.74	123.30	205.77	59.53	174.30	223.77	-251.84
2047	0.00	0.00	10.93	207.34	20.71	0.00	238.98	56.94	127.95	199.47	58.46	180.03	227.31	-266.33
2048	0.00	0.00	0.00	203.59	10.64	0.00	214.24	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2049	0.00	0.00	0.00	203.59	10.22	0.00	213.82	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2050	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2051	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2052	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2053	0.00	0.00	204.94	203.59	0.00	0.00	408.54	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2054	0.00	0.00	280.46	203.59	0.00	0.00	484.06	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2055	0.00	0.00	42.63	203.59	5.30	0.00	251.53	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2056	0.00	0.00	104.64	203.59	8.84	0.00	317.07	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2057	0.00	0.00	143.20	203.59	10.75	0.00	357.54	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2058	0.00	0.00	21.77	203.59	6.01	0.00	231.37	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2059	0.00	0.00	106.85	203.59	27.73	0.00	338.17	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2060	0.00	0.00	146.23	216.69	2.98	0.00	365.89	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2061	0.00	0.00	130.58	603.30	4.78	0.00	738.66	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2062	0.00	0.00	148.28	610.78	79.80	0.00	838.86	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2063	0.00	0.00	22.54	597.69	9.46	0.00	629.69	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2064	0.00	0.00	110.64	211.08	9.46	0.00	331.18	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2065	0.00	0.00	151.42	210.14	9.46	0.00	371.02	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2066	0.00	0.00	135.21	396.90	9.46	0.00	541.57	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2067	0.00	0.00	153.54	207.34	70.78	0.00	431.66	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2068	0.00	0.00	137.11	203.59	9.46	0.00	350.17	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2069	0.00	0.00	155.70	203.59	9.46	0.00	368.75	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2070	0.00	0.00	23.67	203.59	25.37	0.00	252.63	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2071	0.00	0.00	116.18	203.59	35.97	0.00	355.75	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2072	0.00	0.00	158.99	203.59	41.41	0.00	404.00	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2073	0.00	0.00	141.98	203.59	25.79	0.00	371.37	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2074	0.00	0.00	161.23	203.59	78.21	0.00	443.03	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2075	0.00	0.00	77.06	203.59	13.29	0.00	293.94	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2076	0.00	0.00	71.92	203.59	21.80	0.00	297.31	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2077	0.00	0.00	10.93	203.59	54.04	0.00	268.57	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2078	0.00	0.00	0.00	203.59	37.55	0.00	241.14	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2079	0.00	0.00	0.00	203.59	37.12	0.00	240.72	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2080	0.00	0.00	0.00	216.69	36.55	0.00	253.24	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2081	0.00	0.00	0.00	603.30	34.85	0.00	638.16	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2082	0.00	0.00	0.00	610.78	53.50	0.00	664.28	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2083	0.00	0.00	204.94	597.69	30.93	0.00	833.56	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2084	0.00	0.00	280.46	211.08	38.31	0.00	529.85	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2085	0.00	0.00	42.63	210.14	38.03	0.00	290.80	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2086	0.00	0.00	104.64	396.90	36.33	0.00	537.87	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2087	0.00	0.00	143.20	207.34	34.62	0.00	385.16	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2088	0.00	0.00	21.77	203.59	16.03	0.00	241.39	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2089	0.00	0.00	0.00	197.05	28.53	0.00	225.58	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
2090	0.00	0.00	0.00	3.74	0.14	0.00	3.88	56.94	127.95	205.23	59.52	175.90	220.32	-250.52
Salvage Value	0.00	0.00	11.06	25.62	5.43	0.00	42.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1093.35	2578.12	446.03	0.00	4181.82	284.93	641.69	5088.10	1372.04	989.85	2316.85	409.37

Net Present Value -4699

K22/Gas

TABLE 116
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	107.68	0.00	0.00	10.08	0.00	117.76	0.59	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	35.49	0.00	0.00	11.31	0.00	46.80	0.82	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	38.11	0.00	0.00	11.42	0.00	49.53	1.07	0.00	362.00	101.40	25.15	106.58	128.88
2017	0.00	248.88	0.00	0.00	33.24	0.00	282.12	2.48	0.00	380.29	99.79	25.81	108.55	146.14
2018	0.00	486.04	0.00	0.00	11.88	0.00	497.92	4.97	0.00	358.44	96.95	28.25	111.40	121.82
2019	0.00	777.34	0.00	0.00	20.68	0.00	798.02	8.96	0.00	349.59	94.96	25.50	112.89	116.24
2020	0.00	874.32	0.00	0.00	37.63	0.00	911.94	13.52	0.00	378.46	94.25	22.39	124.78	137.04
2021	0.00	711.17	0.00	0.00	53.38	0.00	764.54	17.34	0.00	382.45	92.50	21.50	135.42	133.04
2022	0.00	413.91	0.00	0.00	63.21	0.00	477.12	19.73	13.29	389.41	92.48	24.52	128.94	143.47
2023	0.00	192.68	0.00	0.00	0.01	0.00	192.69	20.69	13.51	510.63	98.27	24.32	117.53	270.51
2024	0.00	66.77	0.00	0.00	0.00	0.00	66.77	21.03	13.21	526.88	98.16	27.63	122.55	278.54
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	21.03	13.43	468.49	98.11	19.38	113.14	237.85
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.03	13.26	449.44	96.21	19.68	115.98	217.57
2027	0.00	0.00	127.65	0.00	0.00	0.00	127.65	21.55	13.21	406.63	94.34	18.83	115.22	178.23
2028	0.00	0.00	166.53	0.00	12.34	0.00	178.87	22.34	12.96	385.36	92.75	19.60	118.29	154.73
2029	0.00	0.00	21.92	0.00	0.00	0.00	21.92	22.45	16.59	378.68	91.90	24.53	118.73	143.52
2030	0.00	0.00	107.60	0.00	0.00	0.00	107.60	22.98	16.59	367.79	90.12	30.14	122.78	124.75
2031	0.00	0.00	376.37	0.00	97.19	0.00	473.56	25.34	16.64	356.20	88.44	35.20	127.67	104.88
2032	0.00	0.00	350.98	0.00	0.00	0.00	350.98	27.10	23.48	346.61	86.82	47.60	132.12	80.07
2033	0.00	0.00	147.46	0.00	12.34	0.00	159.81	27.89	19.46	353.39	87.00	41.57	132.87	91.95
2034	0.00	0.00	10.87	0.00	0.00	0.00	10.87	27.95	26.52	376.12	84.51	99.47	126.80	65.35
2035	0.00	0.00	233.42	0.00	0.00	0.00	233.42	29.12	26.52	358.78	82.43	111.72	133.02	31.61
2036	0.00	0.00	337.89	0.00	0.00	0.00	337.89	30.81	26.53	345.15	80.89	121.68	137.46	5.12
2037	0.00	0.00	151.64	0.00	0.00	0.00	151.64	31.56	26.53	354.10	81.34	115.92	135.14	21.70
2038	0.00	0.00	249.53	0.00	0.00	0.00	249.53	32.81	32.93	375.71	78.91	178.53	132.87	-14.60
2039	0.00	0.00	345.04	0.00	0.00	0.00	345.04	34.54	32.94	363.47	77.52	191.61	143.77	-49.42
2040	0.00	0.00	154.84	0.00	81.76	0.00	236.61	35.72	32.94	362.97	77.06	196.44	145.82	-56.36
2041	0.00	0.00	11.41	0.00	0.00	0.00	11.41	35.78	40.02	388.48	75.03	259.88	141.88	-88.31
2042	0.00	0.00	245.10	0.00	0.00	0.00	245.10	37.00	42.97	374.60	73.18	283.17	147.80	-129.55
2043	0.00	0.00	354.80	0.00	0.00	0.00	354.80	38.78	40.02	364.34	71.83	300.20	152.36	-160.05
2044	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.57	40.02	352.34	71.47	297.42	153.03	-169.58
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.63	47.09	380.03	69.82	361.39	149.21	-200.39
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.09	370.83	68.57	382.90	152.47	-233.11
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	48.87	347.83	67.18	397.29	156.82	-273.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	48.88	366.23	68.53	380.53	152.83	-235.65
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	48.88	366.23	68.53	380.53	152.83	-235.65
2050	0.00	0.00	0.00	0.00	10.62	0.00	10.62	39.63	47.99	366.23	68.53	380.53	152.83	-235.65
2051	0.00	0.00	0.00	0.00	10.69	0.00	10.69	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2052	0.00	0.00	0.00	0.00	10.71	0.00	10.71	39.63	50.06	366.23	68.53	380.53	152.83	-235.65
2053	0.00	0.00	0.00	0.00	0.58	0.00	0.58	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2054	0.00	0.00	0.00	0.00	19.19	0.00	19.19	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2055	0.00	0.00	0.00	0.00	25.46	0.00	25.46	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2056	0.00	0.00	0.00	0.00	27.52	0.00	27.52	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2057	0.00	0.00	105.37	0.00	22.45	0.00	127.82	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2058	0.00	0.00	144.20	0.00	0.00	0.00	144.20	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2059	0.00	0.00	21.92	0.00	0.00	0.00	21.92	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2060	0.00	0.00	107.60	0.00	0.00	0.00	107.60	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2061	0.00	0.00	374.25	0.00	0.00	0.00	374.25	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2062	0.00	0.00	350.98	0.00	0.00	0.00	350.98	39.63	50.06	366.23	68.53	380.53	152.83	-235.65
2063	0.00	0.00	147.46	0.00	12.34	0.00	159.81	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2064	0.00	0.00	10.87	0.00	0.00	0.00	10.87	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2065	0.00	0.00	233.42	0.00	0.69	0.00	234.11	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2066	0.00	0.00	337.89	0.00	73.62	0.00	411.51	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2067	0.00	0.00	151.64	0.00	22.53	0.00	174.16	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2068	0.00	0.00	249.53	0.00	23.63	0.00	273.16	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2069	0.00	0.00	345.04	0.00	1.48	0.00	346.52	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2070	0.00	0.00	154.84	0.00	12.17	0.00	167.01	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2071	0.00	0.00	11.41	0.00	25.85	0.00	37.26	39.63	62.94	366.23	68.53	380.53	152.83	-235.65
2072	0.00	0.00	245.10	0.00	40.76	0.00	285.86	39.63	50.06	366.23	68.53	380.53	152.83	-235.65
2073	0.00	0.00	354.80	0.00	0.01	0.00	354.81	39.63	48.88	366.23	68.53	380.53	152.83	-235.65
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.63	48.88	366.23	68.53	380.53	152.83	-235.65
2075	0.00	0.00	11.73	0.00	61.32	0.00	73.05	39.63	48.88	366.23	68.53	380.53	152.83	-235.65
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.99	366.23	68.53	380.53	152.83	-235.65
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2081	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	50.06	366.23	68.53	380.53	152.83	-235.65
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2087	0.00	0.00	105.37	0.00	10.08	0.00	115.45	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2088	0.00	0.00	144.20	0.00	0.00	0.00	144.20	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2089	0.00	0.00	21.92	0.00	0.00	0.00	21.92	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
2090	0.00	0.00	0.00	0.00	20.44	0.00	20.44	39.63	47.10	366.23	68.53	380.53	152.83	-235.65
Salvage Value	0.00	0.00	10.50	0.00	1.87	0.00	12.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2777.64	1058.42	0.00	257.77	0.00	4093.83	316.50	263.16	6188.84	1467.38	1553.48	2021.31	1146.67

Net Present Value: -3527

K22/C29

TABLE 117
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	107.68	0.00	0.00	10.08	0.00	149.70	0.75	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.87	35.49	0.00	0.00	11.31	0.00	87.67	1.19	0.00	352.45	103.29	24.03	104.25	120.88
2016	11.52	38.11	0.00	0.00	11.42	0.00	61.05	1.49	0.00	362.00	101.40	25.15	106.58	128.88
2017	12.30	248.88	0.00	0.00	33.24	0.00	294.42	2.96	0.00	380.29	99.79	25.81	108.55	146.14
2018	12.39	486.04	0.00	0.00	11.88	0.00	510.31	5.52	0.00	358.44	96.95	28.25	111.40	121.82
2019	14.85	777.34	0.00	0.00	20.68	0.00	812.87	9.58	0.00	349.59	94.96	25.50	112.89	116.24
2020	188.90	874.32	0.00	0.00	37.63	0.00	1100.84	15.08	0.00	378.47	94.25	22.39	124.78	137.05
2021	284.83	711.17	0.00	0.00	53.38	0.00	1049.37	20.33	0.00	382.20	92.50	21.51	135.56	132.64
2022	308.98	413.91	0.00	0.00	63.21	0.00	786.10	24.26	13.29	389.11	92.49	24.47	129.12	143.03
2023	315.53	192.68	0.00	0.00	4.34	0.00	512.55	26.82	13.51	509.67	98.27	24.37	117.65	269.38
2024	856.59	66.77	0.00	0.00	4.33	0.00	927.69	31.46	13.21	524.88	98.15	27.64	122.65	276.43
2025	1364.05	0.00	0.00	0.00	52.77	0.00	1416.82	38.55	13.43	466.05	98.13	19.42	113.33	235.18
2026	1226.99	0.00	0.00	0.00	27.62	0.00	1254.61	44.82	13.26	446.37	96.22	19.73	116.20	214.22
2027	877.84	0.00	0.00	0.00	46.57	0.00	924.42	49.44	13.21	404.65	94.58	18.07	115.13	176.88
2028	609.09	0.00	0.00	0.00	80.98	0.00	690.07	52.89	12.96	378.33	92.66	19.84	119.12	146.71
2029	400.82	0.00	0.00	0.00	107.18	0.00	508.00	55.43	27.13	489.42	96.54	22.67	102.44	267.76
2030	147.90	0.00	0.00	0.00	125.54	0.00	273.44	56.80	27.36	647.71	103.83	22.11	94.28	427.49
2031	46.76	0.00	0.00	0.00	0.00	0.00	46.76	57.03	27.26	667.61	103.61	22.60	98.06	443.35
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	30.24	646.37	101.89	22.32	99.60	422.56
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	26.04	623.22	100.23	22.27	100.96	399.75
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.99	603.10	98.61	22.73	103.20	378.56
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.82	581.71	97.04	22.84	104.51	357.32
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	57.03	25.44	556.99	95.47	22.78	105.85	332.90
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.52	532.05	93.91	22.86	107.80	307.48
2038	0.00	0.00	136.06	0.00	0.00	0.00	136.06	57.60	24.96	508.15	92.37	22.90	111.32	281.57
2039	0.00	0.00	177.98	0.00	12.34	0.00	190.32	58.44	27.74	500.53	90.98	22.41	126.08	261.06
2040	0.00	0.00	23.67	0.00	0.00	0.00	23.67	58.56	28.85	488.38	89.23	39.30	127.85	232.00
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.56	28.85	476.28	87.76	43.93	133.37	211.23
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	59.15	31.81	464.64	86.32	45.33	141.39	191.61
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	60.01	28.85	450.93	84.83	46.02	151.37	168.72
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	60.72	32.92	440.58	83.34	70.90	148.83	137.52
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.02	32.25	428.87	82.08	75.78	154.67	116.34
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.14	36.33	440.64	81.70	74.95	161.37	122.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.11	411.30	79.46	99.97	166.48	65.39
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.11	426.93	81.08	83.56	160.84	101.45
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	41.07	426.93	81.08	83.56	160.84	101.45
2050	0.00	0.00	0.00	0.00	10.62	0.00	10.62	62.14	37.23	426.93	81.08	83.56	160.84	101.45
2051	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.14	36.35	426.93	81.08	83.56	160.84	101.45
2052	0.00	0.00	0.00	0.00	10.71	0.00	10.71	62.14	39.31	426.93	81.08	83.56	160.84	101.45
2053	0.00	0.00	0.00	0.00	0.58	0.00	0.58	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2054	0.00	0.00	0.00	0.00	19.19	0.00	19.19	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2055	0.00	0.00	0.00	0.00	25.46	0.00	25.46	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2056	0.00	0.00	0.00	0.00	27.52	0.00	27.52	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2057	0.00	0.00	0.00	0.00	22.45	0.00	22.45	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2058	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2059	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.14	55.15	426.93	81.08	83.56	160.84	101.45
2060	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2061	0.00	0.00	0.00	0.00	6.42	0.00	6.42	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.14	39.32	426.93	81.08	83.56	160.84	101.45
2063	0.00	0.00	0.00	0.00	18.18	0.00	18.18	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2064	0.00	0.00	0.00	0.00	25.66	0.00	25.66	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2065	0.00	0.00	0.00	0.00	31.70	0.00	31.70	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2066	0.00	0.00	0.00	0.00	0.73	0.00	0.73	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2067	0.00	0.00	0.00	0.00	22.53	0.00	22.53	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2068	0.00	0.00	113.78	0.00	11.29	0.00	125.07	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2069	0.00	0.00	155.70	0.00	1.48	0.00	157.18	62.14	55.15	426.93	81.08	83.56	160.84	101.45
2070	0.00	0.00	23.67	0.00	12.17	0.00	35.83	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2071	0.00	0.00	0.00	0.00	25.85	0.00	25.85	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2072	0.00	0.00	116.99	0.00	40.76	0.00	157.75	62.14	55.15	426.93	81.08	83.56	160.84	101.45
2073	0.00	0.00	160.11	0.00	3.27	0.00	163.38	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2074	0.00	0.00	142.97	0.00	15.60	0.00	158.58	62.14	53.96	426.93	81.08	83.56	160.84	101.45
2075	0.00	0.00	162.36	0.00	39.94	0.00	202.29	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2076	0.00	0.00	24.68	0.00	21.20	0.00	45.88	62.14	53.08	426.93	81.08	83.56	160.84	101.45
2077	0.00	0.00	0.00	0.00	35.88	0.00	35.88	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2078	0.00	0.00	0.00	0.00	75.14	0.00	75.14	62.14	52.19	426.93	81.08	83.56	160.84	101.45
2079	0.00	0.00	0.00	0.00	81.51	0.00	81.51	62.14	39.32	426.93	81.08	83.56	160.84	101.45
2080	0.00	0.00	0.00	0.00	167.42	0.00	167.42	62.14	53.96	426.93	81.08	83.56	160.84	101.45
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	56.92	426.93	81.08	83.56	160.84	101.45
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.13	426.93	81.08	83.56	160.84	101.45
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	53.96	426.93	81.08	83.56	160.84	101.45
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	36.36	426.93	81.08	83.56	160.84	101.45
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	39.32	426.93	81.08	83.56	160.84	101.45
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	36.36	426.93	81.08	83.56	160.84	101.45
Salvage Value	5.07	0.00	3.37	0.00	4.36	0.00	12.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3364.72	2777.64	185.86	0.00	408.28	0.00	6736.50	539.94	248.53	7103.18	1546.98	531.45	1948.72	3076.04

Net Present Value: -4449

SCGT/C26

TABLE 118
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	352.45	103.29	24.03	104.25	120.88
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	362.42	101.40	25.15	106.58	129.29
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	381.33	99.79	25.80	108.52	147.22
2018	243.00	0.00	0.37	0.00	0.00	0.00	243.37	3.58	0.00	360.10	96.94	28.24	111.34	123.57
2019	292.57	0.00	0.00	0.00	0.00	0.00	292.57	5.04	0.00	351.08	94.96	25.50	112.83	117.80
2020	300.06	0.00	122.63	0.00	0.00	0.00	422.69	7.05	0.00	386.00	94.86	20.21	122.96	147.97
2021	828.64	0.00	159.61	0.00	12.34	0.00	1000.59	11.94	0.00	388.11	92.99	19.19	133.93	142.00
2022	1332.76	0.00	20.87	0.00	0.82	0.00	1354.45	18.71	4.07	375.04	90.77	35.71	136.13	112.43
2023	1198.84	0.00	0.00	0.00	1.64	0.00	1200.49	24.71	4.07	357.94	88.37	45.20	142.74	81.63
2024	857.70	0.00	0.00	0.00	3.28	0.00	860.99	29.02	4.07	352.56	87.19	49.67	147.47	68.23
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	32.03	4.07	282.65	87.70	30.36	137.78	26.81
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	34.00	18.69	355.93	91.71	22.78	112.46	128.99
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	34.73	18.91	502.98	99.64	21.60	100.74	280.99
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	34.96	18.61	530.77	99.73	23.67	109.37	298.00
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.83	506.65	97.99	24.36	110.77	273.52
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.65	490.83	96.77	24.07	110.76	259.22
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.60	468.26	94.79	26.22	114.85	232.40
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.36	440.64	92.83	27.83	118.35	201.63
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.92	421.32	90.85	32.77	123.00	174.69
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.92	410.32	89.26	37.87	128.73	154.46
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.96	400.13	87.94	42.00	131.62	138.58
2036	0.00	0.00	112.20	0.00	0.00	0.00	112.20	35.52	20.74	392.81	86.85	42.48	136.36	127.12
2037	0.00	0.00	153.59	0.00	12.34	0.00	165.93	36.35	17.78	380.77	85.33	43.23	147.03	105.19
2038	0.00	0.00	23.34	0.00	0.00	0.00	23.34	36.46	21.85	370.72	83.82	66.52	145.80	74.58
2039	0.00	0.00	114.57	0.00	0.00	0.00	114.57	37.04	21.85	359.47	82.55	72.06	158.07	46.79
2040	0.00	0.00	158.91	0.00	97.19	0.00	256.10	38.31	21.85	349.69	81.18	71.57	171.43	25.52
2041	0.00	0.00	140.01	0.00	0.00	0.00	140.01	39.01	25.94	335.73	79.51	100.53	169.90	-14.21
2042	0.00	0.00	158.99	0.00	0.00	0.00	158.99	39.80	25.27	322.25	78.14	112.73	175.59	-44.22
2043	0.00	0.00	141.98	0.00	0.00	0.00	141.98	40.51	29.34	314.44	76.82	126.47	184.62	-73.47
2044	0.00	0.00	161.23	0.00	81.76	0.00	242.99	41.72	29.34	303.64	75.49	128.07	201.44	-101.37
2045	0.00	0.00	24.51	0.00	0.00	0.00	24.51	41.85	33.43	295.01	74.13	175.98	189.26	-144.36
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	36.39	285.33	72.94	194.06	194.04	-175.70
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.44	274.94	71.61	197.31	213.99	-207.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.45	285.09	72.89	189.12	199.10	-176.01
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.45	285.09	72.89	189.12	199.10	-176.01
2050	0.00	0.00	100.35	0.00	10.08	0.00	110.43	41.85	33.46	285.09	72.89	189.12	199.10	-176.01
2051	0.00	0.00	137.33	0.00	10.08	0.00	147.41	41.85	35.24	285.09	72.89	189.12	199.10	-176.01
2052	0.00	0.00	20.87	0.00	10.08	0.00	30.95	41.85	35.25	285.09	72.89	189.12	199.10	-176.01
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	285.09	72.89	189.12	199.10	-176.01
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	285.09	72.89	189.12	199.10	-176.01
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	285.09	72.89	189.12	199.10	-176.01
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	41.85	36.43	285.09	72.89	189.12	199.10	-176.01
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2066	0.00	0.00	112.20	0.00	0.00	0.00	112.20	41.85	36.43	285.09	72.89	189.12	199.10	-176.01
2067	0.00	0.00	153.54	0.00	0.00	0.00	153.54	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2068	0.00	0.00	23.34	0.00	0.00	0.00	23.34	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2069	0.00	0.00	114.57	0.00	0.00	0.00	114.57	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2070	0.00	0.00	156.79	0.00	0.00	0.00	156.79	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2071	0.00	0.00	140.01	0.00	0.00	0.00	140.01	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2072	0.00	0.00	158.99	0.00	13.16	0.00	172.16	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2073	0.00	0.00	141.98	0.00	1.64	0.00	143.62	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2074	0.00	0.00	161.23	0.00	3.28	0.00	164.51	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2075	0.00	0.00	24.51	0.00	80.28	0.00	104.79	41.85	49.30	285.09	72.89	189.12	199.10	-176.01
2076	0.00	0.00	0.00	0.00	3.28	0.00	3.28	41.85	36.43	285.09	72.89	189.12	199.10	-176.01
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	51.08	285.09	72.89	189.12	199.10	-176.01
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	285.09	72.89	189.12	199.10	-176.01
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	41.85	51.08	285.09	72.89	189.12	199.10	-176.01
2080	0.00	0.00	100.35	0.00	0.00	0.00	100.35	41.85	35.25	285.09	72.89	189.12	199.10	-176.01
2081	0.00	0.00	137.33	0.00	0.00	0.00	137.33	41.85	51.08	285.09	72.89	189.12	199.10	-176.01
2082	0.00	0.00	20.87	0.00	0.00	0.00	20.87	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	36.43	285.09	72.89	189.12	199.10	-176.01
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
2090	0.00	0.00	0.00	0.00	24.30	0.00	24.30	41.85	33.47	285.09	72.89	189.12	199.10	-176.01
Salvage Value	1.98	0.00	5.52	0.00	1.36	0.00	8.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	485.51	0.00	94.79	0.00	4610.65	364.63	196.32	5984.81	1484.44	897.18	2169.62	1433.58

Net Present Value: -3738

CCGT/C26

TABLE 119
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	352.45	103.29	24.03	104.25	120.88
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	362.42	101.40	25.15	106.58	129.29
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	381.33	99.79	25.80	108.52	147.22
2018	243.00	0.00	0.37	0.00	0.00	0.00	243.37	3.58	0.00	360.10	96.94	28.24	111.34	123.57
2019	292.57	0.00	208.77	0.00	0.00	0.00	501.34	6.09	0.00	351.08	94.96	25.50	112.83	117.80
2020	300.06	0.00	324.49	0.00	0.00	0.00	624.54	9.10	0.00	386.00	94.86	20.21	122.96	147.97
2021	828.64	0.00	157.90	0.00	12.34	0.00	998.88	13.98	0.00	394.93	93.74	16.84	131.69	152.67
2022	1332.76	0.00	9.99	0.00	0.82	0.00	1343.57	20.70	7.06	415.43	91.28	69.96	117.82	136.37
2023	1198.84	0.00	0.00	0.00	1.64	0.00	1200.49	26.70	7.06	404.30	89.19	78.27	123.10	113.75
2024	857.70	0.00	0.00	0.00	3.28	0.00	860.99	31.01	7.06	402.46	88.18	83.83	125.87	104.58
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	34.02	7.06	328.74	87.84	69.73	120.83	50.34
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	35.99	21.68	389.16	91.63	57.75	102.85	136.93
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	36.72	21.90	525.33	99.62	42.73	94.87	288.11
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	36.95	21.60	554.51	99.86	43.19	102.84	308.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.82	533.14	98.12	47.47	103.21	284.34
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.65	506.81	95.97	51.00	106.08	253.76
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.60	510.50	95.91	47.41	103.78	263.40
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.35	474.42	93.00	54.81	109.48	217.13
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.91	459.95	91.28	59.79	113.53	195.36
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.91	444.36	89.23	66.08	120.51	168.54
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.95	435.66	87.76	71.69	124.69	151.52
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	23.74	422.56	86.10	81.55	127.78	127.14
2037	0.00	0.00	112.98	0.00	0.00	0.00	112.98	37.51	20.78	421.86	85.36	85.07	130.22	121.22
2038	0.00	0.00	154.66	0.00	12.34	0.00	167.01	38.35	20.78	414.97	84.16	88.57	136.96	105.27
2039	0.00	0.00	23.50	0.00	0.00	0.00	23.50	38.46	24.85	402.35	82.37	109.99	146.01	63.98
2040	0.00	0.00	115.37	0.00	0.00	0.00	115.37	39.04	24.85	390.32	80.92	120.13	150.92	38.36
2041	0.00	0.00	160.01	0.00	97.19	0.00	257.20	40.31	24.85	379.04	79.59	127.03	157.67	14.75
2042	0.00	0.00	140.99	0.00	0.00	0.00	140.99	41.02	28.26	370.64	78.23	139.58	165.76	-12.93
2043	0.00	0.00	160.11	0.00	0.00	0.00	160.11	41.82	28.26	357.45	76.82	161.18	164.80	-45.35
2044	0.00	0.00	24.34	0.00	0.00	0.00	24.34	41.94	32.33	346.27	75.48	178.87	169.54	-77.62
2045	0.00	0.00	119.47	0.00	0.00	0.00	119.47	42.54	32.33	334.80	74.13	185.72	181.37	-106.42
2046	0.00	0.00	163.49	0.00	81.76	0.00	245.25	43.77	35.30	330.40	73.22	185.91	193.77	-122.49
2047	0.00	0.00	24.85	0.00	0.00	0.00	24.85	43.89	36.43	306.84	71.63	221.24	187.53	-173.56
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.43	324.01	72.99	197.62	187.56	-134.16
2049	0.00	0.00	208.77	0.00	10.08	0.00	218.85	43.89	36.44	324.01	72.99	197.62	187.56	-134.16
2050	0.00	0.00	302.21	0.00	10.08	0.00	312.29	43.89	36.44	324.01	72.99	197.62	187.56	-134.16
2051	0.00	0.00	135.62	0.00	10.08	0.00	145.70	43.89	38.22	324.01	72.99	197.62	187.56	-134.16
2052	0.00	0.00	9.99	0.00	10.08	0.00	20.07	43.89	38.23	324.01	72.99	197.62	187.56	-134.16
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.23	324.01	72.99	197.62	187.56	-134.16
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	324.01	72.99	197.62	187.56	-134.16
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	324.01	72.99	197.62	187.56	-134.16
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	43.89	39.42	324.01	72.99	197.62	187.56	-134.16
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	39.42	324.01	72.99	197.62	187.56	-134.16
2067	0.00	0.00	112.98	0.00	0.00	0.00	112.98	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2068	0.00	0.00	154.62	0.00	0.00	0.00	154.62	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2069	0.00	0.00	23.50	0.00	0.00	0.00	23.50	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2070	0.00	0.00	115.37	0.00	0.00	0.00	115.37	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2071	0.00	0.00	157.89	0.00	0.00	0.00	157.89	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2072	0.00	0.00	140.99	0.00	0.82	0.00	141.81	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2073	0.00	0.00	160.11	0.00	13.98	0.00	174.09	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2074	0.00	0.00	24.34	0.00	3.28	0.00	27.62	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2075	0.00	0.00	119.47	0.00	7.39	0.00	126.86	43.89	52.29	324.01	72.99	197.62	187.56	-134.16
2076	0.00	0.00	163.49	0.00	76.18	0.00	239.67	43.89	39.42	324.01	72.99	197.62	187.56	-134.16
2077	0.00	0.00	24.85	0.00	0.00	0.00	24.85	43.89	54.07	324.01	72.99	197.62	187.56	-134.16
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	324.01	72.99	197.62	187.56	-134.16
2079	0.00	0.00	208.77	0.00	0.00	0.00	208.77	43.89	54.07	324.01	72.99	197.62	187.56	-134.16
2080	0.00	0.00	302.21	0.00	0.00	0.00	302.21	43.89	38.24	324.01	72.99	197.62	187.56	-134.16
2081	0.00	0.00	135.62	0.00	61.32	0.00	196.94	43.89	54.07	324.01	72.99	197.62	187.56	-134.16
2082	0.00	0.00	9.99	0.00	0.00	0.00	9.99	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	39.42	324.01	72.99	197.62	187.56	-134.16
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	324.01	72.99	197.62	187.56	-134.16
Salvage Value	1.98	0.00	8.74	0.00	1.21	0.00	11.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	797.55	0.00	91.70	0.00	4919.61	386.12	222.15	6355.96	1486.61	1148.75	2046.17	1674.43

Net Present Value: -3853

Wind/C26

TABLE 120
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	319.76	105.21	20.23	100.02	94.30
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	352.45	103.29	24.03	104.25	120.88
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	362.42	101.40	25.15	106.58	129.29
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	381.33	99.79	25.80	108.51	147.23
2018	243.00	0.00	0.00	0.00	0.00	0.00	243.00	3.58	0.00	360.10	96.94	28.24	111.34	123.57
2019	292.57	0.00	0.00	0.00	0.00	0.00	292.57	5.04	0.00	351.08	94.96	25.50	112.83	117.80
2020	300.06	0.00	0.00	13.09	21.21	0.00	334.36	6.72	0.00	382.58	94.43	21.68	124.08	142.40
2021	828.64	0.00	0.00	399.71	35.35	0.00	1263.70	13.03	0.00	384.13	92.55	21.15	134.42	136.02
2022	1332.76	0.00	0.00	407.19	43.24	0.00	1783.19	21.95	6.34	388.08	90.90	21.21	135.37	140.60
2023	1198.84	0.00	0.00	394.10	22.85	0.00	1615.79	30.03	12.69	384.93	88.39	24.37	139.33	132.84
2024	857.70	0.00	0.00	7.48	10.35	0.00	875.54	34.41	19.03	387.39	86.48	25.10	144.27	131.53
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	37.42	19.03	313.57	86.37	16.53	160.24	50.43
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	39.39	33.65	412.95	90.48	19.67	110.87	191.92
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	40.12	33.87	560.80	98.39	17.73	99.03	345.65
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	40.34	33.57	583.74	98.27	19.41	107.10	358.97
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.79	560.07	96.58	19.71	108.29	335.49
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.62	547.08	95.50	19.20	107.85	324.53
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.57	532.93	94.04	19.84	110.48	308.57
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	40.34	33.32	512.93	92.58	19.78	112.74	287.83
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	32.88	486.44	91.03	19.65	114.33	261.42
2034	0.00	0.00	132.93	0.00	0.00	0.00	132.93	40.90	32.88	461.96	89.55	19.75	116.24	236.42
2035	0.00	0.00	173.70	0.00	12.34	0.00	186.04	41.72	32.92	453.61	88.52	18.24	119.80	227.05
2036	0.00	0.00	135.21	0.00	0.00	0.00	135.21	42.39	39.78	436.42	86.40	33.50	123.78	192.75
2037	0.00	0.00	153.59	0.00	12.34	0.00	165.93	43.22	36.82	422.50	84.92	37.85	128.97	170.76
2038	0.00	0.00	23.34	0.00	0.00	0.00	23.34	43.34	40.89	415.35	83.64	49.13	133.21	149.37
2039	0.00	0.00	114.57	0.00	0.00	0.00	114.57	43.91	40.89	405.33	82.45	48.36	147.80	126.73
2040	0.00	0.00	158.91	13.09	97.19	0.00	269.19	45.25	40.89	388.76	80.74	62.20	151.51	94.31
2041	0.00	0.00	140.01	399.71	0.00	0.00	539.72	47.95	44.97	378.09	79.33	76.13	156.67	65.96
2042	0.00	0.00	158.99	407.19	0.00	0.00	566.18	50.78	44.30	366.60	78.02	79.59	166.33	42.66
2043	0.00	0.00	141.98	394.10	0.00	0.00	536.08	53.46	48.37	359.01	76.70	88.87	177.61	15.83
2044	0.00	0.00	161.23	7.48	81.76	0.00	250.47	54.71	48.37	342.75	75.32	111.15	175.29	-19.00
2045	0.00	0.00	24.51	0.00	0.00	0.00	24.51	54.83	52.46	332.91	74.03	129.63	180.62	-51.37
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	55.43	321.16	72.73	132.31	195.53	-79.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.47	309.94	71.47	134.07	213.45	-109.05
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.48	321.34	72.74	132.00	196.54	-79.94
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.49	321.34	72.74	132.00	196.54	-79.94
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.49	321.34	72.74	132.00	196.54	-79.94
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	54.27	321.34	72.74	132.00	196.54	-79.94
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	54.28	321.34	72.74	132.00	196.54	-79.94
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	321.34	72.74	132.00	196.54	-79.94
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	321.34	72.74	132.00	196.54	-79.94
2055	0.00	0.00	0.00	0.00	5.30	0.00	5.30	54.83	54.28	321.34	72.74	132.00	196.54	-79.94
2056	0.00	0.00	0.00	0.00	8.84	0.00	8.84	54.83	55.46	321.34	72.74	132.00	196.54	-79.94
2057	0.00	0.00	0.00	0.00	10.60	0.00	10.60	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2058	0.00	0.00	0.00	0.00	5.30	0.00	5.30	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2059	0.00	0.00	0.00	0.00	1.77	0.00	1.77	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2060	0.00	0.00	0.00	13.09	0.00	0.00	13.09	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2061	0.00	0.00	0.00	399.71	0.00	0.00	399.71	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2062	0.00	0.00	0.00	407.19	0.00	0.00	407.19	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2063	0.00	0.00	0.00	394.10	0.00	0.00	394.10	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2064	0.00	0.00	110.64	7.48	0.00	0.00	118.13	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2065	0.00	0.00	151.42	0.00	0.00	0.00	151.42	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2066	0.00	0.00	135.21	0.00	0.00	0.00	135.21	54.83	55.46	321.34	72.74	132.00	196.54	-79.94
2067	0.00	0.00	153.54	0.00	0.00	0.00	153.54	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2068	0.00	0.00	23.34	0.00	0.00	0.00	23.34	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2069	0.00	0.00	114.57	0.00	0.00	0.00	114.57	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2070	0.00	0.00	156.79	0.00	28.25	0.00	185.04	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2071	0.00	0.00	140.01	0.00	26.51	0.00	166.53	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2072	0.00	0.00	158.99	0.00	44.98	0.00	203.97	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2073	0.00	0.00	141.98	0.00	17.55	0.00	159.53	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2074	0.00	0.00	161.23	0.00	8.59	0.00	169.81	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2075	0.00	0.00	24.51	0.00	80.28	0.00	104.79	54.83	68.33	321.34	72.74	132.00	196.54	-79.94
2076	0.00	0.00	0.00	0.00	3.28	0.00	3.28	54.83	55.46	321.34	72.74	132.00	196.54	-79.94
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	70.11	321.34	72.74	132.00	196.54	-79.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	321.34	72.74	132.00	196.54	-79.94
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	54.83	70.11	321.34	72.74	132.00	196.54	-79.94
2080	0.00	0.00	0.00	13.09	0.00	0.00	13.09	54.83	54.28	321.34	72.74	132.00	196.54	-79.94
2081	0.00	0.00	0.00	399.71	0.00	0.00	399.71	54.83	70.11	321.34	72.74	132.00	196.54	-79.94
2082	0.00	0.00	0.00	407.19	0.00	0.00	407.19	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2083	0.00	0.00	0.00	394.10	0.00	0.00	394.10	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2084	0.00	0.00	0.00	7.48	10.08	0.00	17.56	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	55.46	321.34	72.74	132.00	196.54	-79.94
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
2090	0.00	0.00	0.00	0.00	24.30	0.00	24.30	54.83	52.50	321.34	72.74	132.00	196.54	-79.94
Salvage Value	1.98	0.00	4.31	6.52	1.97	0.00	14.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	359.13	1019.73	172.43	0.00	5581.64	439.28	347.44	6402.43	1479.32	671.91	2129.81	2121.40

Net Present Value -4247

K19/C25/750MW (WPS Sale &Inv)

TABLE 121
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	3.09	259.35	1.30	0.00	317.99	105.22	20.25	100.48	92.04
2015	87.06	457.15	0.00	0.00	17.36	5.50	567.07	4.13	0.00	348.51	103.30	24.00	104.33	116.88
2016	173.05	602.85	0.00	0.00	22.96	13.86	812.72	8.20	0.00	359.24	101.42	25.17	106.74	125.92
2017	199.14	728.47	0.00	0.00	32.60	20.13	980.34	13.10	0.00	375.35	99.42	26.89	109.76	139.29
2018	237.78	512.16	0.00	0.00	32.01	84.64	866.59	17.43	0.00	359.55	97.28	27.52	110.94	123.81
2019	241.61	365.25	0.00	0.00	40.52	69.15	716.54	21.01	13.29	387.12	97.21	26.08	110.63	153.20
2020	664.05	148.71	0.00	0.00	2.60	130.92	946.29	25.74	45.83	630.53	104.50	20.66	126.35	379.02
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	31.47	43.92	712.36	105.07	22.72	136.16	448.42
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	36.32	42.55	709.65	103.86	22.73	138.69	444.37
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	39.84	40.67	678.49	101.48	22.60	142.98	411.42
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	42.43	39.07	655.15	99.24	25.11	148.68	382.13
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	44.28	52.00	675.40	103.96	22.29	116.05	433.10
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	45.22	50.42	880.89	112.24	22.23	116.82	629.61
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	45.40	48.96	918.60	112.29	21.75	127.77	656.80
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	47.93	908.61	110.58	22.48	131.02	644.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	49.25	887.77	108.61	22.51	134.16	622.48
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	43.96	877.91	107.25	22.04	135.90	612.73
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	42.61	865.34	105.56	22.51	139.61	597.66
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	41.09	846.22	103.83	22.57	142.94	576.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.06	821.64	102.00	22.59	146.18	550.86
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	39.10	798.51	100.24	22.76	150.40	525.11
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.40	757.86	98.52	22.55	146.95	489.84
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	36.88	687.57	96.88	22.96	131.34	436.39
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	45.40	36.35	654.72	95.22	23.07	132.66	403.77
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.83	629.12	93.54	23.02	137.41	375.15
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	45.66	38.28	605.30	91.89	22.97	149.37	341.07
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	46.04	34.83	601.80	90.59	21.84	159.70	329.67
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	46.10	37.76	582.50	88.54	38.96	161.45	293.55
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	46.36	37.30	567.69	86.97	43.45	167.63	269.64
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	46.75	36.85	556.85	85.58	45.86	175.75	249.66
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	47.06	42.27	552.99	84.34	52.59	184.75	231.31
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	47.69	44.81	527.89	82.45	68.05	185.82	191.56
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.74	45.53	516.14	80.99	82.58	191.65	160.93
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	44.25	502.27	79.68	86.30	200.51	135.78
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	42.98	515.43	81.04	78.98	192.66	162.76
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	47.74	45.58	515.43	81.04	78.98	192.66	162.76
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	47.74	44.04	515.43	81.04	78.98	192.66	162.76
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	47.74	43.70	515.43	81.04	78.98	192.66	162.76
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	47.74	43.38	515.43	81.04	78.98	192.66	162.76
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	47.74	43.06	515.43	81.04	78.98	192.66	162.76
2054	0.00	0.00	0.00	0.00	14.11	14.92	29.03	47.74	42.75	515.43	81.04	78.98	192.66	162.76
2055	0.00	0.00	0.00	0.00	0.64	15.47	16.11	47.74	43.63	515.43	81.04	78.98	192.66	162.76
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.74	56.21	515.43	81.04	78.98	192.66	162.76
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	47.74	40.10	515.43	81.04	78.98	192.66	162.76
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	47.74	55.66	515.43	81.04	78.98	192.66	162.76
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	47.74	42.53	515.43	81.04	78.98	192.66	162.76
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	47.74	52.37	515.43	81.04	78.98	192.66	162.76
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	68.20	515.43	81.04	78.98	192.66	162.76
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	47.74	68.20	515.43	81.04	78.98	192.66	162.76
2065	0.00	0.00	0.00	0.00	6.95	3.37	10.32	47.74	39.50	515.43	81.04	78.98	192.66	162.76
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	47.74	68.20	515.43	81.04	78.98	192.66	162.76
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	47.74	68.20	515.43	81.04	78.98	192.66	162.76
2069	0.00	0.00	51.92	0.00	26.41	45.47	123.80	47.74	39.50	515.43	81.04	78.98	192.66	162.76
2070	0.00	0.00	70.63	0.00	1.96	47.15	119.74	47.74	54.15	515.43	81.04	78.98	192.66	162.76
2071	0.00	0.00	10.67	0.00	23.96	0.00	34.63	47.74	38.32	515.43	81.04	78.98	192.66	162.76
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	47.74	54.15	515.43	81.04	78.98	192.66	162.76
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	47.74	37.43	515.43	81.04	78.98	192.66	162.76
2074	0.00	0.00	62.88	0.00	37.68	0.00	100.56	47.74	52.37	515.43	81.04	78.98	192.66	162.76
2075	0.00	0.00	70.98	0.00	55.81	0.00	126.79	47.74	39.50	515.43	81.04	78.98	192.66	162.76
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	47.74	54.15	515.43	81.04	78.98	192.66	162.76
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	38.32	515.43	81.04	78.98	192.66	162.76
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	47.74	54.15	515.43	81.04	78.98	192.66	162.76
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	41.28	515.43	81.04	78.98	192.66	162.76
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	47.74	54.15	515.43	81.04	78.98	192.66	162.76
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	47.74	39.50	515.43	81.04	78.98	192.66	162.76
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	47.74	36.54	515.43	81.04	78.98	192.66	162.76
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	47.74	39.50	515.43	81.04	78.98	192.66	162.76
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	47.74	39.50	515.43	81.04	78.98	192.66	162.76
Salvage Value	0.79	0.00	1.53	0.00	2.91	1.39	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	85.85	0.00	307.55	252.30	6575.59	528.85	494.22	9549.58	1609.11	516.49	2207.98	5215.99

Net Present Value -2383

K19/C25/750MW

TABLE 122
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	4.37	260.63	1.30	0.00	319.00	105.22	20.25	100.07	93.45
2015	87.06	457.15	0.00	0.00	17.36	7.04	568.61	4.15	0.00	350.53	103.30	24.03	104.27	118.93
2016	173.05	602.85	0.00	0.00	22.96	14.52	813.38	8.21	0.00	360.47	101.41	25.12	106.66	127.28
2017	199.14	728.47	0.00	0.00	32.60	20.13	980.34	13.11	0.00	375.60	99.42	26.85	109.69	139.65
2018	237.78	512.16	0.00	0.00	32.01	121.01	902.97	17.63	0.00	358.53	97.27	27.45	110.91	122.91
2019	241.61	365.25	0.00	0.00	40.52	82.31	729.69	21.28	13.29	385.79	97.20	26.05	110.63	151.91
2020	664.05	148.71	0.00	0.00	2.60	233.37	1048.74	26.52	49.02	633.93	104.50	20.63	125.96	382.85
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	32.25	47.22	715.88	105.08	22.86	136.07	451.86
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	37.09	45.88	713.16	103.86	22.73	138.43	448.14
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	40.62	43.85	682.66	101.48	22.60	142.80	415.77
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	43.20	42.12	659.53	99.21	25.17	148.52	386.63
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	45.06	54.92	679.74	103.95	22.32	115.75	437.71
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	46.00	53.22	864.56	112.23	22.32	113.37	616.64
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	46.17	51.65	879.75	112.30	21.59	118.84	627.02
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	50.50	868.20	110.59	22.44	121.42	613.75
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	51.71	849.84	108.61	22.51	124.78	593.92
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	46.31	842.65	107.23	22.06	126.62	586.74
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	44.86	833.11	105.55	22.62	130.36	574.57
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	43.24	817.34	103.82	22.62	134.13	556.77
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	42.11	796.35	102.01	22.52	137.90	533.91
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	41.06	776.94	100.25	22.65	142.79	511.24
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	42.27	706.57	98.59	22.77	126.58	458.64
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	38.67	676.00	96.88	22.99	128.14	428.00
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	46.17	38.06	652.52	95.20	23.00	131.95	402.37
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	37.47	627.87	93.54	22.98	136.57	374.78
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	46.43	39.86	604.88	91.89	23.01	148.49	341.49
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	46.82	36.34	601.22	90.59	21.84	158.82	329.98
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	46.87	39.20	582.08	88.54	38.96	160.82	293.77
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	47.13	38.68	567.45	86.97	43.45	167.09	269.95
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	47.52	38.18	556.38	85.58	45.86	175.10	249.84
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	47.84	43.53	552.68	84.34	52.59	184.21	231.54
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	48.46	46.02	527.68	82.45	68.05	185.41	191.76
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	48.52	46.69	515.79	80.99	82.58	191.10	161.13
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	45.35	501.95	79.68	86.30	199.99	135.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	44.04	515.14	81.04	78.98	192.16	162.96
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	48.52	46.58	515.14	81.04	78.98	192.16	162.96
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	48.52	45.00	515.14	81.04	78.98	192.16	162.96
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	48.52	44.62	515.14	81.04	78.98	192.16	162.96
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	48.52	44.24	515.14	81.04	78.98	192.16	162.96
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	48.52	43.89	515.14	81.04	78.98	192.16	162.96
2054	0.00	0.00	0.00	0.00	14.11	14.92	29.03	48.52	43.53	515.14	81.04	78.98	192.16	162.96
2055	0.00	0.00	0.00	0.00	0.64	15.47	16.11	48.52	44.38	515.14	81.04	78.98	192.16	162.96
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	48.52	56.92	515.14	81.04	78.98	192.16	162.96
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	48.52	40.77	515.14	81.04	78.98	192.16	162.96
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	48.52	56.29	515.14	81.04	78.98	192.16	162.96
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	48.52	43.13	515.14	81.04	78.98	192.16	162.96
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	48.52	52.37	515.14	81.04	78.98	192.16	162.96
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	68.20	515.14	81.04	78.98	192.16	162.96
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	48.52	68.20	515.14	81.04	78.98	192.16	162.96
2065	0.00	0.00	0.00	0.00	6.95	3.37	10.32	48.52	39.50	515.14	81.04	78.98	192.16	162.96
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	48.52	68.20	515.14	81.04	78.98	192.16	162.96
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	48.52	68.20	515.14	81.04	78.98	192.16	162.96
2069	0.00	0.00	51.92	0.00	26.41	45.47	123.80	48.52	39.50	515.14	81.04	78.98	192.16	162.96
2070	0.00	0.00	70.63	0.00	1.96	47.15	119.74	48.52	54.15	515.14	81.04	78.98	192.16	162.96
2071	0.00	0.00	10.67	0.00	23.96	0.00	34.63	48.52	38.32	515.14	81.04	78.98	192.16	162.96
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	48.52	54.15	515.14	81.04	78.98	192.16	162.96
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	48.52	37.43	515.14	81.04	78.98	192.16	162.96
2074	0.00	0.00	62.88	0.00	37.68	0.00	100.56	48.52	52.37	515.14	81.04	78.98	192.16	162.96
2075	0.00	0.00	70.98	0.00	55.81	0.00	126.79	48.52	39.50	515.14	81.04	78.98	192.16	162.96
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	48.52	54.15	515.14	81.04	78.98	192.16	162.96
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	38.32	515.14	81.04	78.98	192.16	162.96
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	48.52	54.15	515.14	81.04	78.98	192.16	162.96
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	41.28	515.14	81.04	78.98	192.16	162.96
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	48.52	54.15	515.14	81.04	78.98	192.16	162.96
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	48.52	39.50	515.14	81.04	78.98	192.16	162.96
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	48.52	36.54	515.14	81.04	78.98	192.16	162.96
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	48.52	39.50	515.14	81.04	78.98	192.16	162.96
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	48.52	39.50	515.14	81.04	78.98	192.16	162.96
Salvage Value	0.79	0.00	1.53	0.00	2.91	1.39	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	85.85	0.00	307.55	363.70	6686.99	537.88	518.00	9443.90	1609.09	516.51	2170.91	5147.39

Net Present Value -2595

K19/Gas25/750MW (WPS Sale & INV)

TABLE 123
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	3.09	228.33	1.14	0.00	317.99	105.22	20.25	100.48	92.04
2015	0.00	457.15	0.00	0.00	17.36	5.50	480.00	3.54	0.00	348.53	103.31	23.99	104.33	116.90
2016	0.00	602.85	0.00	0.00	22.96	13.86	639.67	6.74	0.00	359.26	101.42	25.16	106.73	125.96
2017	0.00	728.47	0.00	0.00	32.60	20.13	781.20	10.65	0.00	375.66	99.42	26.86	109.72	139.66
2018	0.00	512.16	0.00	0.00	32.01	84.64	628.81	13.79	0.00	360.04	97.27	27.47	110.88	124.41
2019	0.00	365.25	0.00	0.00	37.93	69.15	472.33	16.15	13.29	388.02	97.21	26.06	110.61	154.14
2020	0.00	148.71	0.00	0.00	0.01	130.92	279.64	17.55	45.83	631.97	104.50	20.63	126.23	380.62
2021	0.00	51.45	0.37	0.00	0.00	0.00	51.82	17.81	43.92	714.94	105.07	22.71	135.91	451.25
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	17.81	42.55	712.46	103.86	22.68	138.41	447.51
2023	0.00	0.00	73.38	0.00	0.00	0.00	73.38	18.06	40.67	678.76	100.98	24.18	143.17	410.44
2024	0.00	0.00	142.93	0.00	6.90	0.00	149.83	18.70	39.07	659.37	98.91	26.54	148.82	385.11
2025	0.00	0.00	82.20	0.00	54.34	0.00	136.54	19.37	41.46	582.59	98.61	25.74	135.02	323.22
2026	0.00	0.00	61.76	0.00	0.00	0.00	61.76	19.68	43.74	595.87	97.27	30.83	141.55	326.21
2027	0.00	0.00	69.72	0.00	0.00	0.00	69.72	20.03	42.42	583.00	95.25	30.23	151.67	305.85
2028	0.00	0.00	10.53	0.00	0.00	0.00	10.53	20.08	45.24	565.42	92.87	45.20	156.31	271.04
2029	0.00	0.00	51.40	0.00	0.00	0.00	51.40	20.34	46.73	549.20	91.03	50.28	162.63	245.26
2030	0.00	0.00	69.92	0.00	45.72	0.00	115.64	20.92	41.50	546.50	89.93	55.39	167.14	234.03
2031	0.00	0.00	62.07	0.00	0.00	0.00	62.07	21.23	44.41	554.25	89.56	60.33	169.98	234.38
2032	0.00	0.00	70.06	0.00	0.00	0.00	70.06	21.58	43.28	532.94	87.13	72.46	179.06	194.29
2033	0.00	0.00	10.59	0.00	0.00	0.00	10.59	21.63	46.25	523.32	85.56	86.81	185.60	165.35
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	45.18	519.69	84.81	91.52	190.31	153.05
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	43.70	445.24	82.62	87.79	183.17	91.66
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	43.15	364.29	81.13	89.50	161.88	31.79
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	42.62	336.42	79.68	97.77	163.31	-4.34
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	42.10	332.64	78.94	96.23	173.32	-15.85
2039	0.00	0.00	104.41	0.00	0.00	0.00	104.41	22.15	44.56	306.29	76.94	118.08	180.95	-69.69
2040	0.00	0.00	150.24	0.00	0.00	0.00	150.24	22.90	41.11	291.39	75.57	130.62	186.86	-101.66
2041	0.00	0.00	67.02	0.00	6.90	0.00	73.92	23.27	40.64	303.51	75.86	129.79	186.67	-88.82
2042	0.00	0.00	4.91	0.00	0.00	0.00	4.91	23.30	47.24	349.60	73.54	200.50	188.68	-113.11
2043	0.00	0.00	52.13	0.00	0.00	0.00	52.13	23.56	46.80	326.74	71.77	217.49	196.21	-158.73
2044	0.00	0.00	70.91	0.00	45.72	0.00	116.63	24.14	48.14	302.60	70.11	232.66	203.89	-204.06
2045	0.00	0.00	33.69	0.00	0.00	0.00	33.69	24.31	51.81	291.36	68.76	256.18	209.92	-243.50
2046	0.00	0.00	31.25	0.00	0.00	0.00	31.25	24.47	51.40	278.72	67.54	275.73	216.33	-280.88
2047	0.00	0.00	4.72	0.00	0.00	0.00	4.72	24.49	51.60	272.61	66.72	283.67	227.16	-304.93
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	50.33	280.90	67.67	271.86	217.80	-276.44
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	24.49	52.93	280.90	67.67	271.86	217.80	-276.44
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	24.49	49.62	280.90	67.67	271.86	217.80	-276.44
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	24.49	49.28	280.90	67.67	271.86	217.80	-276.44
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	24.49	48.95	280.90	67.67	271.86	217.80	-276.44
2053	0.00	0.00	51.10	0.00	16.51	14.92	82.53	24.49	48.63	280.90	67.67	271.86	217.80	-276.44
2054	0.00	0.00	120.65	0.00	13.47	14.92	149.04	24.49	48.32	280.90	67.67	271.86	217.80	-276.44
2055	0.00	0.00	80.08	0.00	0.00	15.47	95.55	24.49	48.02	280.90	67.67	271.86	217.80	-276.44
2056	0.00	0.00	61.76	0.00	0.00	0.00	61.76	24.49	63.56	280.90	67.67	271.86	217.80	-276.44
2057	0.00	0.00	69.72	0.00	0.00	0.00	69.72	24.49	47.45	280.90	67.67	271.86	217.80	-276.44
2058	0.00	0.00	10.53	0.00	0.00	0.00	10.53	24.49	63.01	280.90	67.67	271.86	217.80	-276.44
2059	0.00	0.00	51.40	0.00	6.90	0.00	58.30	24.49	49.87	280.90	67.67	271.86	217.80	-276.44
2060	0.00	0.00	69.92	0.00	40.76	0.00	110.68	24.49	59.72	280.90	67.67	271.86	217.80	-276.44
2061	0.00	0.00	62.07	0.00	0.00	0.00	62.07	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2062	0.00	0.00	70.06	0.00	0.00	0.00	70.06	24.49	59.72	280.90	67.67	271.86	217.80	-276.44
2063	0.00	0.00	10.59	0.00	0.00	0.00	10.59	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	24.49	59.72	280.90	67.67	271.86	217.80	-276.44
2065	0.00	0.00	0.00	0.00	41.24	3.37	44.61	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	24.49	59.72	280.90	67.67	271.86	217.80	-276.44
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	24.49	59.72	280.90	67.67	271.86	217.80	-276.44
2069	0.00	0.00	104.41	0.00	24.45	45.47	174.33	24.49	46.85	280.90	67.67	271.86	217.80	-276.44
2070	0.00	0.00	150.24	0.00	0.01	47.15	197.40	24.49	45.66	280.90	67.67	271.86	217.80	-276.44
2071	0.00	0.00	67.02	0.00	0.00	0.00	67.02	24.49	45.66	280.90	67.67	271.86	217.80	-276.44
2072	0.00	0.00	4.91	0.00	0.00	0.00	4.91	24.49	45.66	280.90	67.67	271.86	217.80	-276.44
2073	0.00	0.00	52.13	0.00	0.00	0.00	52.13	24.49	44.77	280.90	67.67	271.86	217.80	-276.44
2074	0.00	0.00	70.91	0.00	0.00	0.00	70.91	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2075	0.00	0.00	33.69	0.00	13.59	0.00	47.28	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2076	0.00	0.00	31.25	0.00	6.90	0.00	38.16	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2077	0.00	0.00	4.72	0.00	0.00	0.00	4.72	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	24.49	46.85	280.90	67.67	271.86	217.80	-276.44
2080	0.00	0.00	0.00	0.00	11.43	0.00	11.43	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2083	0.00	0.00	51.10	0.00	0.00	0.00	51.10	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2084	0.00	0.00	120.65	0.00	10.66	0.55	131.87	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2085	0.00	0.00	80.08	0.00	10.41	1.10	91.59	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2086	0.00	0.00	61.76	0.00	22.12	3.31	87.20	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2087	0.00	0.00	69.72	0.00	25.36	4.97	100.04	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2088	0.00	0.00	10.53	0.00	16.51	14.92	41.96	24.49	43.89	280.90	67.67	271.86	217.80	-276.44
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	24.49	46.85	280.90	67.67	271.86	217.80	-276.44
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	24.49	46.85	280.90	67.67	271.86	217.80	-276.44
Salvage Value	0.00	0.00	5.09	0.00	1.66	1.39	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	465.67	0.00	206.87	252.30	3494.59	274.27	507.22	7352.42	1491.29	1258.59	2431.40	2171.14

Net Present Value -2105

K19/C31/750MW

TABLE 124
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	206.20	0.00	0.00	19.04	4.37	259.99	1.30	0.00	319.00	105.22	20.25	100.07	93.45
2015	38.25	457.15	0.00	0.00	17.36	7.04	519.79	3.90	0.00	350.53	103.30	24.03	104.27	118.93
2016	10.75	602.85	0.00	0.00	22.96	14.52	651.08	7.15	0.00	360.47	101.41	25.12	106.66	127.28
2017	10.78	728.47	0.00	0.00	32.60	20.13	791.98	11.11	0.00	376.02	99.42	26.85	109.69	140.06
2018	12.78	512.16	0.00	0.00	32.01	121.01	677.96	14.50	0.00	358.99	97.25	27.44	110.84	123.46
2019	12.81	365.25	0.00	0.00	37.93	82.31	498.30	17.00	13.29	386.62	97.19	26.09	110.60	152.74
2020	12.85	148.71	0.00	0.00	0.01	233.37	394.94	18.97	49.02	635.47	104.49	20.68	125.83	384.47
2021	16.21	51.45	0.00	0.00	0.00	0.00	67.66	19.31	47.22	718.04	105.06	22.82	135.77	454.39
2022	152.49	0.00	0.00	0.00	0.00	0.00	152.49	20.07	45.88	716.31	103.87	22.71	138.09	451.65
2023	234.24	0.00	0.00	0.00	0.00	0.00	234.24	21.24	43.85	681.41	100.87	24.45	143.26	412.84
2024	251.18	0.00	0.00	0.00	0.00	0.00	251.18	22.50	42.12	661.38	98.72	27.19	149.80	385.67
2025	253.97	0.00	0.00	0.00	2.60	0.00	256.57	23.78	40.31	583.48	98.63	19.60	142.41	322.85
2026	684.03	0.00	0.00	0.00	2.60	0.00	686.63	27.21	38.38	563.70	96.69	20.23	156.22	290.55
2027	1082.05	0.00	0.00	0.00	31.66	0.00	1113.71	32.78	36.95	516.80	94.72	19.04	154.65	248.39
2028	968.69	0.00	0.00	0.00	16.57	0.00	985.26	37.71	35.58	494.62	93.11	19.78	168.13	213.60
2029	689.74	0.00	0.00	0.00	27.94	0.00	717.69	41.30	36.97	478.39	91.46	20.36	185.26	181.31
2030	476.30	0.00	0.00	0.00	48.59	0.00	524.89	43.92	31.62	474.25	90.10	20.82	199.46	163.88
2031	311.94	0.00	0.00	0.00	64.31	0.00	376.25	45.80	44.95	556.85	94.23	24.05	124.77	313.80
2032	114.56	0.00	0.00	0.00	75.32	0.00	189.88	46.75	43.93	740.96	101.62	23.62	120.48	495.24
2033	36.05	0.00	0.00	0.00	0.00	0.00	36.05	46.93	42.59	800.09	102.10	23.10	138.26	536.63
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	41.65	777.10	100.26	22.64	142.69	511.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	39.90	705.45	98.59	22.62	126.50	457.74
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	39.21	675.93	96.88	23.12	128.13	427.80
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	46.93	38.42	652.96	95.21	23.06	131.98	402.71
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	37.46	627.93	93.54	22.97	136.57	374.85
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	47.19	39.92	604.97	91.90	23.00	148.49	341.58
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	47.58	36.52	601.22	90.59	21.84	158.83	329.97
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	47.63	42.83	582.08	88.54	38.96	160.80	293.78
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	47.89	39.35	567.45	86.97	43.45	167.10	269.94
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	48.28	38.85	556.38	85.58	45.86	175.11	249.83
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	48.60	44.21	552.68	84.34	52.59	184.20	231.55
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	49.22	43.73	527.68	82.45	68.05	185.41	191.76
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	49.28	47.36	515.79	80.99	82.58	191.11	161.12
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	45.35	501.95	79.68	86.30	199.99	135.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	44.04	515.14	81.04	78.98	192.17	162.95
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	49.28	46.58	515.14	81.04	78.98	192.17	162.95
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	49.28	43.22	515.14	81.04	78.98	192.17	162.95
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	49.28	45.80	515.14	81.04	78.98	192.17	162.95
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	49.28	42.47	515.14	81.04	78.98	192.17	162.95
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	49.28	42.11	515.14	81.04	78.98	192.17	162.95
2054	0.00	0.00	0.00	0.00	13.47	14.92	28.39	49.28	41.76	515.14	81.04	78.98	192.17	162.95
2055	0.00	0.00	0.00	0.00	0.00	15.47	15.47	49.28	41.42	515.14	81.04	78.98	192.17	162.95
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	58.69	515.14	81.04	78.98	192.17	162.95
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	42.55	515.14	81.04	78.98	192.17	162.95
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	58.07	515.14	81.04	78.98	192.17	162.95
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	44.90	515.14	81.04	78.98	192.17	162.95
2060	0.00	0.00	0.00	0.00	0.64	0.00	0.64	49.28	54.15	515.14	81.04	78.98	192.17	162.95
2061	0.00	0.00	0.00	0.00	0.64	0.00	0.64	49.28	39.50	515.14	81.04	78.98	192.17	162.95
2062	0.00	0.00	0.00	0.00	7.70	0.00	7.70	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2063	0.00	0.00	0.00	0.00	3.85	0.00	3.85	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2064	0.00	0.00	0.00	0.00	14.79	1.68	16.47	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2065	0.00	0.00	0.00	0.00	17.86	3.37	21.22	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2066	0.00	0.00	0.00	0.00	16.23	10.10	26.34	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2067	0.00	0.00	0.00	0.00	25.85	15.16	41.01	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	49.28	68.20	515.14	81.04	78.98	192.17	162.95
2069	0.00	0.00	51.92	0.00	24.45	45.47	121.84	49.28	39.50	515.14	81.04	78.98	192.17	162.95
2070	0.00	0.00	70.63	0.00	0.01	47.15	117.79	49.28	54.15	515.14	81.04	78.98	192.17	162.95
2071	0.00	0.00	10.67	0.00	0.00	0.00	10.67	49.28	41.28	515.14	81.04	78.98	192.17	162.95
2072	0.00	0.00	52.07	0.00	0.00	0.00	52.07	49.28	54.15	515.14	81.04	78.98	192.17	162.95
2073	0.00	0.00	70.84	0.00	0.00	0.00	70.84	49.28	37.43	515.14	81.04	78.98	192.17	162.95
2074	0.00	0.00	62.88	0.00	0.00	0.00	62.88	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2075	0.00	0.00	70.98	0.00	8.86	0.00	79.84	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2076	0.00	0.00	10.72	0.00	1.96	0.00	12.68	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2077	0.00	0.00	0.00	0.00	23.96	0.00	23.96	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2078	0.00	0.00	0.00	0.00	19.62	0.00	19.62	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2079	0.00	0.00	0.00	0.00	21.53	0.00	21.53	49.28	39.50	515.14	81.04	78.98	192.17	162.95
2080	0.00	0.00	0.00	0.00	78.44	0.00	78.44	49.28	52.37	515.14	81.04	78.98	192.17	162.95
2081	0.00	0.00	0.00	0.00	48.91	0.00	48.91	49.28	39.50	515.14	81.04	78.98	192.17	162.95
2082	0.00	0.00	0.00	0.00	56.72	0.00	56.72	49.28	54.15	515.14	81.04	78.98	192.17	162.95
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	38.32	515.14	81.04	78.98	192.17	162.95
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	49.28	54.15	515.14	81.04	78.98	192.17	162.95
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	49.28	38.32	515.14	81.04	78.98	192.17	162.95
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	49.28	54.15	515.14	81.04	78.98	192.17	162.95
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	49.28	36.54	515.14	81.04	78.98	192.17	162.95
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	49.28	39.50	515.14	81.04	78.98	192.17	162.95
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	49.28	39.50	515.14	81.04	78.98	192.17	162.95
Salvage Value	5.74	0.00	1.53	0.00	3.25	1.39	11.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2399.77	2569.75	85.85	0.00	259.45	363.70	5678.51	455.81	479.28	8548.39	1566.01	513.78	2283.75	4184.85

Net Present Value -2429

K19/Gas31/750MW

TABLE 125
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	4.37	229.61	1.15	0.00	319.00	105.22	20.25	100.07	93.45
2015	0.00	457.15	0.00	0.00	17.36	7.04	481.54	3.56	0.00	350.53	103.30	24.03	104.27	118.93
2016	0.00	602.85	0.00	0.00	22.96	14.52	640.33	6.76	0.00	360.47	101.41	25.12	106.66	127.28
2017	0.00	728.47	0.00	0.00	32.60	20.13	781.20	10.66	0.00	376.02	99.42	26.85	109.69	140.06
2018	0.00	512.16	0.00	0.00	32.01	121.01	665.19	13.99	0.00	358.99	97.25	27.44	110.84	123.46
2019	0.00	365.25	0.00	0.00	37.93	82.31	485.49	16.42	13.29	386.62	97.19	26.09	110.60	152.74
2020	0.00	148.71	0.00	0.00	0.01	233.37	382.09	18.33	49.02	635.47	104.49	20.68	125.83	384.47
2021	0.00	51.45	0.00	0.00	0.00	0.00	51.45	18.58	47.22	718.04	105.06	22.82	135.77	454.39
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	45.88	716.26	103.87	22.73	138.12	451.54
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	43.85	681.97	100.87	24.45	143.23	413.42
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	42.12	662.28	98.72	27.21	149.73	386.63
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	40.31	585.76	98.62	19.62	142.78	324.74
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	38.38	568.08	96.68	20.36	157.09	293.95
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	18.58	36.95	522.33	94.70	19.11	155.36	253.15
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	18.58	35.58	502.87	93.09	19.78	169.95	220.05
2029	0.00	0.00	125.09	0.00	0.00	0.00	125.09	19.10	36.97	485.09	91.52	20.05	185.10	188.41
2030	0.00	0.00	213.58	0.00	13.80	0.00	227.39	20.12	31.62	487.54	90.92	17.86	195.13	183.64
2031	0.00	0.00	93.25	0.00	54.34	0.00	147.59	20.85	38.48	475.81	88.71	41.13	158.30	187.67
2032	0.00	0.00	62.13	0.00	0.00	0.00	62.13	21.16	41.32	465.18	87.10	52.23	163.08	162.78
2033	0.00	0.00	70.13	0.00	0.00	0.00	70.13	21.51	40.12	450.64	85.62	57.42	168.78	138.81
2034	0.00	0.00	10.60	0.00	0.00	0.00	10.60	21.57	43.03	450.86	84.82	62.26	175.24	128.54
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.57	41.46	374.31	82.65	75.42	156.16	60.08
2036	0.00	0.00	104.10	0.00	0.00	0.00	104.10	22.09	40.82	347.94	81.19	82.39	157.77	26.60
2037	0.00	0.00	149.79	0.00	0.00	0.00	149.79	22.84	40.22	332.79	79.84	90.12	162.65	0.18
2038	0.00	0.00	66.82	0.00	45.72	0.00	112.54	23.40	39.63	340.55	79.71	83.33	172.62	4.88
2039	0.00	0.00	4.89	0.00	0.00	0.00	4.89	23.42	49.10	388.92	77.38	162.17	173.61	-24.24
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.42	45.59	365.52	75.46	175.55	181.39	-66.87
2041	0.00	0.00	52.02	0.00	0.00	0.00	52.02	23.68	45.05	347.86	73.96	188.16	187.59	-101.86
2042	0.00	0.00	175.49	0.00	0.00	0.00	175.49	24.56	44.53	331.60	72.58	202.31	193.65	-136.94
2043	0.00	0.00	161.38	0.00	0.00	0.00	161.38	25.37	48.10	326.52	71.70	215.01	199.32	-159.51
2044	0.00	0.00	67.22	0.00	45.72	0.00	112.94	25.93	49.39	325.00	71.38	206.11	210.02	-162.51
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	25.96	56.01	375.43	69.35	296.28	199.80	-189.99
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	55.55	360.71	68.13	310.43	205.54	-223.38
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	54.22	338.28	66.84	323.08	211.42	-263.07
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	52.90	358.14	68.11	309.93	205.59	-225.48
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	25.96	55.45	358.14	68.11	309.93	205.59	-225.48
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	25.96	52.10	358.14	68.11	309.93	205.59	-225.48
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	25.96	51.71	358.14	68.11	309.93	205.59	-225.48
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	25.96	51.34	358.14	68.11	309.93	205.59	-225.48
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	25.96	50.98	358.14	68.11	309.93	205.59	-225.48
2054	0.00	0.00	0.00	0.00	13.47	14.92	28.39	25.96	50.63	358.14	68.11	309.93	205.59	-225.48
2055	0.00	0.00	0.00	0.00	0.00	15.47	15.47	25.96	50.28	358.14	68.11	309.93	205.59	-225.48
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	65.79	358.14	68.11	309.93	205.59	-225.48
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	49.64	358.14	68.11	309.93	205.59	-225.48
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	65.16	358.14	68.11	309.93	205.59	-225.48
2059	0.00	0.00	102.81	0.00	0.00	0.00	102.81	25.96	51.99	358.14	68.11	309.93	205.59	-225.48
2060	0.00	0.00	191.30	0.00	0.00	0.00	191.30	25.96	61.24	358.14	68.11	309.93	205.59	-225.48
2061	0.00	0.00	91.13	0.00	0.00	0.00	91.13	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2062	0.00	0.00	62.13	0.00	0.00	0.00	62.13	25.96	61.24	358.14	68.11	309.93	205.59	-225.48
2063	0.00	0.00	70.13	0.00	0.00	0.00	70.13	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2064	0.00	0.00	10.60	0.00	8.37	1.68	20.65	25.96	61.24	358.14	68.11	309.93	205.59	-225.48
2065	0.00	0.00	0.00	0.00	20.75	3.37	24.12	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2066	0.00	0.00	104.10	0.00	41.59	10.10	155.79	25.96	61.24	358.14	68.11	309.93	205.59	-225.48
2067	0.00	0.00	149.79	0.00	7.25	15.16	172.19	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2068	0.00	0.00	66.82	0.00	15.50	45.47	127.79	25.96	61.24	358.14	68.11	309.93	205.59	-225.48
2069	0.00	0.00	4.89	0.00	24.45	45.47	74.82	25.96	48.37	358.14	68.11	309.93	205.59	-225.48
2070	0.00	0.00	0.00	0.00	0.01	47.15	47.16	25.96	47.18	358.14	68.11	309.93	205.59	-225.48
2071	0.00	0.00	52.02	0.00	0.00	0.00	52.02	25.96	47.18	358.14	68.11	309.93	205.59	-225.48
2072	0.00	0.00	175.49	0.00	0.00	0.00	175.49	25.96	47.18	358.14	68.11	309.93	205.59	-225.48
2073	0.00	0.00	161.38	0.00	34.29	0.00	195.67	25.96	46.30	358.14	68.11	309.93	205.59	-225.48
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2075	0.00	0.00	4.92	0.00	0.00	0.00	4.92	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	25.96	48.37	358.14	68.11	309.93	205.59	-225.48
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2081	0.00	0.00	0.00	0.00	13.59	0.00	13.59	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2088	0.00	0.00	0.00	0.00	27.94	14.92	42.86	25.96	45.41	358.14	68.11	309.93	205.59	-225.48
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	25.96	48.37	358.14	68.11	309.93	205.59	-225.48
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	25.96	48.37	358.14	68.11	309.93	205.59	-225.48
Salvage Value	0.00	0.00	2.93	0.00	1.80	1.39	6.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	404.68	0.00	190.27	363.70	3528.39	278.38	500.27	7351.81	1491.84	1278.48	2414.24	2167.25

Net Present Value -2140

K19/C25/250MW

TABLE 126
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	3.87	260.13	1.31	0.00	319.00	105.22	20.25	100.07	93.45
2015	87.06	457.15	0.00	0.00	17.36	2.40	563.97	4.13	0.00	350.53	103.30	24.03	104.27	118.93
2016	173.05	602.85	0.00	0.00	22.96	2.91	801.77	8.14	0.00	360.47	101.41	25.12	106.66	127.28
2017	199.14	728.47	0.00	0.00	32.60	4.36	964.57	12.97	0.00	375.60	99.42	26.85	109.69	139.65
2018	237.78	512.16	0.00	0.00	32.01	13.09	795.04	16.94	0.00	354.68	96.67	29.46	111.73	116.82
2019	241.61	365.25	0.00	0.00	40.52	13.09	660.47	20.24	13.29	378.93	96.30	29.57	111.86	141.21
2020	664.05	148.71	0.00	0.00	2.60	13.57	828.94	24.39	13.51	595.93	104.83	21.21	113.27	356.62
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	30.12	13.26	662.71	105.44	21.71	120.03	415.53
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	34.96	13.48	650.49	103.50	22.71	123.68	400.60
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	38.49	13.31	634.20	101.26	22.74	132.03	378.17
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	41.07	13.26	622.32	98.90	25.24	142.74	355.44
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	42.92	27.65	628.80	103.74	22.49	102.81	399.75
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	43.86	27.45	791.03	111.57	22.06	98.74	558.66
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	44.04	27.33	788.07	110.98	20.86	101.81	554.41
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	27.62	773.67	109.21	21.70	104.23	538.53
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	30.20	753.82	107.39	21.88	105.60	518.94
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	26.13	744.25	106.09	21.62	106.07	510.47
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.96	730.17	104.43	22.08	108.05	495.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.58	712.00	102.77	22.25	110.44	476.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.65	689.13	101.06	22.34	112.34	453.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.77	667.02	99.38	22.52	114.88	430.22
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	27.88	628.06	97.74	22.69	112.41	395.21
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	44.04	24.92	599.49	96.13	23.02	113.87	366.48
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	24.92	573.99	94.53	22.97	116.13	340.36
2038	0.00	0.00	74.15	0.00	0.00	0.00	74.15	44.30	24.92	547.01	92.94	22.94	119.14	311.99
2039	0.00	0.00	92.84	0.00	6.90	0.00	99.74	44.69	27.88	538.45	91.73	21.68	131.74	293.29
2040	0.00	0.00	10.66	0.00	0.00	0.00	10.66	44.74	28.99	521.26	89.68	38.04	135.52	258.02
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.74	28.32	507.57	88.13	42.72	141.08	235.65
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	45.00	28.32	496.45	86.77	45.45	147.11	217.12
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	45.39	28.32	483.66	85.35	45.17	156.50	196.65
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	45.70	34.16	471.68	83.76	68.32	156.32	163.29
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	46.33	37.12	456.85	82.31	75.22	162.51	136.80
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	46.38	38.25	448.17	80.91	85.42	171.63	110.21
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	37.36	433.60	79.48	86.41	184.77	82.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.47	446.21	80.90	82.35	172.97	109.98
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	46.38	39.43	446.21	80.90	82.35	172.97	109.98
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	46.38	38.25	446.21	80.90	82.35	172.97	109.98
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	46.38	38.26	446.21	80.90	82.35	172.97	109.98
2052	0.00	0.00	0.00	0.00	25.36	1.08	26.43	46.38	38.27	446.21	80.90	82.35	172.97	109.98
2053	0.00	0.00	0.00	0.00	16.51	3.23	19.75	46.38	38.27	446.21	80.90	82.35	172.97	109.98
2054	0.00	0.00	0.00	0.00	14.11	3.23	17.35	46.38	38.27	446.21	80.90	82.35	172.97	109.98
2055	0.00	0.00	0.00	0.00	0.64	3.35	3.99	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	46.38	52.33	446.21	80.90	82.35	172.97	109.98
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	46.38	52.33	446.21	80.90	82.35	172.97	109.98
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	46.38	52.33	446.21	80.90	82.35	172.97	109.98
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	68.16	446.21	80.90	82.35	172.97	109.98
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2064	0.00	0.00	0.00	0.00	8.37	3.75	12.12	46.38	68.16	446.21	80.90	82.35	172.97	109.98
2065	0.00	0.00	0.00	0.00	6.95	2.16	9.11	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2066	0.00	0.00	0.00	0.00	0.84	2.19	3.03	46.38	68.16	446.21	80.90	82.35	172.97	109.98
2067	0.00	0.00	0.00	0.00	7.25	3.28	10.53	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2068	0.00	0.00	51.87	0.00	15.50	9.85	77.22	46.38	68.16	446.21	80.90	82.35	172.97	109.98
2069	0.00	0.00	70.56	0.00	26.41	9.85	106.82	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2070	0.00	0.00	10.66	0.00	1.96	10.22	22.84	46.38	54.10	446.21	80.90	82.35	172.97	109.98
2071	0.00	0.00	0.00	0.00	23.96	0.00	23.96	46.38	38.27	446.21	80.90	82.35	172.97	109.98
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	46.38	54.10	446.21	80.90	82.35	172.97	109.98
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	46.38	37.38	446.21	80.90	82.35	172.97	109.98
2074	0.00	0.00	62.88	0.00	44.58	0.00	107.46	46.38	52.33	446.21	80.90	82.35	172.97	109.98
2075	0.00	0.00	70.98	0.00	48.91	0.00	119.89	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	46.38	54.10	446.21	80.90	82.35	172.97	109.98
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	38.27	446.21	80.90	82.35	172.97	109.98
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	46.38	54.10	446.21	80.90	82.35	172.97	109.98
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	41.23	446.21	80.90	82.35	172.97	109.98
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	46.38	54.10	446.21	80.90	82.35	172.97	109.98
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2084	0.00	0.00	0.00	0.00	10.66	0.12	10.78	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2087	0.00	0.00	0.00	0.00	25.36	1.08	26.43	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2088	0.00	0.00	0.00	0.00	16.51	3.23	19.75	46.38	36.50	446.21	80.90	82.35	172.97	109.98
2089	0.00	0.00	0.00	0.00	13.47	3.23	16.70	46.38	39.46	446.21	80.90	82.35	172.97	109.98
2090	0.00	0.00	0.00	0.00	0.00	3.35	3.35	46.38	39.46	446.21	80.90	82.35	172.97	109.98
Salvage Value	0.79	0.00	1.49	0.00	2.91	0.36	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	88.42	0.00	307.65	46.64	6372.61	512.89	303.25	8637.89	1602.74	532.56	1982.08	4520.51

Net Present Value -2668

K19/Gas24/250MW

TABLE 127
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	3.87	229.11	1.16	0.00	319.00	105.22	20.25	100.07	93.45
2015	0.00	457.15	0.00	0.00	17.36	2.40	476.91	3.54	0.00	350.53	103.30	24.03	104.29	118.92
2016	0.00	602.85	0.00	0.00	22.96	2.91	628.72	6.69	0.00	360.47	101.41	25.12	106.66	127.28
2017	0.00	728.47	0.00	0.00	32.60	4.36	765.43	10.52	0.00	376.02	99.42	26.85	109.69	140.06
2018	0.00	512.16	0.00	0.00	32.01	13.09	557.26	13.30	0.00	355.24	96.67	29.42	111.67	117.48
2019	0.00	365.25	0.00	0.00	37.93	13.09	416.26	15.38	13.29	379.85	96.30	29.57	111.83	142.15
2020	0.00	148.71	0.37	0.00	0.01	13.57	162.66	16.19	13.51	597.49	104.83	21.22	113.20	358.25
2021	0.00	51.45	0.00	0.00	0.00	0.00	51.45	16.45	13.26	665.23	105.42	21.72	119.85	418.24
2022	0.00	0.00	73.33	0.00	0.00	0.00	73.33	16.71	13.48	657.13	103.95	21.44	122.06	409.68
2023	0.00	0.00	91.72	0.00	6.90	0.00	98.62	17.09	13.31	649.71	102.84	18.07	124.53	404.27
2024	0.00	0.00	10.49	0.00	0.00	0.00	10.49	17.14	17.33	642.97	100.96	29.41	126.88	385.71
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	17.14	17.11	528.85	98.67	22.28	120.59	287.31
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.14	16.68	504.53	96.34	25.28	125.14	257.76
2027	0.00	0.00	51.30	0.00	0.00	0.00	51.30	17.40	16.71	469.89	94.24	27.48	127.45	220.73
2028	0.00	0.00	71.91	0.00	54.34	0.00	126.25	18.02	16.77	452.45	92.39	31.79	131.98	196.30
2029	0.00	0.00	113.91	0.00	0.00	0.00	113.91	18.59	23.61	442.78	90.62	43.96	136.52	171.68
2030	0.00	0.00	148.74	0.00	0.00	0.00	148.74	19.33	19.59	441.70	89.69	47.72	139.21	165.08
2031	0.00	0.00	66.35	0.00	6.90	0.00	73.25	19.70	19.59	456.14	90.28	40.88	138.66	186.32
2032	0.00	0.00	4.86	0.00	0.00	0.00	4.86	19.72	26.66	483.42	87.66	99.42	134.22	162.13
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.72	26.66	471.14	86.12	107.47	138.38	139.17
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.72	26.67	459.76	84.60	116.70	143.22	115.23
2035	0.00	0.00	103.99	0.00	0.00	0.00	103.99	20.24	26.00	393.98	82.56	116.85	141.21	53.37
2036	0.00	0.00	149.64	0.00	0.00	0.00	149.64	20.99	26.01	367.70	81.05	125.14	142.01	19.49
2037	0.00	0.00	66.75	0.00	0.00	0.00	66.75	21.32	26.01	377.38	81.50	120.52	139.38	35.98
2038	0.00	0.00	109.19	0.00	0.00	0.00	109.19	21.87	33.08	404.11	79.01	187.66	137.83	-0.39
2039	0.00	0.00	150.09	0.00	0.00	0.00	150.09	22.62	36.03	391.56	77.60	200.48	148.91	-35.43
2040	0.00	0.00	66.95	0.00	45.72	0.00	112.67	23.18	33.08	388.03	77.01	206.34	151.16	-46.48
2041	0.00	0.00	4.90	0.00	0.00	0.00	4.90	23.21	40.15	419.37	75.09	272.58	146.86	-75.16
2042	0.00	0.00	104.72	0.00	0.00	0.00	104.72	23.73	40.15	405.09	73.26	294.83	152.66	-115.66
2043	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.49	40.15	394.58	71.91	311.42	157.24	-145.99
2044	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.82	41.93	378.50	71.41	308.94	158.61	-160.45
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	24.85	49.00	403.15	69.05	387.25	156.97	-210.13
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	49.01	408.62	69.24	385.28	155.19	-201.09
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	48.12	378.13	67.24	409.18	161.63	-259.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	24.85	50.20	396.63	68.51	393.91	157.93	-223.71
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2052	0.00	0.00	51.04	0.00	25.36	1.08	77.48	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2053	0.00	0.00	69.44	0.00	16.51	3.23	89.18	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2054	0.00	0.00	10.49	0.00	13.47	3.23	27.20	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2055	0.00	0.00	0.00	0.00	0.00	3.35	3.35	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2057	0.00	0.00	51.30	0.00	0.00	0.00	51.30	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2058	0.00	0.00	69.79	0.00	6.90	0.00	76.69	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2059	0.00	0.00	113.91	0.00	0.00	0.00	113.91	24.85	50.20	396.63	68.51	393.91	157.93	-223.71
2060	0.00	0.00	148.74	0.00	0.00	0.00	148.74	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2061	0.00	0.00	66.35	0.00	0.00	0.00	66.35	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2062	0.00	0.00	4.86	0.00	0.00	0.00	4.86	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2063	0.00	0.00	0.00	0.00	40.76	2.86	43.62	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2064	0.00	0.00	0.00	0.00	8.37	3.75	12.12	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2065	0.00	0.00	103.99	0.00	6.95	2.16	113.10	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2066	0.00	0.00	149.64	0.00	7.74	2.19	159.56	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2067	0.00	0.00	66.75	0.00	7.25	3.28	77.28	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2068	0.00	0.00	109.19	0.00	15.50	9.85	134.55	24.85	63.07	396.63	68.51	393.91	157.93	-223.71
2069	0.00	0.00	150.09	0.00	24.45	9.85	184.40	24.85	50.20	396.63	68.51	393.91	157.93	-223.71
2070	0.00	0.00	66.95	0.00	0.01	10.22	77.18	24.85	49.02	396.63	68.51	393.91	157.93	-223.71
2071	0.00	0.00	4.90	0.00	0.00	0.00	4.90	24.85	49.02	396.63	68.51	393.91	157.93	-223.71
2072	0.00	0.00	104.72	0.00	0.00	0.00	104.72	24.85	49.02	396.63	68.51	393.91	157.93	-223.71
2073	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.85	48.13	396.63	68.51	393.91	157.93	-223.71
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2075	0.00	0.00	4.92	0.00	34.29	0.00	39.21	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2078	0.00	0.00	0.00	0.00	13.59	0.00	13.59	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	50.20	396.63	68.51	393.91	157.93	-223.71
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2082	0.00	0.00	51.04	0.00	0.00	0.00	51.04	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2083	0.00	0.00	69.44	0.00	0.00	0.00	69.44	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2084	0.00	0.00	10.49	0.00	10.66	0.12	21.27	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2087	0.00	0.00	51.30	0.00	25.36	1.08	77.73	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2088	0.00	0.00	69.79	0.00	16.51	3.23	89.53	24.85	47.24	396.63	68.51	393.91	157.93	-223.71
2089	0.00	0.00	10.54	0.00	13.47	3.23	27.25	24.85	50.20	396.63	68.51	393.91	157.93	-223.71
2090	0.00	0.00	0.00	0.00	11.43	3.35	14.78	24.85	50.20	396.63	68.51	393.91	157.93	-223.71
Salvage Value	0.00	0.00	5.34	0.00	1.58	0.36	7.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	546.72	0.00	187.31	46.64	3350.42	262.26	309.00	7260.78	1494.71	1669.94	2070.92	2025.21

Net Present Value -1896

K19/C31/250MW

TABLE 128
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	206.20	0.00	0.00	19.04	3.87	259.48	1.31	0.00	319.00	105.22	20.25	100.07	93.45
2015	38.25	457.15	0.00	0.00	17.36	2.40	515.16	3.89	0.00	350.53	103.30	24.03	104.29	118.92
2016	10.75	602.85	0.00	0.00	22.96	2.91	639.47	7.08	0.00	360.47	101.41	25.12	106.66	127.28
2017	10.78	728.47	0.00	0.00	32.60	4.36	776.21	10.97	0.00	376.02	99.42	26.85	109.69	140.06
2018	12.78	512.16	0.00	0.00	32.01	13.09	570.04	13.82	0.00	355.24	96.67	29.42	111.67	117.48
2019	12.81	365.25	0.00	0.00	37.93	13.09	429.08	15.96	13.29	379.85	96.30	29.57	111.83	142.15
2020	12.85	148.71	0.37	0.00	0.01	13.57	175.51	16.84	13.51	597.49	104.83	21.22	113.20	358.25
2021	16.21	51.45	0.00	0.00	0.00	0.00	67.66	17.18	13.26	665.23	105.42	21.72	119.85	418.24
2022	152.49	0.00	73.33	0.00	0.00	0.00	225.82	18.19	13.48	657.01	103.94	21.47	122.09	409.51
2023	234.24	0.00	91.72	0.00	6.90	0.00	332.86	19.75	13.31	649.11	102.81	18.22	124.73	403.35
2024	251.18	0.00	10.49	0.00	0.00	0.00	261.67	21.05	17.33	642.27	100.93	29.60	127.20	384.54
2025	253.97	0.00	0.00	0.00	2.60	0.00	256.57	22.34	17.11	527.50	98.64	22.36	120.89	285.61
2026	684.03	0.00	0.00	0.00	2.60	0.00	686.63	25.77	16.68	503.42	96.33	25.50	125.51	256.09
2027	1082.05	0.00	51.30	0.00	31.66	0.00	1165.01	31.60	16.71	468.14	94.24	27.86	127.77	218.28
2028	968.69	0.00	69.79	0.00	23.47	0.00	1061.95	36.91	16.77	449.94	92.32	32.64	132.64	192.35
2029	689.74	0.00	10.54	0.00	27.94	0.00	728.23	40.55	23.60	439.45	90.58	44.91	137.21	166.76
2030	476.30	0.00	0.00	0.00	48.59	0.00	524.89	43.17	19.58	459.53	91.66	39.17	132.79	195.90
2031	311.94	0.00	0.00	0.00	64.31	0.00	376.25	45.05	34.19	519.71	94.83	32.39	107.90	284.58
2032	114.56	0.00	0.00	0.00	75.32	0.00	189.88	46.00	34.42	686.46	102.03	31.69	103.32	449.43
2033	36.05	0.00	0.00	0.00	0.00	0.00	36.05	46.18	34.27	714.48	102.01	32.70	111.65	468.11
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	34.50	687.63	100.20	33.52	113.76	440.15
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.65	647.70	98.47	34.04	111.91	403.27
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.60	619.72	96.84	34.80	112.50	375.58
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.42	589.32	94.93	36.02	115.35	343.02
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.05	556.06	92.93	37.52	119.30	306.31
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	36.08	533.39	90.99	41.62	131.20	269.58
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.24	518.87	89.26	47.13	136.97	245.50
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	36.02	502.66	87.57	53.29	142.64	219.15
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	46.18	33.06	499.45	86.70	54.26	145.97	212.52
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.06	487.73	85.34	53.79	154.81	193.79
2044	0.00	0.00	52.18	0.00	0.00	0.00	52.18	46.44	34.84	471.79	83.77	68.29	156.22	163.52
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	47.07	34.84	456.89	82.31	75.19	162.45	136.93
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.12	38.92	448.21	80.91	85.40	171.62	110.28
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	37.36	433.61	79.49	86.41	184.77	82.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	36.47	446.23	80.90	82.33	172.95	110.05
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	47.12	39.43	446.23	80.90	82.33	172.95	110.05
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	47.12	36.48	446.23	80.90	82.33	172.95	110.05
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	47.12	39.44	446.23	80.90	82.33	172.95	110.05
2052	0.00	0.00	51.04	0.00	25.36	1.08	77.48	47.12	36.49	446.23	80.90	82.33	172.95	110.05
2053	0.00	0.00	69.44	0.00	16.51	3.23	89.18	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2054	0.00	0.00	10.49	0.00	13.47	3.23	27.20	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2055	0.00	0.00	0.00	0.00	0.00	3.35	3.35	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2057	0.00	0.00	51.30	0.00	0.00	0.00	51.30	47.12	38.27	446.23	80.90	82.33	172.95	110.05
2058	0.00	0.00	69.79	0.00	6.90	0.00	76.69	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2059	0.00	0.00	10.54	0.00	0.00	0.00	10.54	47.12	41.23	446.23	80.90	82.33	172.95	110.05
2060	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2061	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.12	39.46	446.23	80.90	82.33	172.95	110.05
2062	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2063	0.00	0.00	0.00	0.00	10.75	2.86	13.62	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2064	0.00	0.00	0.00	0.00	14.79	3.75	18.54	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2065	0.00	0.00	0.00	0.00	17.86	2.16	20.02	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2066	0.00	0.00	0.00	0.00	16.23	2.19	18.42	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2067	0.00	0.00	0.00	0.00	25.85	3.28	29.14	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2068	0.00	0.00	0.00	0.00	15.50	9.85	25.35	47.12	68.16	446.23	80.90	82.33	172.95	110.05
2069	0.00	0.00	0.00	0.00	24.45	9.85	34.31	47.12	39.46	446.23	80.90	82.33	172.95	110.05
2070	0.00	0.00	0.00	0.00	0.01	10.22	10.23	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	41.23	446.23	80.90	82.33	172.95	110.05
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	37.38	446.23	80.90	82.33	172.95	110.05
2074	0.00	0.00	52.18	0.00	0.00	0.00	52.18	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2075	0.00	0.00	70.98	0.00	1.96	0.00	72.94	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2076	0.00	0.00	10.72	0.00	1.96	0.00	12.68	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2077	0.00	0.00	0.00	0.00	23.96	0.00	23.96	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2078	0.00	0.00	0.00	0.00	12.72	0.00	12.72	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2079	0.00	0.00	0.00	0.00	21.53	0.00	21.53	47.12	39.46	446.23	80.90	82.33	172.95	110.05
2080	0.00	0.00	0.00	0.00	78.44	0.00	78.44	47.12	52.33	446.23	80.90	82.33	172.95	110.05
2081	0.00	0.00	0.00	0.00	48.91	0.00	48.91	47.12	39.46	446.23	80.90	82.33	172.95	110.05
2082	0.00	0.00	51.04	0.00	56.72	0.00	107.76	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2083	0.00	0.00	69.44	0.00	0.00	0.00	69.44	47.12	38.27	446.23	80.90	82.33	172.95	110.05
2084	0.00	0.00	10.49	0.00	10.66	0.12	21.27	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	47.12	38.27	446.23	80.90	82.33	172.95	110.05
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	47.12	54.10	446.23	80.90	82.33	172.95	110.05
2087	0.00	0.00	51.30	0.00	25.36	1.08	77.73	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2088	0.00	0.00	69.79	0.00	16.51	3.23	89.53	47.12	36.50	446.23	80.90	82.33	172.95	110.05
2089	0.00	0.00	10.54	0.00	13.47	3.23	27.25	47.12	39.46	446.23	80.90	82.33	172.95	110.05
2090	0.00	0.00	0.00	0.00	0.00	3.35	3.35	47.12	39.46	446.23	80.90	82.33	172.95	110.05
Salvage Value	5.74	0.00	2.63	0.00	3.20	0.36	11.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2399.77	2569.75	200.69	0.00	264.30	46.64	5481.14	437.84	302.94	7925.86	1566.17	591.84	2031.77	3736.07

Net Present Value -2486

All Gas

TABLE 129
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	362.42	101.40	25.15	106.58	129.29
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	381.33	99.79	25.80	108.52	147.22
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	360.54	96.94	28.23	111.33	124.03
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	351.76	94.96	25.49	112.81	118.51
2020	0.00	0.00	73.22	0.00	0.00	0.00	73.22	0.78	0.00	387.25	94.88	20.11	122.82	149.44
2021	0.00	0.00	91.63	0.00	6.90	0.00	98.53	1.16	0.00	389.18	93.02	18.94	133.47	143.75
2022	0.00	0.00	10.47	0.00	0.00	0.00	10.47	1.21	4.07	376.47	90.75	35.31	135.74	114.67
2023	0.00	0.00	51.10	0.00	0.00	0.00	51.10	1.47	4.07	361.08	88.51	43.72	141.95	86.90
2024	0.00	0.00	71.63	0.00	54.34	0.00	125.97	2.09	4.07	352.57	87.02	50.05	147.18	68.32
2025	0.00	0.00	10.50	0.00	0.00	0.00	10.50	2.14	8.16	278.44	86.52	41.86	133.57	16.49
2026	0.00	0.00	51.25	0.00	0.00	0.00	51.25	2.39	8.16	260.03	85.20	42.96	135.89	-4.02
2027	0.00	0.00	69.72	0.00	0.00	0.00	69.72	2.74	8.16	242.78	83.30	43.15	147.67	-31.34
2028	0.00	0.00	113.80	0.00	0.00	0.00	113.80	3.31	12.23	225.54	81.35	66.39	146.62	-68.82
2029	0.00	0.00	148.60	0.00	0.00	0.00	148.60	4.06	12.23	209.73	79.87	75.59	151.06	-96.79
2030	0.00	0.00	66.29	0.00	6.90	0.00	73.19	4.42	12.24	222.88	80.81	70.04	147.17	-75.13
2031	0.00	0.00	4.86	0.00	0.00	0.00	4.86	4.45	19.31	240.37	78.35	124.12	139.83	-101.93
2032	0.00	0.00	51.56	0.00	0.00	0.00	51.56	4.70	19.32	219.92	76.41	137.34	146.56	-140.38
2033	0.00	0.00	70.13	0.00	45.72	0.00	115.85	5.28	19.32	199.53	74.64	150.70	152.19	-178.00
2034	0.00	0.00	114.49	0.00	0.00	0.00	114.49	5.85	23.40	185.38	73.21	169.46	155.83	-213.12
2035	0.00	0.00	149.49	0.00	0.00	0.00	149.49	6.60	23.40	174.16	72.30	179.39	158.84	-236.37
2036	0.00	0.00	66.69	0.00	0.00	0.00	66.69	6.94	23.40	172.27	72.24	174.66	165.02	-239.65
2037	0.00	0.00	109.08	0.00	0.00	0.00	109.08	7.48	30.46	179.44	70.21	231.56	150.80	-273.13
2038	0.00	0.00	149.94	0.00	0.00	0.00	149.94	8.23	30.47	164.05	68.98	245.59	157.14	-307.66
2039	0.00	0.00	66.89	0.00	0.00	0.00	66.89	8.57	30.48	158.88	68.90	249.06	164.10	-323.18
2040	0.00	0.00	4.90	0.00	0.00	0.00	4.90	8.59	37.55	169.01	66.95	301.77	157.69	-357.40
2041	0.00	0.00	104.62	0.00	0.00	0.00	104.62	9.11	37.55	158.78	65.15	332.54	166.13	-405.04
2042	0.00	0.00	150.54	0.00	0.00	0.00	150.54	9.87	37.55	152.94	64.07	354.86	172.34	-438.33
2043	0.00	0.00	67.15	0.00	45.72	0.00	112.87	10.43	37.55	154.23	64.04	359.96	173.55	-443.33
2044	0.00	0.00	4.92	0.00	0.00	0.00	4.92	10.45	44.63	162.81	62.46	410.88	165.34	-475.87
2045	0.00	0.00	22.98	0.00	0.00	0.00	22.98	10.57	44.63	153.90	60.89	444.13	172.69	-523.81
2046	0.00	0.00	31.25	0.00	0.00	0.00	31.25	10.73	44.63	148.03	59.77	471.25	178.53	-561.52
2047	0.00	0.00	4.72	0.00	0.00	0.00	4.72	10.75	46.11	138.76	58.90	491.24	183.51	-594.89
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.11	146.89	59.85	468.88	178.24	-560.08
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	10.75	46.12	146.89	59.85	468.88	178.24	-560.08
2050	0.00	0.00	50.94	0.00	10.08	0.00	61.02	10.75	46.12	146.89	59.85	468.88	178.24	-560.08
2051	0.00	0.00	69.30	0.00	10.08	0.00	79.38	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2052	0.00	0.00	10.47	0.00	10.08	0.00	20.55	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2053	0.00	0.00	51.10	0.00	0.00	0.00	51.10	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2054	0.00	0.00	69.51	0.00	0.00	0.00	69.51	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2055	0.00	0.00	10.50	0.00	0.00	0.00	10.50	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2056	0.00	0.00	51.25	0.00	6.90	0.00	58.15	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2057	0.00	0.00	69.72	0.00	0.00	0.00	69.72	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2058	0.00	0.00	113.80	0.00	0.00	0.00	113.80	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2059	0.00	0.00	148.60	0.00	40.76	0.00	189.35	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2060	0.00	0.00	66.29	0.00	0.00	0.00	66.29	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2061	0.00	0.00	4.86	0.00	0.00	0.00	4.86	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2062	0.00	0.00	51.56	0.00	0.00	0.00	51.56	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2063	0.00	0.00	70.13	0.00	0.00	0.00	70.13	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2064	0.00	0.00	114.49	0.00	0.00	0.00	114.49	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2065	0.00	0.00	149.49	0.00	6.90	0.00	156.39	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2066	0.00	0.00	66.69	0.00	0.00	0.00	66.69	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2067	0.00	0.00	109.08	0.00	0.00	0.00	109.08	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2068	0.00	0.00	149.94	0.00	34.29	0.00	184.23	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2069	0.00	0.00	66.89	0.00	0.00	0.00	66.89	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2070	0.00	0.00	4.90	0.00	0.00	0.00	4.90	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2071	0.00	0.00	104.62	0.00	0.00	0.00	104.62	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2072	0.00	0.00	150.54	0.00	0.00	0.00	150.54	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2073	0.00	0.00	67.15	0.00	0.00	0.00	67.15	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2074	0.00	0.00	4.92	0.00	13.59	0.00	18.50	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2075	0.00	0.00	22.98	0.00	0.00	0.00	22.98	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2076	0.00	0.00	31.25	0.00	0.00	0.00	31.25	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2077	0.00	0.00	4.72	0.00	0.00	0.00	4.72	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2078	0.00	0.00	0.00	0.00	34.29	0.00	34.29	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2080	0.00	0.00	50.94	0.00	0.00	0.00	50.94	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2081	0.00	0.00	69.30	0.00	0.00	0.00	69.30	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2082	0.00	0.00	10.47	0.00	0.00	0.00	10.47	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2083	0.00	0.00	51.10	0.00	11.43	0.00	62.52	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2084	0.00	0.00	69.51	0.00	10.08	0.00	79.59	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2085	0.00	0.00	10.50	0.00	10.08	0.00	20.58	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2086	0.00	0.00	51.25	0.00	10.08	0.00	61.33	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2087	0.00	0.00	69.72	0.00	10.08	0.00	79.79	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2088	0.00	0.00	10.53	0.00	0.00	0.00	10.53	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	146.89	59.85	468.88	178.24	-560.08
Salvage Value	0.00	0.00	22.70	0.00	0.81	0.00	23.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	712.65	0.00	102.94	0.00	879.91	61.35	224.68	4511.07	1374.75	2130.65	2238.71	-1233.05

Net Present Value: -2399

Wind/Gas

TABLE 130
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	362.42	101.40	25.15	106.58	129.29
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	381.33	99.79	25.80	108.52	147.22
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	360.53	96.94	28.23	111.33	124.02
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	351.76	94.95	25.49	112.81	118.52
2020	0.00	0.00	0.00	7.22	10.78	0.00	18.00	0.61	0.00	383.53	94.42	21.69	124.06	143.36
2021	0.00	0.00	0.37	220.30	17.97	0.00	238.64	1.80	0.00	384.94	92.55	21.07	133.99	137.32
2022	0.00	0.00	0.00	224.43	21.71	0.00	246.14	3.04	6.34	389.32	90.90	21.20	134.51	142.71
2023	0.00	0.00	124.47	217.21	11.36	0.00	353.04	4.69	12.69	386.16	88.37	24.41	138.45	134.93
2024	0.00	0.00	161.34	4.12	19.13	0.00	184.59	5.50	19.03	390.50	86.58	24.81	142.21	136.91
2025	0.00	0.00	21.00	3.61	3.46	0.00	28.07	5.64	27.18	326.88	86.63	28.83	125.12	86.30
2026	0.00	0.00	51.25	110.15	8.70	0.00	170.10	6.49	27.18	314.16	85.62	27.63	125.86	75.05
2027	0.00	0.00	71.84	112.21	68.17	0.00	252.22	7.74	30.35	299.18	83.24	33.76	130.06	52.13
2028	0.00	0.00	10.53	112.21	19.16	0.00	141.91	8.45	37.60	293.87	81.46	43.64	133.19	35.59
2029	0.00	0.00	51.40	112.21	19.24	0.00	182.85	9.37	40.78	285.87	79.85	47.21	136.92	21.89
2030	0.00	0.00	69.92	112.21	19.24	0.00	201.37	10.37	43.95	288.87	78.94	49.41	138.28	22.24
2031	0.00	0.00	62.07	112.21	19.24	0.00	193.52	11.34	51.19	290.85	77.70	58.78	140.28	14.09
2032	0.00	0.00	70.06	112.21	64.95	0.00	247.23	12.58	54.37	287.43	76.57	59.30	143.74	7.82
2033	0.00	0.00	10.59	112.21	19.24	0.00	142.04	13.29	61.63	292.87	75.90	62.66	146.22	8.08
2034	0.00	0.00	51.66	112.21	19.24	0.00	183.11	14.20	64.81	279.89	74.09	72.99	149.12	-16.31
2035	0.00	0.00	70.28	112.21	19.24	0.00	201.72	15.21	67.99	267.22	72.39	79.12	153.74	-38.03
2036	0.00	0.00	62.38	112.21	19.24	0.00	193.83	16.18	75.23	262.03	71.02	90.98	156.70	-56.67
2037	0.00	0.00	70.42	112.21	19.24	0.00	201.87	17.19	78.41	253.08	69.73	96.24	161.00	-73.89
2038	0.00	0.00	62.51	112.21	19.24	0.00	193.96	18.16	85.66	252.01	68.68	105.96	165.06	-87.69
2039	0.00	0.00	70.56	112.21	64.95	0.00	247.72	19.40	88.84	245.51	67.51	106.21	180.51	-108.71
2040	0.00	0.00	10.66	119.43	19.24	0.00	149.33	20.14	96.10	248.26	66.72	111.89	186.78	-117.12
2041	0.00	0.00	52.02	332.52	19.24	0.00	403.78	22.16	99.28	234.84	65.18	133.34	184.77	-148.44
2042	0.00	0.00	70.77	336.64	19.24	0.00	426.64	24.30	102.45	223.63	63.80	142.62	191.44	-174.23
2043	0.00	0.00	62.82	329.42	19.09	0.00	411.34	26.35	109.69	218.49	62.61	157.72	195.65	-197.48
2044	0.00	0.00	70.91	116.34	18.66	0.00	205.91	27.38	112.87	213.70	61.67	163.72	201.02	-212.71
2045	0.00	0.00	33.69	115.82	17.51	0.00	167.02	28.22	120.12	210.44	60.57	173.36	209.89	-233.38
2046	0.00	0.00	31.25	218.76	15.77	0.00	265.78	29.55	123.30	205.77	59.53	174.30	223.77	-251.84
2047	0.00	0.00	4.72	114.28	10.53	0.00	129.53	30.19	127.95	199.47	58.46	180.03	227.31	-266.33
2048	0.00	0.00	0.00	112.21	5.41	0.00	117.62	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2049	0.00	0.00	0.00	112.21	10.15	0.00	122.36	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2050	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2051	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2052	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2053	0.00	0.00	102.19	112.21	0.00	0.00	214.40	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2054	0.00	0.00	139.01	112.21	0.00	0.00	251.23	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2055	0.00	0.00	21.00	112.21	2.70	0.00	135.91	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2056	0.00	0.00	51.25	112.21	4.49	0.00	167.96	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2057	0.00	0.00	69.72	112.21	5.46	0.00	187.39	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2058	0.00	0.00	10.53	112.21	3.06	0.00	125.80	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2059	0.00	0.00	51.40	112.21	15.35	0.00	178.97	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2060	0.00	0.00	69.92	119.43	1.51	0.00	190.87	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2061	0.00	0.00	62.07	332.52	2.43	0.00	397.02	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2062	0.00	0.00	70.06	336.64	44.27	0.00	450.97	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2063	0.00	0.00	10.59	329.42	4.81	0.00	344.82	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2064	0.00	0.00	51.66	116.34	4.81	0.00	172.81	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2065	0.00	0.00	70.28	115.82	4.81	0.00	190.91	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2066	0.00	0.00	62.38	218.76	4.81	0.00	285.95	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2067	0.00	0.00	70.42	114.28	39.10	0.00	223.79	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2068	0.00	0.00	62.51	112.21	4.81	0.00	179.53	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2069	0.00	0.00	70.56	112.21	4.81	0.00	187.58	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2070	0.00	0.00	10.66	112.21	12.90	0.00	135.77	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2071	0.00	0.00	52.02	112.21	18.29	0.00	182.53	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2072	0.00	0.00	70.77	112.21	21.06	0.00	204.04	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2073	0.00	0.00	62.82	112.21	13.11	0.00	188.15	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2074	0.00	0.00	70.91	112.21	42.88	0.00	226.00	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2075	0.00	0.00	33.69	112.21	6.76	0.00	152.66	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2076	0.00	0.00	31.25	112.21	11.08	0.00	154.55	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2077	0.00	0.00	4.72	112.21	28.71	0.00	145.65	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2078	0.00	0.00	0.00	112.21	19.09	0.00	131.31	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2079	0.00	0.00	0.00	112.21	18.88	0.00	131.09	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2080	0.00	0.00	0.00	119.43	18.59	0.00	138.02	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2081	0.00	0.00	0.00	332.52	17.72	0.00	350.24	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2082	0.00	0.00	0.00	336.64	28.24	0.00	364.88	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2083	0.00	0.00	102.19	329.42	15.73	0.00	447.34	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2084	0.00	0.00	139.01	116.34	24.43	0.00	279.78	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2085	0.00	0.00	21.00	115.82	24.29	0.00	161.12	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2086	0.00	0.00	51.25	218.76	23.42	0.00	293.43	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2087	0.00	0.00	69.72	114.28	22.56	0.00	206.55	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2088	0.00	0.00	10.53	112.21	8.15	0.00	130.90	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2089	0.00	0.00	0.00	108.61	15.54	0.00	124.15	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
2090	0.00	0.00	0.00	2.06	0.07	0.00	2.13	30.19	127.95	205.23	59.52	175.90	220.32	-250.52
Salvage Value	0.00	0.00	5.23	14.12	2.97	0.00	22.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	534.25	1420.96	252.38	0.00	2271.91	154.27	641.69	5088.10	1372.04	989.85	2316.85	409.37

Net Present Value -2659

K22/Gas

TABLE 131
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	102.05	0.00	0.00	10.08	0.00	112.13	0.56	0.00	319.76	105.21	20.23	100.02	94.30
2015	0.00	30.48	0.00	0.00	10.82	0.00	41.30	0.77	0.00	352.45	103.29	24.03	104.25	120.88
2016	0.00	26.48	0.00	0.00	10.88	0.00	37.37	0.95	0.00	362.00	101.40	25.15	106.58	128.88
2017	0.00	196.98	0.00	0.00	23.98	0.00	220.95	2.06	0.00	380.29	99.79	25.81	108.55	146.14
2018	0.00	383.04	0.00	0.00	7.13	0.00	390.17	4.01	0.00	358.44	96.95	28.25	111.40	121.82
2019	0.00	622.95	0.00	0.00	12.41	0.00	635.36	7.19	0.00	349.59	94.96	25.50	112.89	116.24
2020	0.00	691.73	0.00	0.00	22.58	0.00	714.30	10.76	0.00	378.46	94.25	22.39	124.78	137.04
2021	0.00	563.84	0.00	0.00	32.03	0.00	595.87	13.74	0.00	382.45	92.50	21.50	135.42	133.04
2022	0.00	326.51	0.00	0.00	37.93	0.00	364.43	15.56	13.29	389.41	92.48	24.52	128.94	143.47
2023	0.00	151.35	0.00	0.00	0.01	0.00	151.35	16.32	13.51	510.63	98.27	24.32	117.53	270.51
2024	0.00	52.18	0.00	0.00	0.00	0.00	52.18	16.58	13.21	526.88	98.16	27.63	122.55	278.54
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	16.58	13.43	468.49	98.11	19.38	113.14	237.85
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.58	13.26	449.44	96.21	19.68	115.98	217.57
2027	0.00	0.00	73.58	0.00	0.00	0.00	73.58	16.83	13.21	406.63	94.34	18.83	115.22	178.23
2028	0.00	0.00	92.11	0.00	6.90	0.00	99.01	17.22	12.96	385.36	92.75	19.60	118.29	154.73
2029	0.00	0.00	10.54	0.00	0.00	0.00	10.54	17.27	16.59	378.68	91.90	24.53	118.73	143.52
2030	0.00	0.00	51.45	0.00	0.00	0.00	51.45	17.53	16.59	367.79	90.12	30.14	122.78	124.75
2031	0.00	0.00	175.69	0.00	54.34	0.00	230.04	18.67	16.64	356.20	88.44	35.20	127.67	104.88
2032	0.00	0.00	159.62	0.00	0.00	0.00	159.62	19.46	23.48	346.61	86.82	47.60	132.12	80.07
2033	0.00	0.00	66.49	0.00	6.90	0.00	73.39	19.83	19.46	353.39	87.00	41.57	132.87	91.95
2034	0.00	0.00	4.87	0.00	0.00	0.00	4.87	19.86	26.52	376.12	84.51	99.47	126.80	65.35
2035	0.00	0.00	103.99	0.00	0.00	0.00	103.99	20.38	26.52	358.78	82.43	111.72	133.02	31.61
2036	0.00	0.00	149.64	0.00	0.00	0.00	149.64	21.12	26.53	345.15	80.89	121.68	137.46	5.12
2037	0.00	0.00	66.75	0.00	0.00	0.00	66.75	21.46	26.53	354.10	81.34	115.92	135.14	21.70
2038	0.00	0.00	109.19	0.00	0.00	0.00	109.19	22.00	32.93	375.71	78.91	178.53	132.87	-14.60
2039	0.00	0.00	150.09	0.00	0.00	0.00	150.09	22.75	32.94	363.47	77.52	191.61	143.77	-49.42
2040	0.00	0.00	66.95	0.00	45.72	0.00	112.67	23.32	32.94	362.97	77.06	196.44	145.82	-56.36
2041	0.00	0.00	4.90	0.00	0.00	0.00	4.90	23.34	40.02	388.48	75.03	259.88	141.88	-88.31
2042	0.00	0.00	104.72	0.00	0.00	0.00	104.72	23.87	42.97	374.60	73.18	283.17	147.80	-129.55
2043	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.62	40.02	364.34	71.83	300.20	152.36	-160.05
2044	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.96	40.02	352.34	71.47	297.42	153.03	-169.58
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	24.98	47.09	380.03	69.82	361.39	149.21	-200.39
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.09	370.83	68.57	382.90	152.47	-233.11
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	48.87	347.83	67.18	397.29	156.82	-273.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	48.88	366.23	68.53	380.53	152.83	-235.65
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	48.88	366.23	68.53	380.53	152.83	-235.65
2050	0.00	0.00	0.00	0.00	10.41	0.00	10.41	24.98	47.99	366.23	68.53	380.53	152.83	-235.65
2051	0.00	0.00	0.00	0.00	10.45	0.00	10.45	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2052	0.00	0.00	0.00	0.00	10.46	0.00	10.46	24.98	50.06	366.23	68.53	380.53	152.83	-235.65
2053	0.00	0.00	0.00	0.00	0.35	0.00	0.35	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2054	0.00	0.00	0.00	0.00	11.52	0.00	11.52	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2055	0.00	0.00	0.00	0.00	15.28	0.00	15.28	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2056	0.00	0.00	0.00	0.00	16.51	0.00	16.51	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2057	0.00	0.00	51.30	0.00	13.47	0.00	64.77	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2058	0.00	0.00	69.79	0.00	0.00	0.00	69.79	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2059	0.00	0.00	10.54	0.00	0.00	0.00	10.54	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2060	0.00	0.00	51.45	0.00	0.00	0.00	51.45	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2061	0.00	0.00	173.57	0.00	0.00	0.00	173.57	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2062	0.00	0.00	159.62	0.00	0.00	0.00	159.62	24.98	50.06	366.23	68.53	380.53	152.83	-235.65
2063	0.00	0.00	66.49	0.00	6.90	0.00	73.39	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2064	0.00	0.00	4.87	0.00	0.00	0.00	4.87	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2065	0.00	0.00	103.99	0.00	0.41	0.00	104.40	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2066	0.00	0.00	149.64	0.00	41.19	0.00	190.83	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2067	0.00	0.00	66.75	0.00	13.52	0.00	80.27	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2068	0.00	0.00	109.19	0.00	13.68	0.00	122.87	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2069	0.00	0.00	150.09	0.00	0.89	0.00	150.98	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2070	0.00	0.00	66.95	0.00	7.30	0.00	74.25	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2071	0.00	0.00	4.90	0.00	15.51	0.00	20.42	24.98	62.94	366.23	68.53	380.53	152.83	-235.65
2072	0.00	0.00	104.72	0.00	24.45	0.00	129.18	24.98	50.06	366.23	68.53	380.53	152.83	-235.65
2073	0.00	0.00	150.69	0.00	0.01	0.00	150.70	24.98	48.88	366.23	68.53	380.53	152.83	-235.65
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.98	48.88	366.23	68.53	380.53	152.83	-235.65
2075	0.00	0.00	4.92	0.00	34.29	0.00	39.21	24.98	48.88	366.23	68.53	380.53	152.83	-235.65
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.99	366.23	68.53	380.53	152.83	-235.65
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2081	0.00	0.00	0.00	0.00	13.59	0.00	13.59	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	50.06	366.23	68.53	380.53	152.83	-235.65
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2087	0.00	0.00	51.30	0.00	10.08	0.00	61.38	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2088	0.00	0.00	69.79	0.00	0.00	0.00	69.79	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2089	0.00	0.00	10.54	0.00	0.00	0.00	10.54	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
2090	0.00	0.00	0.00	0.00	11.43	0.00	11.43	24.98	47.10	366.23	68.53	380.53	152.83	-235.65
Salvage Value	0.00	0.00	4.68	0.00	1.22	0.00	5.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2217.37	488.31	0.00	168.48	0.00	2874.16	224.78	263.16	6188.84	1467.38	1553.48	2021.31	1146.67

Net Present Value: -2215

K22/C29

TABLE 132
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	102.05	0.00	0.00	10.08	0.00	142.51	0.71	0.00	319.76	105.21	20.23	100.02	94.30
2015	38.78	30.48	0.00	0.00	10.82	0.00	80.08	1.11	0.00	352.45	103.29	24.03	104.25	120.88
2016	11.28	26.48	0.00	0.00	10.88	0.00	48.65	1.36	0.00	362.00	101.40	25.15	106.58	128.88
2017	11.98	196.98	0.00	0.00	23.98	0.00	232.94	2.52	0.00	380.29	99.79	25.81	108.55	146.14
2018	12.02	383.04	0.00	0.00	7.13	0.00	402.19	4.53	0.00	358.44	96.95	28.25	111.40	121.82
2019	14.33	622.95	0.00	0.00	12.41	0.00	649.69	7.78	0.00	349.59	94.96	25.50	112.89	116.24
2020	154.77	691.73	0.00	0.00	22.58	0.00	869.07	12.13	0.00	378.47	94.25	22.39	124.78	137.05
2021	236.04	563.84	0.00	0.00	32.03	0.00	831.91	16.29	0.00	382.20	92.50	21.51	135.56	132.64
2022	249.69	326.51	0.00	0.00	37.93	0.00	614.13	19.36	13.29	389.11	92.49	24.47	129.12	143.03
2023	252.47	151.35	0.00	0.00	2.60	0.00	406.42	21.39	13.51	509.67	98.27	24.37	117.65	269.38
2024	679.98	52.18	0.00	0.00	2.60	0.00	734.76	25.06	13.21	524.88	98.15	27.64	122.65	276.43
2025	1075.65	0.00	0.00	0.00	31.66	0.00	1107.31	30.60	13.43	466.05	98.13	19.42	113.33	235.18
2026	962.96	0.00	0.00	0.00	16.57	0.00	979.53	35.50	13.26	446.37	96.22	19.73	116.20	214.22
2027	685.66	0.00	0.00	0.00	27.94	0.00	713.61	39.06	13.21	404.65	94.58	18.07	115.13	176.88
2028	473.49	0.00	0.00	0.00	48.59	0.00	522.07	41.67	12.96	378.33	92.66	19.84	119.12	146.71
2029	310.10	0.00	0.00	0.00	64.31	0.00	374.40	43.55	27.13	489.42	96.54	22.67	102.44	267.76
2030	113.88	0.00	0.00	0.00	75.32	0.00	189.20	44.49	27.36	647.71	103.83	22.11	94.28	427.49
2031	35.83	0.00	0.00	0.00	0.00	0.00	35.83	44.67	27.26	667.61	103.61	22.60	98.06	443.35
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	30.24	646.37	101.89	22.32	99.60	422.56
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	26.04	623.22	100.23	22.27	100.96	399.75
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.99	603.10	98.61	22.73	103.20	378.56
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.82	581.71	97.04	22.84	104.51	357.32
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	44.67	25.44	556.99	95.47	22.78	105.85	332.90
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.52	532.05	93.91	22.86	107.80	307.48
2038	0.00	0.00	74.15	0.00	0.00	0.00	74.15	44.93	24.96	508.15	92.37	22.90	111.32	281.57
2039	0.00	0.00	92.84	0.00	6.90	0.00	99.74	45.32	27.74	500.53	90.98	22.41	126.08	261.06
2040	0.00	0.00	10.66	0.00	0.00	0.00	10.66	45.37	28.85	488.38	89.23	39.30	127.85	232.00
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.37	28.85	476.28	87.76	43.93	133.37	211.23
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	45.63	31.81	464.64	86.32	45.33	141.39	191.61
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	46.02	28.85	450.93	84.83	46.02	151.37	168.72
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	46.33	32.92	440.58	83.34	70.90	148.83	137.52
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	46.96	32.25	428.87	82.08	75.78	154.67	116.34
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.02	36.33	440.64	81.70	74.95	161.37	122.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.11	411.30	79.46	99.97	166.48	65.39
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.11	426.93	81.08	83.56	160.84	101.45
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	41.07	426.93	81.08	83.56	160.84	101.45
2050	0.00	0.00	0.00	0.00	10.41	0.00	10.41	47.02	37.23	426.93	81.08	83.56	160.84	101.45
2051	0.00	0.00	0.00	0.00	10.45	0.00	10.45	47.02	36.35	426.93	81.08	83.56	160.84	101.45
2052	0.00	0.00	0.00	0.00	10.46	0.00	10.46	47.02	39.31	426.93	81.08	83.56	160.84	101.45
2053	0.00	0.00	0.00	0.00	0.35	0.00	0.35	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2054	0.00	0.00	0.00	0.00	11.52	0.00	11.52	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2055	0.00	0.00	0.00	0.00	15.28	0.00	15.28	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2056	0.00	0.00	0.00	0.00	16.51	0.00	16.51	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2057	0.00	0.00	0.00	0.00	13.47	0.00	13.47	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2058	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2059	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.02	55.15	426.93	81.08	83.56	160.84	101.45
2060	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2061	0.00	0.00	0.00	0.00	3.85	0.00	3.85	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2062	0.00	0.00	0.00	0.00	6.42	0.00	6.42	47.02	39.32	426.93	81.08	83.56	160.84	101.45
2063	0.00	0.00	0.00	0.00	10.91	0.00	10.91	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2064	0.00	0.00	0.00	0.00	15.40	0.00	15.40	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2065	0.00	0.00	0.00	0.00	19.02	0.00	19.02	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2066	0.00	0.00	0.00	0.00	0.44	0.00	0.44	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2067	0.00	0.00	0.00	0.00	13.52	0.00	13.52	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2068	0.00	0.00	51.87	0.00	6.77	0.00	58.64	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2069	0.00	0.00	70.56	0.00	0.89	0.00	71.45	47.02	55.15	426.93	81.08	83.56	160.84	101.45
2070	0.00	0.00	10.66	0.00	7.30	0.00	17.96	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2071	0.00	0.00	0.00	0.00	15.51	0.00	15.51	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2072	0.00	0.00	52.07	0.00	24.45	0.00	76.53	47.02	55.15	426.93	81.08	83.56	160.84	101.45
2073	0.00	0.00	70.84	0.00	1.96	0.00	72.80	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2074	0.00	0.00	62.88	0.00	8.86	0.00	71.74	47.02	53.96	426.93	81.08	83.56	160.84	101.45
2075	0.00	0.00	70.98	0.00	23.96	0.00	94.94	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2076	0.00	0.00	10.72	0.00	12.72	0.00	23.44	47.02	53.08	426.93	81.08	83.56	160.84	101.45
2077	0.00	0.00	0.00	0.00	21.53	0.00	21.53	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2078	0.00	0.00	0.00	0.00	44.58	0.00	44.58	47.02	52.19	426.93	81.08	83.56	160.84	101.45
2079	0.00	0.00	0.00	0.00	48.91	0.00	48.91	47.02	39.32	426.93	81.08	83.56	160.84	101.45
2080	0.00	0.00	0.00	0.00	97.47	0.00	97.47	47.02	53.96	426.93	81.08	83.56	160.84	101.45
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	56.92	426.93	81.08	83.56	160.84	101.45
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.13	426.93	81.08	83.56	160.84	101.45
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	53.96	426.93	81.08	83.56	160.84	101.45
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	36.36	426.93	81.08	83.56	160.84	101.45
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	39.32	426.93	81.08	83.56	160.84	101.45
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	36.36	426.93	81.08	83.56	160.84	101.45
Salvage Value	4.04	0.00	1.49	0.00	2.72	0.00	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2679.97	2217.37	88.42	0.00	260.56	0.00	5246.32	421.26	248.53	7103.18	1546.98	531.45	1948.72	3076.04

Net Present Value: -2840

SCGT/C26

TABLE 133
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	319.76	105.21	20.23	100.02	94.30
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	352.45	103.29	24.03	104.25	120.88
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	362.42	101.40	25.15	106.58	129.29
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	381.33	99.79	25.80	108.52	147.22
2018	199.73	0.00	0.37	0.00	0.00	0.00	200.10	3.18	0.00	360.10	96.94	28.24	111.34	123.57
2019	238.48	0.00	0.00	0.00	0.00	0.00	238.48	4.37	0.00	351.08	94.96	25.50	112.83	117.80
2020	242.33	0.00	73.22	0.00	0.00	0.00	315.55	5.84	0.00	386.00	94.86	20.21	122.96	147.97
2021	666.03	0.00	91.58	0.00	6.90	0.00	764.51	9.55	0.00	388.11	92.99	19.19	133.93	142.00
2022	1066.12	0.00	10.47	0.00	0.49	0.00	1077.08	14.93	4.07	375.04	90.77	35.71	136.13	112.43
2023	954.43	0.00	0.00	0.00	0.99	0.00	955.42	19.71	4.07	357.94	88.37	45.20	142.74	81.63
2024	679.59	0.00	0.00	0.00	1.97	0.00	681.56	23.12	4.07	352.56	87.19	49.67	147.47	68.23
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	25.49	4.07	282.65	87.70	30.36	137.78	26.81
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	27.03	18.69	355.93	91.71	22.78	112.46	128.99
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	27.60	18.91	502.98	99.64	21.60	100.74	280.99
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	27.78	18.61	530.77	99.73	23.67	109.37	298.00
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.83	506.65	97.99	24.36	110.77	273.52
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.65	490.83	96.77	24.07	110.76	259.22
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.60	468.26	94.79	26.22	114.85	232.40
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.36	440.64	92.83	27.83	118.35	201.63
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.92	421.32	90.85	32.77	123.00	174.69
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.92	410.32	89.26	37.87	128.73	154.46
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.96	400.13	87.94	42.00	131.62	138.58
2036	0.00	0.00	51.76	0.00	0.00	0.00	51.76	28.03	20.74	392.81	86.85	42.48	136.36	127.12
2037	0.00	0.00	70.46	0.00	6.90	0.00	77.36	28.42	17.78	380.77	85.33	43.23	147.03	105.19
2038	0.00	0.00	10.64	0.00	0.00	0.00	10.64	28.47	21.85	370.72	83.82	66.52	145.80	74.58
2039	0.00	0.00	51.92	0.00	0.00	0.00	51.92	28.73	21.85	359.47	82.55	72.06	158.07	46.79
2040	0.00	0.00	72.75	0.00	54.34	0.00	127.09	29.36	21.85	349.69	81.18	71.57	171.43	25.52
2041	0.00	0.00	62.69	0.00	0.00	0.00	62.69	29.67	25.94	335.73	79.51	100.53	169.90	-14.21
2042	0.00	0.00	70.77	0.00	0.00	0.00	70.77	30.03	25.27	322.25	78.14	112.73	175.59	-44.22
2043	0.00	0.00	62.82	0.00	0.00	0.00	62.82	30.34	29.34	314.44	76.82	126.47	184.62	-73.47
2044	0.00	0.00	70.91	0.00	45.72	0.00	116.63	30.92	29.34	303.64	75.49	128.07	201.44	-101.37
2045	0.00	0.00	10.71	0.00	0.00	0.00	10.71	30.98	33.43	295.01	74.13	175.98	189.26	-144.36
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	36.39	285.33	72.94	194.06	194.04	-175.70
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.44	274.94	71.61	197.31	213.99	-207.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.45	285.09	72.89	189.12	199.10	-176.01
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.45	285.09	72.89	189.12	199.10	-176.01
2050	0.00	0.00	50.94	0.00	10.08	0.00	61.02	30.98	33.46	285.09	72.89	189.12	199.10	-176.01
2051	0.00	0.00	69.30	0.00	10.08	0.00	79.38	30.98	35.24	285.09	72.89	189.12	199.10	-176.01
2052	0.00	0.00	10.47	0.00	10.08	0.00	20.55	30.98	35.25	285.09	72.89	189.12	199.10	-176.01
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	285.09	72.89	189.12	199.10	-176.01
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	285.09	72.89	189.12	199.10	-176.01
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	285.09	72.89	189.12	199.10	-176.01
2056	0.00	0.00	0.00	0.00	6.90	0.00	6.90	30.98	36.43	285.09	72.89	189.12	199.10	-176.01
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2066	0.00	0.00	51.76	0.00	0.00	0.00	51.76	30.98	36.43	285.09	72.89	189.12	199.10	-176.01
2067	0.00	0.00	70.42	0.00	0.00	0.00	70.42	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2068	0.00	0.00	10.64	0.00	0.00	0.00	10.64	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2069	0.00	0.00	51.92	0.00	0.00	0.00	51.92	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2070	0.00	0.00	70.63	0.00	0.00	0.00	70.63	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2071	0.00	0.00	62.69	0.00	0.00	0.00	62.69	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2072	0.00	0.00	70.77	0.00	7.39	0.00	78.16	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2073	0.00	0.00	62.82	0.00	0.99	0.00	63.81	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2074	0.00	0.00	70.91	0.00	1.97	0.00	72.88	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2075	0.00	0.00	10.71	0.00	45.19	0.00	55.91	30.98	49.30	285.09	72.89	189.12	199.10	-176.01
2076	0.00	0.00	0.00	0.00	1.97	0.00	1.97	30.98	36.43	285.09	72.89	189.12	199.10	-176.01
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	51.08	285.09	72.89	189.12	199.10	-176.01
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	285.09	72.89	189.12	199.10	-176.01
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	30.98	51.08	285.09	72.89	189.12	199.10	-176.01
2080	0.00	0.00	50.94	0.00	0.00	0.00	50.94	30.98	35.25	285.09	72.89	189.12	199.10	-176.01
2081	0.00	0.00	69.30	0.00	0.00	0.00	69.30	30.98	51.08	285.09	72.89	189.12	199.10	-176.01
2082	0.00	0.00	10.47	0.00	0.00	0.00	10.47	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	36.43	285.09	72.89	189.12	199.10	-176.01
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
2090	0.00	0.00	0.00	0.00	13.59	0.00	13.59	30.98	33.47	285.09	72.89	189.12	199.10	-176.01
Salvage Value	1.60	0.00	2.56	0.00	0.91	0.00	5.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	246.26	0.00	71.41	0.00	3584.28	284.53	196.32	5984.81	1484.44	897.18	2169.62	1433.58

Net Present Value -2632

CCGT/C26

TABLE 134
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Reference
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	319.76	105.21	20.23	100.02	94.30
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	352.45	103.29	24.03	104.25	120.88
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	362.42	101.40	25.15	106.58	129.29
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	381.33	99.79	25.80	108.52	147.22
2018	199.73	0.00	0.37	0.00	0.00	0.00	200.10	3.18	0.00	360.10	96.94	28.24	111.34	123.57
2019	238.48	0.00	102.34	0.00	0.00	0.00	340.83	4.88	0.00	351.08	94.96	25.50	112.83	117.80
2020	242.33	0.00	169.55	0.00	0.00	0.00	411.87	6.83	0.00	386.00	94.86	20.21	122.96	147.97
2021	666.03	0.00	87.98	0.00	6.90	0.00	760.90	10.52	0.00	394.93	93.74	16.84	131.69	152.67
2022	1066.12	0.00	4.81	0.00	0.49	0.00	1071.42	15.88	7.06	415.43	91.28	69.96	117.82	136.37
2023	954.43	0.00	0.00	0.00	0.99	0.00	955.42	20.66	7.06	404.30	89.19	78.27	123.10	113.75
2024	679.59	0.00	0.00	0.00	1.97	0.00	681.56	24.07	7.06	402.46	88.18	83.83	125.87	104.58
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	26.43	7.06	328.74	87.84	69.73	120.83	50.34
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	27.98	21.68	389.16	91.63	57.75	102.85	136.93
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	28.55	21.90	525.33	99.62	42.73	94.87	288.11
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	28.72	21.60	554.51	99.86	43.19	102.84	308.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.82	533.14	98.12	47.47	103.21	284.34
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.65	506.81	95.97	51.00	106.08	253.76
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.60	510.50	95.91	47.41	103.78	263.40
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.35	474.42	93.00	54.81	109.48	217.13
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.91	459.95	91.28	59.79	113.53	195.36
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.91	444.36	89.23	66.08	120.51	168.54
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.95	435.66	87.76	71.69	124.69	151.52
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	23.74	422.56	86.10	81.55	127.78	127.14
2037	0.00	0.00	51.82	0.00	0.00	0.00	51.82	28.98	20.78	421.86	85.36	85.07	130.22	121.22
2038	0.00	0.00	70.53	0.00	6.90	0.00	77.43	29.37	20.78	414.97	84.16	88.57	136.96	105.27
2039	0.00	0.00	10.65	0.00	0.00	0.00	10.65	29.42	24.85	402.35	82.37	109.99	146.01	63.98
2040	0.00	0.00	51.97	0.00	0.00	0.00	51.97	29.68	24.85	390.32	80.92	120.13	150.92	38.36
2041	0.00	0.00	72.82	0.00	54.34	0.00	127.16	30.31	24.85	379.04	79.59	127.03	157.67	14.75
2042	0.00	0.00	62.76	0.00	0.00	0.00	62.76	30.62	28.26	370.64	78.23	139.58	165.76	-12.93
2043	0.00	0.00	70.84	0.00	0.00	0.00	70.84	30.98	28.26	357.45	76.82	161.18	164.80	-45.35
2044	0.00	0.00	10.70	0.00	0.00	0.00	10.70	31.03	32.33	346.27	75.48	178.87	169.54	-77.62
2045	0.00	0.00	52.23	0.00	0.00	0.00	52.23	31.29	32.33	334.80	74.13	185.72	181.37	-106.42
2046	0.00	0.00	71.05	0.00	45.72	0.00	116.77	31.87	35.30	330.40	73.22	185.91	193.77	-122.49
2047	0.00	0.00	10.74	0.00	0.00	0.00	10.74	31.93	36.43	306.84	71.63	221.24	187.53	-173.56
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.43	324.01	72.99	197.62	187.56	-134.16
2049	0.00	0.00	102.34	0.00	10.08	0.00	112.42	31.93	36.44	324.01	72.99	197.62	187.56	-134.16
2050	0.00	0.00	147.26	0.00	10.08	0.00	157.34	31.93	36.44	324.01	72.99	197.62	187.56	-134.16
2051	0.00	0.00	65.69	0.00	10.08	0.00	75.77	31.93	38.22	324.01	72.99	197.62	187.56	-134.16
2052	0.00	0.00	4.81	0.00	10.08	0.00	14.89	31.93	38.23	324.01	72.99	197.62	187.56	-134.16
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.23	324.01	72.99	197.62	187.56	-134.16
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	324.01	72.99	197.62	187.56	-134.16
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	324.01	72.99	197.62	187.56	-134.16
2056	0.00	0.00	0.00	0.00	6.90	0.00	6.90	31.93	39.42	324.01	72.99	197.62	187.56	-134.16
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	39.42	324.01	72.99	197.62	187.56	-134.16
2067	0.00	0.00	51.82	0.00	0.00	0.00	51.82	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2068	0.00	0.00	70.49	0.00	0.00	0.00	70.49	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2069	0.00	0.00	10.65	0.00	0.00	0.00	10.65	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2070	0.00	0.00	51.97	0.00	0.00	0.00	51.97	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2071	0.00	0.00	70.70	0.00	0.00	0.00	70.70	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2072	0.00	0.00	62.76	0.00	0.49	0.00	63.25	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2073	0.00	0.00	70.84	0.00	7.89	0.00	78.73	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2074	0.00	0.00	10.70	0.00	1.97	0.00	12.67	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2075	0.00	0.00	52.23	0.00	4.43	0.00	56.66	31.93	52.29	324.01	72.99	197.62	187.56	-134.16
2076	0.00	0.00	71.05	0.00	42.73	0.00	113.78	31.93	39.42	324.01	72.99	197.62	187.56	-134.16
2077	0.00	0.00	10.74	0.00	0.00	0.00	10.74	31.93	54.07	324.01	72.99	197.62	187.56	-134.16
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	324.01	72.99	197.62	187.56	-134.16
2079	0.00	0.00	102.34	0.00	0.00	0.00	102.34	31.93	54.07	324.01	72.99	197.62	187.56	-134.16
2080	0.00	0.00	147.26	0.00	0.00	0.00	147.26	31.93	38.24	324.01	72.99	197.62	187.56	-134.16
2081	0.00	0.00	65.69	0.00	34.29	0.00	99.98	31.93	54.07	324.01	72.99	197.62	187.56	-134.16
2082	0.00	0.00	4.81	0.00	0.00	0.00	4.81	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	39.42	324.01	72.99	197.62	187.56	-134.16
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	324.01	72.99	197.62	187.56	-134.16
Salvage Value	1.60	0.00	4.07	0.00	0.83	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	394.77	0.00	69.68	0.00	3731.07	294.74	222.15	6355.96	1486.61	1148.75	2046.17	1674.43

Net Present Value: -2574

Wind/C26

TABLE 135
ECONOMIC SUMMARY
NFAT 2012

Energy Price Reference
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	319.76	105.21	20.23	100.02	94.30
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	352.45	103.29	24.03	104.25	120.88
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	362.42	101.40	25.15	106.58	129.29
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	381.33	99.79	25.80	108.51	147.23
2018	199.73	0.00	0.00	0.00	0.00	0.00	199.73	3.18	0.00	360.10	96.94	28.24	111.34	123.57
2019	238.48	0.00	0.00	0.00	0.00	0.00	238.48	4.37	0.00	351.08	94.96	25.50	112.83	117.80
2020	242.33	0.00	0.00	7.22	10.78	0.00	260.33	5.67	0.00	382.58	94.43	21.68	124.08	142.40
2021	666.03	0.00	0.00	220.30	17.97	0.00	904.30	10.19	0.00	384.13	92.55	21.15	134.42	136.02
2022	1066.12	0.00	0.00	224.43	22.06	0.00	1312.61	16.76	6.34	388.08	90.90	21.21	135.37	140.60
2023	954.43	0.00	0.00	217.21	11.77	0.00	1183.41	22.67	12.69	384.93	88.39	24.37	139.33	132.84
2024	679.59	0.00	0.00	4.12	5.57	0.00	689.28	26.12	19.03	387.39	86.48	25.10	144.27	131.53
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	28.49	19.03	313.57	86.37	16.53	160.24	50.43
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	30.04	33.65	412.95	90.48	19.67	110.87	191.92
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	30.60	33.87	560.80	98.39	17.73	99.03	345.65
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	30.78	33.57	583.74	98.27	19.41	107.10	358.97
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.79	560.07	96.58	19.71	108.29	335.49
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.62	547.08	95.50	19.20	107.85	324.53
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.57	532.93	94.04	19.84	110.48	308.57
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	30.78	33.32	512.93	92.58	19.78	112.74	287.83
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	32.88	486.44	91.03	19.65	114.33	261.42
2034	0.00	0.00	73.94	0.00	0.00	0.00	73.94	31.04	32.88	461.96	89.55	19.75	116.24	236.42
2035	0.00	0.00	92.56	0.00	6.90	0.00	99.46	31.42	32.92	453.61	88.52	18.24	119.80	227.05
2036	0.00	0.00	62.38	0.00	0.00	0.00	62.38	31.73	39.78	436.42	86.40	33.50	123.78	192.75
2037	0.00	0.00	70.46	0.00	6.90	0.00	77.36	32.12	36.82	422.50	84.92	37.85	128.97	170.76
2038	0.00	0.00	10.64	0.00	0.00	0.00	10.64	32.17	40.89	415.35	83.64	49.13	133.21	149.37
2039	0.00	0.00	51.92	0.00	0.00	0.00	51.92	32.43	40.89	405.33	82.45	48.36	147.80	126.73
2040	0.00	0.00	72.75	7.22	54.34	0.00	134.31	33.09	40.89	388.76	80.74	62.20	151.51	94.31
2041	0.00	0.00	62.69	220.30	0.00	0.00	283.00	34.51	44.97	378.09	79.33	76.13	156.67	65.96
2042	0.00	0.00	70.77	224.43	0.00	0.00	295.20	35.99	44.30	366.60	78.02	79.59	166.33	42.66
2043	0.00	0.00	62.82	217.21	0.00	0.00	280.03	37.39	48.37	359.01	76.70	88.87	177.61	15.83
2044	0.00	0.00	70.91	4.12	45.72	0.00	120.75	37.99	48.37	342.75	75.32	111.15	175.29	-19.00
2045	0.00	0.00	10.71	0.00	0.00	0.00	10.71	38.04	52.46	332.91	74.03	129.63	180.62	-51.37
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	55.43	321.16	72.73	132.31	195.53	-79.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.47	309.94	71.47	134.07	213.45	-109.05
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.48	321.34	72.74	132.00	196.54	-79.94
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.49	321.34	72.74	132.00	196.54	-79.94
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.49	321.34	72.74	132.00	196.54	-79.94
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	54.27	321.34	72.74	132.00	196.54	-79.94
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	54.28	321.34	72.74	132.00	196.54	-79.94
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	321.34	72.74	132.00	196.54	-79.94
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	321.34	72.74	132.00	196.54	-79.94
2055	0.00	0.00	0.00	0.00	2.70	0.00	2.70	38.04	54.28	321.34	72.74	132.00	196.54	-79.94
2056	0.00	0.00	0.00	0.00	4.49	0.00	4.49	38.04	55.46	321.34	72.74	132.00	196.54	-79.94
2057	0.00	0.00	0.00	0.00	5.39	0.00	5.39	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2058	0.00	0.00	0.00	0.00	2.70	0.00	2.70	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2059	0.00	0.00	0.00	0.00	0.90	0.00	0.90	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2060	0.00	0.00	0.00	7.22	0.00	0.00	7.22	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2061	0.00	0.00	0.00	220.30	0.00	0.00	220.30	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2062	0.00	0.00	0.00	224.43	0.00	0.00	224.43	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2063	0.00	0.00	0.00	217.21	0.00	0.00	217.21	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2064	0.00	0.00	51.66	4.12	0.00	0.00	55.78	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2065	0.00	0.00	70.28	0.00	0.00	0.00	70.28	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2066	0.00	0.00	62.38	0.00	0.00	0.00	62.38	38.04	55.46	321.34	72.74	132.00	196.54	-79.94
2067	0.00	0.00	70.42	0.00	0.00	0.00	70.42	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2068	0.00	0.00	10.64	0.00	0.00	0.00	10.64	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2069	0.00	0.00	51.92	0.00	0.00	0.00	51.92	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2070	0.00	0.00	70.63	0.00	14.99	0.00	85.62	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2071	0.00	0.00	62.69	0.00	13.48	0.00	76.18	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2072	0.00	0.00	70.77	0.00	23.57	0.00	94.34	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2073	0.00	0.00	62.82	0.00	9.07	0.00	71.89	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2074	0.00	0.00	70.91	0.00	4.67	0.00	75.58	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2075	0.00	0.00	10.71	0.00	45.19	0.00	55.91	38.04	68.33	321.34	72.74	132.00	196.54	-79.94
2076	0.00	0.00	0.00	0.00	1.97	0.00	1.97	38.04	55.46	321.34	72.74	132.00	196.54	-79.94
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	70.11	321.34	72.74	132.00	196.54	-79.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	321.34	72.74	132.00	196.54	-79.94
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	38.04	70.11	321.34	72.74	132.00	196.54	-79.94
2080	0.00	0.00	0.00	7.22	0.00	0.00	7.22	38.04	54.28	321.34	72.74	132.00	196.54	-79.94
2081	0.00	0.00	0.00	220.30	0.00	0.00	220.30	38.04	70.11	321.34	72.74	132.00	196.54	-79.94
2082	0.00	0.00	0.00	224.43	0.00	0.00	224.43	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2083	0.00	0.00	0.00	217.21	0.00	0.00	217.21	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2084	0.00	0.00	0.00	4.12	10.08	0.00	14.20	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	55.46	321.34	72.74	132.00	196.54	-79.94
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
2090	0.00	0.00	0.00	0.00	13.59	0.00	13.59	38.04	52.50	321.34	72.74	132.00	196.54	-79.94
Salvage Value	1.60	0.00	1.93	3.59	1.22	0.00	8.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	170.10	562.03	110.63	0.00	4109.37	325.49	347.44	6402.43	1479.32	671.91	2129.81	2121.40

Net Present Value -2661

K19/C25/750MW (WPS Sale &Inv)

TABLE 136
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	3.78	277.90	1.39	0.00	242.21	102.83	15.48	80.87	43.02
2015	87.48	485.83	0.00	0.00	18.92	6.75	598.98	4.38	0.00	260.10	101.13	17.25	85.39	56.32
2016	182.24	643.32	0.00	0.00	25.89	17.15	868.60	8.73	0.00	267.99	99.25	17.82	86.97	63.95
2017	212.03	779.65	0.00	0.00	37.88	24.95	1054.51	14.00	0.00	279.67	97.32	19.03	88.23	75.09
2018	254.86	549.74	0.00	0.00	39.82	103.34	947.77	18.74	0.00	272.60	95.25	19.93	88.09	69.34
2019	260.97	393.19	0.00	0.00	50.71	85.16	790.03	22.69	13.01	288.25	95.16	18.80	86.88	87.42
2020	719.36	160.55	0.00	0.00	3.54	157.85	1041.30	27.90	44.86	449.38	102.30	13.40	94.38	239.31
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	34.16	42.99	525.13	102.85	14.78	98.96	308.54
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	39.46	41.65	526.20	101.62	14.84	99.99	309.75
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	43.35	39.80	516.71	99.30	14.70	102.60	300.11
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	46.24	38.24	516.11	97.04	16.33	107.99	294.75
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	48.35	50.89	459.61	101.54	14.61	91.00	252.47
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	49.49	49.35	600.80	109.54	14.54	90.54	386.17
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	49.68	47.92	630.74	109.76	14.26	95.62	411.10
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	46.91	631.44	108.10	14.77	97.28	411.29
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	48.20	620.79	106.19	14.77	99.06	400.78
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	43.02	614.61	104.84	14.44	100.06	395.26
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	41.70	606.74	103.20	14.79	101.68	387.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	40.22	595.17	101.50	14.81	103.31	375.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	39.21	581.21	99.71	14.78	105.06	361.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	38.27	567.19	97.99	14.84	106.63	347.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	39.54	515.63	96.32	14.67	104.60	300.04
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	36.10	437.00	94.66	14.92	97.63	229.78
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	49.68	35.57	411.37	93.04	15.02	98.34	204.97
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	35.06	395.40	91.40	14.96	100.88	188.14
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	50.07	37.47	380.48	89.79	14.92	109.91	165.86
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	50.66	34.09	359.66	88.53	14.17	114.48	142.48
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	50.74	36.95	341.61	86.53	24.36	114.53	116.18
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	51.13	36.51	331.48	85.01	27.29	117.13	102.06
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	51.72	36.07	323.61	83.65	28.88	120.56	90.52
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	52.21	41.37	320.59	82.43	33.29	124.83	80.03
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	53.12	43.86	303.22	80.60	42.00	124.59	56.02
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	53.20	44.56	295.19	79.17	51.41	126.95	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	43.31	286.90	77.89	53.82	131.36	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	42.07	295.10	79.22	49.08	127.63	39.17
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	53.20	44.61	295.10	79.22	49.08	127.63	39.17
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	53.20	43.11	295.10	79.22	49.08	127.63	39.17
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	53.20	42.78	295.10	79.22	49.08	127.63	39.17
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	53.20	42.46	295.10	79.22	49.08	127.63	39.17
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	53.20	42.15	295.10	79.22	49.08	127.63	39.17
2054	0.00	0.00	0.00	0.00	17.63	18.49	36.12	53.20	41.84	295.10	79.22	49.08	127.63	39.17
2055	0.00	0.00	0.00	0.00	0.87	19.18	20.05	53.20	42.71	295.10	79.22	49.08	127.63	39.17
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	53.20	55.02	295.10	79.22	49.08	127.63	39.17
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	53.20	39.25	295.10	79.22	49.08	127.63	39.17
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	53.20	54.48	295.10	79.22	49.08	127.63	39.17
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	53.20	41.62	295.10	79.22	49.08	127.63	39.17
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	53.20	51.26	295.10	79.22	49.08	127.63	39.17
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	66.75	295.10	79.22	49.08	127.63	39.17
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	53.20	66.75	295.10	79.22	49.08	127.63	39.17
2065	0.00	0.00	0.00	0.00	8.65	4.18	12.82	53.20	38.66	295.10	79.22	49.08	127.63	39.17
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	53.20	66.75	295.10	79.22	49.08	127.63	39.17
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	53.20	66.75	295.10	79.22	49.08	127.63	39.17
2069	0.00	0.00	78.30	0.00	33.08	56.37	167.75	53.20	38.66	295.10	79.22	49.08	127.63	39.17
2070	0.00	0.00	106.94	0.00	2.67	58.46	168.07	53.20	53.00	295.10	79.22	49.08	127.63	39.17
2071	0.00	0.00	16.22	0.00	32.44	0.00	48.66	53.20	37.50	295.10	79.22	49.08	127.63	39.17
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	53.20	53.00	295.10	79.22	49.08	127.63	39.17
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	53.20	36.63	295.10	79.22	49.08	127.63	39.17
2074	0.00	0.00	96.75	0.00	50.02	0.00	146.76	53.20	51.26	295.10	79.22	49.08	127.63	39.17
2075	0.00	0.00	109.64	0.00	75.23	0.00	184.87	53.20	38.66	295.10	79.22	49.08	127.63	39.17
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	53.20	53.00	295.10	79.22	49.08	127.63	39.17
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	37.50	295.10	79.22	49.08	127.63	39.17
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	53.20	53.00	295.10	79.22	49.08	127.63	39.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	40.40	295.10	79.22	49.08	127.63	39.17
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	53.20	53.00	295.10	79.22	49.08	127.63	39.17
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	53.20	38.66	295.10	79.22	49.08	127.63	39.17
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	53.20	35.76	295.10	79.22	49.08	127.63	39.17
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	53.20	38.66	295.10	79.22	49.08	127.63	39.17
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	53.20	38.66	295.10	79.22	49.08	127.63	39.17
Salvage Value	2.31	0.00	6.54	0.00	10.30	4.78	23.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	193.35	0.00	449.81	337.17	7837.52	779.59	651.85	8218.72	1937.33	468.68	2089.97	3722.73

Net Present Value -5546

K19/C25/750MW

TABLE 137
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	5.28	279.40	1.40	0.00	235.04	102.84	15.48	80.73	35.99
2015	87.48	485.83	0.00	0.00	18.92	8.56	600.79	4.40	0.00	253.15	101.12	17.24	85.38	49.41
2016	182.24	643.32	0.00	0.00	25.89	17.93	869.38	8.75	0.00	259.84	99.24	17.80	86.94	55.86
2017	212.03	779.65	0.00	0.00	37.88	24.95	1054.51	14.02	0.00	270.25	97.31	19.03	88.21	65.70
2018	254.86	549.74	0.00	0.00	39.82	146.07	990.49	18.97	0.00	261.92	95.24	19.90	88.12	58.66
2019	260.97	393.19	0.00	0.00	50.71	100.61	805.48	23.00	13.01	276.27	95.15	18.76	86.90	75.45
2020	719.36	160.55	0.00	0.00	3.54	278.17	1161.63	28.81	47.98	427.19	102.30	13.38	94.29	217.23
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	35.08	46.21	512.43	102.85	14.88	99.04	295.66
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	40.37	44.90	516.02	101.61	14.84	100.01	299.56
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	44.26	42.92	507.21	99.29	14.70	102.63	290.59
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	47.15	41.22	507.90	97.02	16.38	108.04	286.46
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	49.27	53.76	450.55	101.54	14.63	90.99	243.39
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	50.40	52.09	554.42	109.53	14.59	88.69	341.61
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	50.60	50.55	550.50	109.77	14.17	91.03	335.52
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	49.42	548.21	108.10	14.75	92.34	333.03
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	50.61	539.20	106.18	14.76	94.21	324.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	45.33	534.45	104.82	14.48	95.38	319.78
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	43.90	528.29	103.18	14.86	97.08	313.16
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	42.32	518.49	101.49	14.87	98.98	303.15
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	41.21	506.40	99.71	14.76	100.93	291.00
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	40.19	494.28	98.00	14.81	102.77	278.70
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	41.37	427.29	96.35	14.84	95.98	220.12
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	37.85	402.80	94.67	14.98	96.41	196.73
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	50.60	37.25	388.49	93.02	14.97	98.37	182.12
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	36.67	373.34	91.40	14.94	100.87	166.12
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	50.99	39.01	359.20	89.79	14.95	109.86	144.59
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	51.57	35.57	355.41	88.53	14.19	114.45	138.25
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	51.65	38.37	341.61	86.53	24.36	114.52	116.19
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	52.05	37.86	331.48	85.01	27.29	117.12	102.07
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	52.64	37.36	323.62	83.65	28.88	120.56	90.53
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	53.12	42.61	320.60	82.43	33.29	124.82	80.05
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	54.03	45.04	303.20	80.60	42.00	124.56	56.03
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	54.12	45.69	295.13	79.17	51.41	126.90	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	44.39	286.86	77.89	53.82	131.32	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	43.10	295.07	79.22	49.08	127.59	39.17
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	54.12	45.59	295.07	79.22	49.08	127.59	39.17
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	54.12	44.04	295.07	79.22	49.08	127.59	39.17
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	54.12	43.67	295.07	79.22	49.08	127.59	39.17
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	54.12	43.30	295.07	79.22	49.08	127.59	39.17
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	54.12	42.95	295.07	79.22	49.08	127.59	39.17
2054	0.00	0.00	0.00	0.00	17.63	18.49	36.12	54.12	42.61	295.07	79.22	49.08	127.59	39.17
2055	0.00	0.00	0.00	0.00	0.87	19.18	20.05	54.12	43.43	295.07	79.22	49.08	127.59	39.17
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	54.12	55.71	295.07	79.22	49.08	127.59	39.17
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	54.12	39.90	295.07	79.22	49.08	127.59	39.17
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	54.12	55.10	295.07	79.22	49.08	127.59	39.17
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	54.12	42.21	295.07	79.22	49.08	127.59	39.17
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	54.12	51.26	295.07	79.22	49.08	127.59	39.17
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	66.75	295.07	79.22	49.08	127.59	39.17
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	54.12	66.75	295.07	79.22	49.08	127.59	39.17
2065	0.00	0.00	0.00	0.00	8.65	4.18	12.82	54.12	38.66	295.07	79.22	49.08	127.59	39.17
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	54.12	66.75	295.07	79.22	49.08	127.59	39.17
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	54.12	66.75	295.07	79.22	49.08	127.59	39.17
2069	0.00	0.00	78.30	0.00	33.08	56.37	167.75	54.12	38.66	295.07	79.22	49.08	127.59	39.17
2070	0.00	0.00	106.94	0.00	2.67	58.46	168.07	54.12	53.00	295.07	79.22	49.08	127.59	39.17
2071	0.00	0.00	16.22	0.00	32.44	0.00	48.66	54.12	37.50	295.07	79.22	49.08	127.59	39.17
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	54.12	53.00	295.07	79.22	49.08	127.59	39.17
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	54.12	36.63	295.07	79.22	49.08	127.59	39.17
2074	0.00	0.00	96.75	0.00	50.02	0.00	146.76	54.12	51.26	295.07	79.22	49.08	127.59	39.17
2075	0.00	0.00	109.64	0.00	75.23	0.00	184.87	54.12	38.66	295.07	79.22	49.08	127.59	39.17
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	54.12	53.00	295.07	79.22	49.08	127.59	39.17
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	37.50	295.07	79.22	49.08	127.59	39.17
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	54.12	53.00	295.07	79.22	49.08	127.59	39.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	40.40	295.07	79.22	49.08	127.59	39.17
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	54.12	53.00	295.07	79.22	49.08	127.59	39.17
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	54.12	38.66	295.07	79.22	49.08	127.59	39.17
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	54.12	35.76	295.07	79.22	49.08	127.59	39.17
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	54.12	38.66	295.07	79.22	49.08	127.59	39.17
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	54.12	38.66	295.07	79.22	49.08	127.59	39.17
Salvage Value	2.31	0.00	6.54	0.00	10.30	4.78	23.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	193.35	0.00	449.81	477.79	7978.14	793.78	680.39	7750.65	1937.26	468.79	2068.98	3275.62

Net Present Value -6177

K19/Gas25/750MW (WPS Sale & INV)

TABLE 138
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	3.78	246.19	1.23	0.00	242.21	102.83	15.48	80.87	43.02
2015	0.00	485.83	0.00	0.00	18.92	6.75	511.50	3.79	0.00	260.11	101.13	17.25	85.39	56.34
2016	0.00	643.32	0.00	0.00	25.89	17.15	686.36	7.22	0.00	268.02	99.25	17.81	86.97	63.99
2017	0.00	779.65	0.00	0.00	37.88	24.95	842.49	11.43	0.00	279.87	97.31	19.02	88.21	75.33
2018	0.00	549.74	0.00	0.00	39.82	103.34	692.91	14.90	0.00	272.90	95.25	19.89	88.06	69.71
2019	0.00	393.19	0.00	0.00	47.18	85.16	525.53	17.52	13.01	288.76	95.16	18.79	86.87	87.95
2020	0.00	160.55	0.00	0.00	0.01	157.85	318.41	19.12	44.86	450.11	102.30	13.39	94.34	240.09
2021	0.00	55.71	0.36	0.00	0.00	0.00	56.07	19.40	42.99	526.41	102.85	14.77	98.89	309.90
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.40	41.65	527.62	101.61	14.81	99.90	311.30
2023	0.00	0.00	94.10	0.00	0.00	0.00	94.10	19.76	39.80	516.96	98.83	15.69	103.11	299.33
2024	0.00	0.00	193.21	0.00	9.28	0.00	202.49	20.66	38.24	518.44	96.72	17.26	108.32	296.14
2025	0.00	0.00	116.29	0.00	73.08	0.00	189.37	21.60	40.58	407.70	96.38	16.66	99.91	194.76
2026	0.00	0.00	88.44	0.00	0.00	0.00	88.44	22.04	42.81	436.08	95.06	19.74	102.82	218.47
2027	0.00	0.00	100.23	0.00	0.00	0.00	100.23	22.54	41.52	435.35	93.10	19.37	107.25	215.63
2028	0.00	0.00	15.20	0.00	0.00	0.00	15.20	22.62	44.28	427.72	90.77	28.45	109.90	198.60
2029	0.00	0.00	74.49	0.00	0.00	0.00	74.49	22.99	45.74	418.45	89.00	31.85	112.95	184.64
2030	0.00	0.00	101.74	0.00	61.48	0.00	163.22	23.80	40.62	416.77	87.91	34.97	115.44	178.44
2031	0.00	0.00	90.67	0.00	0.00	0.00	90.67	24.26	43.47	420.45	87.52	38.02	116.35	178.57
2032	0.00	0.00	102.76	0.00	0.00	0.00	102.76	24.77	42.36	407.34	85.18	45.35	120.92	155.89
2033	0.00	0.00	15.59	0.00	0.00	0.00	15.59	24.85	45.27	401.28	83.65	54.36	123.98	139.30
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	44.22	397.76	82.88	56.79	125.92	132.17
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	42.77	327.85	80.76	54.97	121.35	70.76
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	42.23	234.95	79.31	55.99	109.50	-9.85
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	41.71	210.09	77.89	61.43	110.05	-39.29
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	41.21	206.91	77.14	60.04	115.48	-45.75
2039	0.00	0.00	161.42	0.00	0.00	0.00	161.42	25.66	43.61	187.52	75.22	71.84	122.10	-81.64
2040	0.00	0.00	233.20	0.00	0.00	0.00	233.20	26.82	40.24	168.22	73.88	79.52	125.06	-110.25
2041	0.00	0.00	104.44	0.00	9.28	0.00	113.72	27.39	39.77	170.65	74.09	77.86	124.79	-106.10
2042	0.00	0.00	7.68	0.00	0.00	0.00	7.68	27.43	46.24	187.38	71.91	111.85	126.46	-122.85
2043	0.00	0.00	79.88	0.00	0.00	0.00	79.88	27.83	45.80	173.87	70.18	122.40	130.42	-149.13
2044	0.00	0.00	109.10	0.00	61.48	0.00	170.58	28.68	47.12	158.19	68.58	130.87	134.36	-175.63
2045	0.00	0.00	52.04	0.00	0.00	0.00	52.04	28.94	50.71	151.11	67.25	146.06	137.45	-199.64
2046	0.00	0.00	48.47	0.00	0.00	0.00	48.47	29.18	50.31	142.96	66.04	158.46	140.50	-222.04
2047	0.00	0.00	7.35	0.00	0.00	0.00	7.35	29.22	50.50	139.63	65.22	163.56	146.17	-235.33
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	49.26	144.57	66.17	156.03	141.37	-219.00
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	29.22	51.80	144.57	66.17	156.03	141.37	-219.00
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	29.22	48.56	144.57	66.17	156.03	141.37	-219.00
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	29.22	48.23	144.57	66.17	156.03	141.37	-219.00
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	29.22	47.91	144.57	66.17	156.03	141.37	-219.00
2053	0.00	0.00	72.30	0.00	20.54	18.49	111.33	29.22	47.60	144.57	66.17	156.03	141.37	-219.00
2054	0.00	0.00	171.40	0.00	16.76	18.49	206.65	29.22	47.29	144.57	66.17	156.03	141.37	-219.00
2055	0.00	0.00	114.21	0.00	0.00	19.18	133.39	29.22	47.00	144.57	66.17	156.03	141.37	-219.00
2056	0.00	0.00	88.44	0.00	0.00	0.00	88.44	29.22	62.21	144.57	66.17	156.03	141.37	-219.00
2057	0.00	0.00	100.23	0.00	0.00	0.00	100.23	29.22	46.44	144.57	66.17	156.03	141.37	-219.00
2058	0.00	0.00	15.20	0.00	0.00	0.00	15.20	29.22	61.67	144.57	66.17	156.03	141.37	-219.00
2059	0.00	0.00	74.49	0.00	9.28	0.00	83.77	29.22	48.81	144.57	66.17	156.03	141.37	-219.00
2060	0.00	0.00	101.74	0.00	54.81	0.00	156.55	29.22	58.45	144.57	66.17	156.03	141.37	-219.00
2061	0.00	0.00	90.67	0.00	0.00	0.00	90.67	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2062	0.00	0.00	102.76	0.00	0.00	0.00	102.76	29.22	58.45	144.57	66.17	156.03	141.37	-219.00
2063	0.00	0.00	15.59	0.00	0.00	0.00	15.59	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	29.22	58.45	144.57	66.17	156.03	141.37	-219.00
2065	0.00	0.00	0.00	0.00	54.75	4.18	58.93	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	29.22	58.45	144.57	66.17	156.03	141.37	-219.00
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	29.22	58.45	144.57	66.17	156.03	141.37	-219.00
2069	0.00	0.00	161.42	0.00	30.42	56.37	248.21	29.22	45.85	144.57	66.17	156.03	141.37	-219.00
2070	0.00	0.00	233.20	0.00	0.01	58.46	291.66	29.22	44.69	144.57	66.17	156.03	141.37	-219.00
2071	0.00	0.00	104.44	0.00	0.00	0.00	104.44	29.22	44.69	144.57	66.17	156.03	141.37	-219.00
2072	0.00	0.00	7.68	0.00	0.00	0.00	7.68	29.22	44.69	144.57	66.17	156.03	141.37	-219.00
2073	0.00	0.00	79.88	0.00	0.00	0.00	79.88	29.22	43.82	144.57	66.17	156.03	141.37	-219.00
2074	0.00	0.00	109.10	0.00	0.00	0.00	109.10	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2075	0.00	0.00	52.04	0.00	18.27	0.00	70.31	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2076	0.00	0.00	48.47	0.00	9.28	0.00	57.75	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2077	0.00	0.00	7.35	0.00	0.00	0.00	7.35	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	29.22	45.85	144.57	66.17	156.03	141.37	-219.00
2080	0.00	0.00	0.00	0.00	15.37	0.00	15.37	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2083	0.00	0.00	72.30	0.00	0.00	0.00	72.30	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2084	0.00	0.00	171.40	0.00	10.59	0.68	182.68	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2085	0.00	0.00	114.21	0.00	10.27	1.37	125.86	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2086	0.00	0.00	88.44	0.00	24.85	4.11	117.40	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2087	0.00	0.00	100.23	0.00	28.87	6.16	135.26	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2088	0.00	0.00	15.20	0.00	20.54	18.49	54.24	29.22	42.95	144.57	66.17	156.03	141.37	-219.00
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	29.22	45.85	144.57	66.17	156.03	141.37	-219.00
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	29.22	45.85	144.57	66.17	156.03	141.37	-219.00
Salvage Value	0.00	0.00	20.83	0.00	5.66	4.78	31.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	890.47	0.00	292.17	337.17	4376.86	416.42	675.38	6287.53	1772.86	1159.47	2246.50	1108.70

Net Present Value -4360

K19/C31/750MW

TABLE 139
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	221.41	0.00	0.00	21.01	5.28	278.77	1.39	0.00	235.04	102.84	15.48	80.73	35.99
2015	39.22	485.83	0.00	0.00	18.92	8.56	552.53	4.16	0.00	253.15	101.12	17.24	85.38	49.41
2016	10.66	643.32	0.00	0.00	25.89	17.93	697.80	7.65	0.00	259.84	99.24	17.80	86.94	55.86
2017	10.72	779.65	0.00	0.00	37.88	24.95	853.21	11.91	0.00	270.49	97.30	19.03	88.21	65.95
2018	12.74	549.74	0.00	0.00	39.82	146.07	748.37	15.65	0.00	262.21	95.22	19.89	88.09	59.00
2019	12.82	393.19	0.00	0.00	47.18	100.61	553.80	18.42	13.01	276.72	95.14	18.81	86.89	75.89
2020	12.89	160.55	0.00	0.00	0.01	278.17	451.63	20.68	47.98	427.97	102.29	13.41	94.28	218.00
2021	16.30	55.71	0.00	0.00	0.00	0.00	72.02	21.04	46.21	513.52	102.84	14.85	98.93	296.90
2022	164.90	0.00	0.00	0.00	0.00	0.00	164.90	21.87	44.90	517.57	101.63	14.82	99.91	301.21
2023	251.53	0.00	0.00	0.00	0.00	0.00	251.53	23.12	42.92	507.05	98.72	15.88	103.40	289.05
2024	273.27	0.00	0.00	0.00	0.00	0.00	273.27	24.49	41.22	508.98	96.54	17.66	108.96	285.81
2025	278.50	0.00	0.00	0.00	3.53	0.00	282.03	25.90	39.45	396.48	96.40	12.81	105.63	181.63
2026	753.38	0.00	0.00	0.00	3.53	0.00	756.91	29.68	37.57	381.05	94.51	13.22	114.38	158.93
2027	1196.26	0.00	0.00	0.00	42.90	0.00	1239.16	35.88	36.17	340.15	92.59	12.42	112.80	122.35
2028	1074.05	0.00	0.00	0.00	22.26	0.00	1096.31	41.36	34.83	327.36	90.99	12.90	122.14	101.33
2029	766.99	0.00	0.00	0.00	37.45	0.00	804.44	45.38	36.18	318.05	89.38	13.28	133.01	82.38
2030	531.19	0.00	0.00	0.00	64.84	0.00	596.03	48.36	30.95	315.57	88.06	13.59	141.65	72.27
2031	348.90	0.00	0.00	0.00	86.88	0.00	435.78	50.54	44.00	362.08	92.07	15.75	93.46	160.80
2032	128.50	0.00	0.00	0.00	102.39	0.00	230.89	51.70	43.00	473.50	99.09	15.49	93.01	265.90
2033	40.55	0.00	0.00	0.00	0.00	0.00	40.55	51.90	41.68	508.23	99.80	15.14	100.93	292.36
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	40.76	494.32	98.01	14.80	102.75	278.76
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	39.05	426.72	96.35	14.76	95.92	219.69
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	38.38	402.71	94.67	15.07	96.35	196.62
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	51.90	37.61	388.66	93.03	15.01	98.34	182.28
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	36.66	373.37	91.40	14.93	100.85	166.18
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	52.29	39.07	359.24	89.79	14.94	109.84	144.67
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	52.87	35.74	355.41	88.53	14.19	114.45	138.25
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	52.95	41.92	341.61	86.53	24.36	114.52	116.19
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	53.35	38.52	331.48	85.01	27.29	117.12	102.07
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	53.94	38.02	323.62	83.65	28.88	120.56	90.53
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	54.42	43.27	320.60	82.43	33.29	124.82	80.05
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	55.34	42.80	303.20	80.60	42.00	124.56	56.03
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	55.42	46.35	295.13	79.17	51.41	126.90	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	44.39	286.86	77.89	53.82	131.32	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	43.10	295.07	79.22	49.08	127.59	39.17
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	55.42	45.59	295.07	79.22	49.08	127.59	39.17
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	55.42	42.30	295.07	79.22	49.08	127.59	39.17
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	55.42	44.82	295.07	79.22	49.08	127.59	39.17
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	55.42	41.57	295.07	79.22	49.08	127.59	39.17
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	55.42	41.22	295.07	79.22	49.08	127.59	39.17
2054	0.00	0.00	0.00	0.00	16.76	18.49	35.25	55.42	40.87	295.07	79.22	49.08	127.59	39.17
2055	0.00	0.00	0.00	0.00	0.00	19.18	19.18	55.42	40.54	295.07	79.22	49.08	127.59	39.17
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	57.45	295.07	79.22	49.08	127.59	39.17
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	41.64	295.07	79.22	49.08	127.59	39.17
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	56.83	295.07	79.22	49.08	127.59	39.17
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	43.95	295.07	79.22	49.08	127.59	39.17
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	55.42	53.00	295.07	79.22	49.08	127.59	39.17
2061	0.00	0.00	0.00	0.00	0.87	0.00	0.87	55.42	38.66	295.07	79.22	49.08	127.59	39.17
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2063	0.00	0.00	0.00	0.00	5.23	0.00	5.23	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2064	0.00	0.00	0.00	0.00	19.14	2.09	21.22	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2065	0.00	0.00	0.00	0.00	23.47	4.18	27.65	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2066	0.00	0.00	0.00	0.00	21.97	12.53	34.50	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2067	0.00	0.00	0.00	0.00	34.31	18.79	53.10	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	55.42	66.75	295.07	79.22	49.08	127.59	39.17
2069	0.00	0.00	78.30	0.00	30.42	56.37	165.09	55.42	38.66	295.07	79.22	49.08	127.59	39.17
2070	0.00	0.00	106.94	0.00	0.01	58.46	165.41	55.42	53.00	295.07	79.22	49.08	127.59	39.17
2071	0.00	0.00	16.22	0.00	0.00	0.00	16.22	55.42	40.40	295.07	79.22	49.08	127.59	39.17
2072	0.00	0.00	79.48	0.00	0.00	0.00	79.48	55.42	53.00	295.07	79.22	49.08	127.59	39.17
2073	0.00	0.00	108.56	0.00	0.00	0.00	108.56	55.42	36.63	295.07	79.22	49.08	127.59	39.17
2074	0.00	0.00	96.75	0.00	0.00	0.00	96.75	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2075	0.00	0.00	109.64	0.00	11.94	0.00	121.58	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2076	0.00	0.00	16.63	0.00	2.66	0.00	19.29	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2077	0.00	0.00	0.00	0.00	32.44	0.00	32.44	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2078	0.00	0.00	0.00	0.00	26.30	0.00	26.30	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2079	0.00	0.00	0.00	0.00	28.73	0.00	28.73	55.42	38.66	295.07	79.22	49.08	127.59	39.17
2080	0.00	0.00	0.00	0.00	104.82	0.00	104.82	55.42	51.26	295.07	79.22	49.08	127.59	39.17
2081	0.00	0.00	0.00	0.00	65.95	0.00	65.95	55.42	38.66	295.07	79.22	49.08	127.59	39.17
2082	0.00	0.00	0.00	0.00	77.10	0.00	77.10	55.42	53.00	295.07	79.22	49.08	127.59	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	37.50	295.07	79.22	49.08	127.59	39.17
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	55.42	53.00	295.07	79.22	49.08	127.59	39.17
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	55.42	37.50	295.07	79.22	49.08	127.59	39.17
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	55.42	53.00	295.07	79.22	49.08	127.59	39.17
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	55.42	35.76	295.07	79.22	49.08	127.59	39.17
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	55.42	38.66	295.07	79.22	49.08	127.59	39.17
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	55.42	38.66	295.07	79.22	49.08	127.59	39.17
Salvage Value	17.09	0.00	6.54	0.00	11.55	4.78	39.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3127.55	2857.05	193.35	0.00	385.74	477.79	7041.47	698.05	634.27	7110.28	1886.23	466.36	2154.49	2603.20

Net Present Value -5771

K19/Gas31/750MW | **TABLE 140** | **Energy Price** Low
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	5.28	247.70	1.24	0.00	235.04	102.84	15.48	80.73	35.99
2015	0.00	485.83	0.00	0.00	18.92	8.56	513.31	3.81	0.00	253.15	101.12	17.24	85.38	49.41
2016	0.00	643.32	0.00	0.00	25.89	17.93	687.14	7.24	0.00	259.84	99.24	17.80	86.94	55.86
2017	0.00	779.65	0.00	0.00	37.88	24.95	842.49	11.45	0.00	270.49	97.30	19.03	88.21	65.95
2018	0.00	549.74	0.00	0.00	39.82	146.07	735.63	15.13	0.00	262.21	95.22	19.89	88.09	59.00
2019	0.00	393.19	0.00	0.00	47.18	100.61	540.98	17.84	13.01	276.72	95.14	18.81	86.89	75.89
2020	0.00	160.55	0.00	0.00	0.01	278.17	438.74	20.03	47.98	427.97	102.29	13.41	94.28	218.00
2021	0.00	55.71	0.00	0.00	0.00	0.00	55.71	20.31	46.21	513.52	102.84	14.85	98.93	296.90
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	44.90	517.53	101.62	14.84	99.92	301.15
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	42.92	507.32	98.72	15.88	103.38	289.34
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	41.22	509.51	96.54	17.67	108.94	286.35
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	39.45	397.76	96.40	12.82	105.83	182.71
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	37.57	383.42	94.50	13.31	114.79	160.82
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	20.31	36.17	343.20	92.58	12.46	113.14	125.03
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	20.31	34.83	331.98	90.98	12.91	122.94	105.15
2029	0.00	0.00	170.79	0.00	0.00	0.00	170.79	21.05	36.18	322.00	89.43	13.08	133.00	86.48
2030	0.00	0.00	300.16	0.00	18.56	0.00	318.72	22.54	30.95	323.09	88.83	11.60	139.32	83.35
2031	0.00	0.00	135.19	0.00	73.08	0.00	208.27	23.57	37.66	315.44	86.70	25.87	110.03	92.84
2032	0.00	0.00	91.13	0.00	0.00	0.00	91.13	24.02	40.44	308.62	85.12	32.96	112.29	78.26
2033	0.00	0.00	103.28	0.00	0.00	0.00	103.28	24.54	39.27	299.91	83.68	36.37	114.96	64.91
2034	0.00	0.00	15.67	0.00	0.00	0.00	15.67	24.62	42.11	299.40	82.88	39.34	117.75	59.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.62	40.58	225.74	80.78	47.05	107.30	-9.40
2036	0.00	0.00	159.02	0.00	0.00	0.00	159.02	25.41	39.95	204.04	79.36	51.57	107.78	-34.66
2037	0.00	0.00	229.73	0.00	0.00	0.00	229.73	26.56	39.36	194.52	78.04	56.53	110.11	-50.16
2038	0.00	0.00	102.89	0.00	61.48	0.00	164.37	27.38	38.79	197.75	77.88	51.71	115.25	-47.09
2039	0.00	0.00	7.57	0.00	0.00	0.00	7.57	27.42	48.06	210.73	75.67	86.71	119.60	-71.25
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.42	44.62	196.96	73.80	95.38	123.43	-95.65
2041	0.00	0.00	79.09	0.00	0.00	0.00	79.09	27.82	44.09	186.96	72.34	104.01	126.60	-115.98
2042	0.00	0.00	271.87	0.00	0.00	0.00	271.87	29.18	43.58	177.38	70.99	113.43	129.64	-136.68
2043	0.00	0.00	253.10	0.00	0.00	0.00	253.10	30.44	47.08	174.09	70.13	121.23	132.80	-150.05
2044	0.00	0.00	106.02	0.00	61.48	0.00	167.50	31.28	48.34	171.40	69.76	113.37	139.08	-150.80
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	31.32	54.81	181.88	67.85	153.08	134.30	-173.35
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	54.37	173.04	66.65	162.01	137.27	-192.89
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	53.07	162.28	65.39	171.80	140.32	-215.24
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	51.78	172.40	66.63	162.29	137.30	-193.82
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	31.32	54.27	172.40	66.63	162.29	137.30	-193.82
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	31.32	50.99	172.40	66.63	162.29	137.30	-193.82
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	31.32	50.61	172.40	66.63	162.29	137.30	-193.82
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	31.32	50.25	172.40	66.63	162.29	137.30	-193.82
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	31.32	49.89	172.40	66.63	162.29	137.30	-193.82
2054	0.00	0.00	0.00	0.00	16.76	18.49	35.25	31.32	49.55	172.40	66.63	162.29	137.30	-193.82
2055	0.00	0.00	0.00	0.00	0.00	19.18	19.18	31.32	49.22	172.40	66.63	162.29	137.30	-193.82
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	64.39	172.40	66.63	162.29	137.30	-193.82
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	48.58	172.40	66.63	162.29	137.30	-193.82
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	63.78	172.40	66.63	162.29	137.30	-193.82
2059	0.00	0.00	148.99	0.00	0.00	0.00	148.99	31.32	50.89	172.40	66.63	162.29	137.30	-193.82
2060	0.00	0.00	278.35	0.00	0.00	0.00	278.35	31.32	59.94	172.40	66.63	162.29	137.30	-193.82
2061	0.00	0.00	133.12	0.00	0.00	0.00	133.12	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2062	0.00	0.00	91.13	0.00	0.00	0.00	91.13	31.32	59.94	172.40	66.63	162.29	137.30	-193.82
2063	0.00	0.00	103.28	0.00	0.00	0.00	103.28	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2064	0.00	0.00	15.67	0.00	10.42	2.09	28.17	31.32	59.94	172.40	66.63	162.29	137.30	-193.82
2065	0.00	0.00	0.00	0.00	27.20	4.18	31.38	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2066	0.00	0.00	159.02	0.00	55.85	12.53	227.39	31.32	59.94	172.40	66.63	162.29	137.30	-193.82
2067	0.00	0.00	229.73	0.00	9.01	18.79	257.54	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2068	0.00	0.00	102.89	0.00	19.28	56.37	178.54	31.32	59.94	172.40	66.63	162.29	137.30	-193.82
2069	0.00	0.00	7.57	0.00	30.42	56.37	94.36	31.32	47.34	172.40	66.63	162.29	137.30	-193.82
2070	0.00	0.00	0.00	0.00	0.01	58.46	58.46	31.32	46.18	172.40	66.63	162.29	137.30	-193.82
2071	0.00	0.00	79.09	0.00	0.00	0.00	79.09	31.32	46.18	172.40	66.63	162.29	137.30	-193.82
2072	0.00	0.00	271.87	0.00	0.00	0.00	271.87	31.32	46.18	172.40	66.63	162.29	137.30	-193.82
2073	0.00	0.00	253.10	0.00	46.11	0.00	299.21	31.32	45.31	172.40	66.63	162.29	137.30	-193.82
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2075	0.00	0.00	7.80	0.00	0.00	0.00	7.80	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	31.32	47.34	172.40	66.63	162.29	137.30	-193.82
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2081	0.00	0.00	0.00	0.00	18.27	0.00	18.27	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2088	0.00	0.00	0.00	0.00	35.91	18.49	54.41	31.32	44.44	172.40	66.63	162.29	137.30	-193.82
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	31.32	47.34	172.40	66.63	162.29	137.30	-193.82
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	31.32	47.34	172.40	66.63	162.29	137.30	-193.82
Salvage Value	0.00	0.00	12.49	0.00	6.21	4.78	23.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	839.87	0.00	268.91	477.79	4443.62	425.09	668.78	5891.03	1774.24	1127.89	2253.82	735.08

Net Present Value -4802

K19/C25/250MW

TABLE 141
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	3.97	278.09	1.40	0.00	235.04	102.84	15.48	80.73	35.99
2015	87.48	485.83	0.00	0.00	18.92	2.72	594.95	4.38	0.00	253.15	101.12	17.24	85.38	49.41
2016	182.24	643.32	0.00	0.00	25.89	3.96	855.41	8.66	0.00	259.84	99.24	17.80	86.94	55.86
2017	212.03	779.65	0.00	0.00	37.88	5.94	1035.50	13.83	0.00	270.25	97.31	19.03	88.21	65.70
2018	254.86	549.74	0.00	0.00	39.82	17.82	862.24	18.14	0.00	258.53	94.70	21.50	87.78	54.56
2019	260.97	393.19	0.00	0.00	50.71	17.82	722.69	21.76	13.01	273.60	94.28	21.25	88.67	69.40
2020	719.36	160.55	0.00	0.00	3.54	18.48	901.93	26.27	13.22	407.99	102.59	13.84	86.50	205.06
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	32.54	12.98	485.90	103.17	14.19	88.44	280.10
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	37.83	13.20	484.56	101.28	14.84	89.91	278.53
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	41.72	13.02	481.76	99.07	14.83	95.80	272.07
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	44.61	12.98	486.69	96.71	16.48	104.61	268.88
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	46.73	27.06	421.59	101.38	14.73	83.92	221.56
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	47.86	26.87	511.91	108.87	14.35	81.57	307.12
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	48.06	26.75	497.29	108.45	13.61	83.15	292.07
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	27.03	492.33	106.73	14.16	84.34	287.10
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	29.55	483.71	104.93	14.34	86.07	278.36
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.57	477.54	103.68	14.14	86.28	273.43
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.40	469.13	102.08	14.49	87.25	265.31
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.04	458.13	100.45	14.57	88.43	254.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.11	445.77	98.77	14.61	90.05	242.34
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.22	432.55	97.14	14.71	91.21	229.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	27.29	381.69	95.51	14.77	90.20	181.22
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	48.06	24.39	357.66	93.94	15.05	90.26	158.41
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	24.39	341.86	92.37	14.98	91.21	143.30
2038	0.00	0.00	99.72	0.00	0.00	0.00	99.72	48.44	24.39	325.27	90.81	14.96	92.72	126.77
2039	0.00	0.00	128.22	0.00	9.28	0.00	137.50	49.02	27.29	318.25	89.63	14.01	101.61	113.00
2040	0.00	0.00	16.14	0.00	0.00	0.00	16.14	49.10	28.37	306.80	87.63	23.77	103.02	92.37
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.72	297.48	86.14	26.81	105.46	79.07
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	49.50	27.72	289.81	84.81	28.62	108.21	68.17
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	50.09	27.72	281.87	83.43	28.35	113.22	56.88
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	50.57	33.44	272.79	81.87	42.09	112.30	36.53
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	51.49	36.33	262.97	80.47	46.56	115.03	20.91
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	51.57	37.43	256.94	79.10	53.02	119.53	5.29
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	36.57	247.99	77.72	53.69	126.43	-9.84
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.70	255.97	79.09	51.09	120.33	5.45
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	51.57	38.59	255.97	79.09	51.09	120.33	5.45
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	51.57	37.44	255.97	79.09	51.09	120.33	5.45
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	51.57	37.45	255.97	79.09	51.09	120.33	5.45
2052	0.00	0.00	0.00	0.00	28.87	1.47	30.34	51.57	37.45	255.97	79.09	51.09	120.33	5.45
2053	0.00	0.00	0.00	0.00	20.54	4.40	24.95	51.57	37.46	255.97	79.09	51.09	120.33	5.45
2054	0.00	0.00	0.00	0.00	17.63	4.40	22.03	51.57	37.46	255.97	79.09	51.09	120.33	5.45
2055	0.00	0.00	0.00	0.00	0.87	4.56	5.44	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	51.57	51.21	255.97	79.09	51.09	120.33	5.45
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	51.57	51.21	255.97	79.09	51.09	120.33	5.45
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	51.57	51.21	255.97	79.09	51.09	120.33	5.45
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	66.71	255.97	79.09	51.09	120.33	5.45
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2064	0.00	0.00	0.00	0.00	10.42	3.81	14.22	51.57	66.71	255.97	79.09	51.09	120.33	5.45
2065	0.00	0.00	0.00	0.00	8.65	2.40	11.04	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2066	0.00	0.00	0.00	0.00	1.04	2.98	4.02	51.57	66.71	255.97	79.09	51.09	120.33	5.45
2067	0.00	0.00	0.00	0.00	9.01	4.47	13.49	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2068	0.00	0.00	77.91	0.00	19.28	13.42	110.61	51.57	66.71	255.97	79.09	51.09	120.33	5.45
2069	0.00	0.00	106.41	0.00	33.08	13.42	152.91	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2070	0.00	0.00	16.14	0.00	2.67	13.91	32.72	51.57	52.95	255.97	79.09	51.09	120.33	5.45
2071	0.00	0.00	0.00	0.00	32.44	0.00	32.44	51.57	37.46	255.97	79.09	51.09	120.33	5.45
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	51.57	52.95	255.97	79.09	51.09	120.33	5.45
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	51.57	36.59	255.97	79.09	51.09	120.33	5.45
2074	0.00	0.00	96.75	0.00	59.30	0.00	156.04	51.57	51.21	255.97	79.09	51.09	120.33	5.45
2075	0.00	0.00	109.64	0.00	65.95	0.00	175.59	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	51.57	52.95	255.97	79.09	51.09	120.33	5.45
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	37.46	255.97	79.09	51.09	120.33	5.45
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	51.57	52.95	255.97	79.09	51.09	120.33	5.45
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	40.35	255.97	79.09	51.09	120.33	5.45
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	51.57	52.95	255.97	79.09	51.09	120.33	5.45
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2084	0.00	0.00	0.00	0.00	10.59	0.16	10.75	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2087	0.00	0.00	0.00	0.00	28.87	1.47	30.34	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2088	0.00	0.00	0.00	0.00	20.54	4.40	24.95	51.57	35.72	255.97	79.09	51.09	120.33	5.45
2089	0.00	0.00	0.00	0.00	16.76	4.40	21.16	51.57	38.62	255.97	79.09	51.09	120.33	5.45
2090	0.00	0.00	0.00	0.00	0.00	4.56	4.56	51.57	38.62	255.97	79.09	51.09	120.33	5.45
Salvage Value	2.31	0.00	6.36	0.00	10.29	1.28	20.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	197.32	0.00	449.97	66.04	7570.52	754.04	426.24	7128.03	1929.38	484.10	1948.85	2765.71

Net Present Value -5985

K19/Gas24/250MW | **TABLE 142** | **Energy Price** Low
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	3.97	246.39	1.25	0.00	235.04	102.84	15.48	80.73	35.99
2015	0.00	485.83	0.00	0.00	18.92	2.72	507.47	3.78	0.00	253.15	101.12	17.24	85.38	49.41
2016	0.00	643.32	0.00	0.00	25.89	3.96	673.16	7.15	0.00	259.84	99.24	17.80	86.94	55.86
2017	0.00	779.65	0.00	0.00	37.88	5.94	823.47	11.27	0.00	270.49	97.30	19.03	88.21	65.95
2018	0.00	549.74	0.00	0.00	39.82	17.82	607.38	14.30	0.00	258.86	94.70	21.46	87.75	54.95
2019	0.00	393.19	0.00	0.00	47.18	17.82	458.19	16.59	13.01	274.12	94.28	21.25	88.65	69.94
2020	0.00	160.55	0.36	0.00	0.01	18.48	179.40	17.49	13.22	408.76	102.59	13.84	86.49	205.84
2021	0.00	55.71	0.00	0.00	0.00	0.00	55.71	17.77	12.98	487.12	103.15	14.20	88.40	281.38
2022	0.00	0.00	93.75	0.00	0.00	0.00	93.75	18.13	13.20	487.98	101.68	14.02	89.20	283.08
2023	0.00	0.00	120.06	0.00	9.28	0.00	129.34	18.67	13.02	490.56	100.55	11.77	92.04	286.20
2024	0.00	0.00	14.90	0.00	0.00	0.00	14.90	18.74	16.96	498.54	98.67	18.35	95.96	285.56
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.74	16.74	366.05	96.43	13.62	92.71	163.28
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.74	16.33	347.75	94.21	15.72	94.32	143.50
2027	0.00	0.00	73.75	0.00	0.00	0.00	73.75	19.11	16.35	313.27	92.16	17.22	95.38	108.51
2028	0.00	0.00	102.81	0.00	73.08	0.00	175.88	19.98	16.42	303.01	90.33	20.10	98.10	94.47
2029	0.00	0.00	168.84	0.00	0.00	0.00	168.84	20.82	23.11	297.05	88.58	27.66	100.26	80.54
2030	0.00	0.00	221.85	0.00	0.00	0.00	221.85	21.93	19.18	296.21	87.68	30.20	101.57	76.77
2031	0.00	0.00	99.36	0.00	9.28	0.00	108.64	22.47	19.18	303.64	88.15	25.75	101.07	88.66
2032	0.00	0.00	7.31	0.00	0.00	0.00	7.31	22.51	26.09	312.36	85.72	53.57	99.70	73.37
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.51	26.10	304.90	84.19	58.13	102.23	60.34
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.51	26.10	297.73	82.71	63.59	104.64	46.78
2035	0.00	0.00	158.23	0.00	0.00	0.00	158.23	23.30	25.45	226.95	80.72	60.85	102.49	-17.11
2036	0.00	0.00	228.59	0.00	0.00	0.00	228.59	24.45	25.46	205.30	79.24	65.63	103.20	-42.77
2037	0.00	0.00	102.38	0.00	0.00	0.00	102.38	24.96	25.46	207.14	79.62	60.15	102.01	-34.63
2038	0.00	0.00	168.14	0.00	0.00	0.00	168.14	25.80	32.37	208.47	77.26	87.54	102.85	-59.18
2039	0.00	0.00	232.04	0.00	0.00	0.00	232.04	26.96	35.27	202.39	75.88	96.53	112.16	-82.18
2040	0.00	0.00	103.92	0.00	61.48	0.00	165.40	27.78	32.37	197.91	75.23	99.21	112.92	-89.46
2041	0.00	0.00	7.64	0.00	0.00	0.00	7.64	27.82	39.30	202.47	73.46	125.92	112.50	-109.41
2042	0.00	0.00	163.85	0.00	0.00	0.00	163.85	28.64	39.30	193.85	71.71	138.85	116.04	-132.75
2043	0.00	0.00	236.71	0.00	0.00	0.00	236.71	29.83	39.30	185.84	70.38	148.02	118.65	-151.21
2044	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.36	41.04	180.37	69.80	151.37	119.35	-160.16
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	30.40	47.96	182.15	67.64	187.42	119.87	-192.78
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	47.96	185.44	67.70	186.35	120.25	-188.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	47.10	172.85	65.87	204.08	124.01	-221.11
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	30.40	49.14	180.15	67.07	192.62	121.38	-200.91
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2052	0.00	0.00	71.94	0.00	28.87	1.47	102.27	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2053	0.00	0.00	98.25	0.00	20.54	4.40	123.20	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2054	0.00	0.00	14.90	0.00	16.76	4.40	36.07	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2055	0.00	0.00	0.00	0.00	0.00	4.56	4.56	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2057	0.00	0.00	73.75	0.00	0.00	0.00	73.75	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2058	0.00	0.00	100.73	0.00	9.28	0.00	110.01	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2059	0.00	0.00	168.84	0.00	0.00	0.00	168.84	30.40	49.14	180.15	67.07	192.62	121.38	-200.91
2060	0.00	0.00	221.85	0.00	0.00	0.00	221.85	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2061	0.00	0.00	99.36	0.00	0.00	0.00	99.36	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2062	0.00	0.00	7.31	0.00	0.00	0.00	7.31	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2063	0.00	0.00	0.00	0.00	54.81	2.80	57.61	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2064	0.00	0.00	0.00	0.00	10.42	3.81	14.22	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2065	0.00	0.00	158.23	0.00	8.65	2.40	169.27	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2066	0.00	0.00	228.59	0.00	10.32	2.98	241.89	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2067	0.00	0.00	102.38	0.00	9.01	4.47	115.87	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2068	0.00	0.00	168.14	0.00	19.28	13.42	200.84	30.40	61.73	180.15	67.07	192.62	121.38	-200.91
2069	0.00	0.00	232.04	0.00	30.42	13.42	275.88	30.40	49.14	180.15	67.07	192.62	121.38	-200.91
2070	0.00	0.00	103.92	0.00	0.01	13.91	117.85	30.40	47.98	180.15	67.07	192.62	121.38	-200.91
2071	0.00	0.00	7.64	0.00	0.00	0.00	7.64	30.40	47.98	180.15	67.07	192.62	121.38	-200.91
2072	0.00	0.00	163.85	0.00	0.00	0.00	163.85	30.40	47.98	180.15	67.07	192.62	121.38	-200.91
2073	0.00	0.00	236.71	0.00	0.00	0.00	236.71	30.40	47.11	180.15	67.07	192.62	121.38	-200.91
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2075	0.00	0.00	7.80	0.00	46.11	0.00	53.90	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2078	0.00	0.00	0.00	0.00	18.27	0.00	18.27	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	49.14	180.15	67.07	192.62	121.38	-200.91
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2082	0.00	0.00	71.94	0.00	0.00	0.00	71.94	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2083	0.00	0.00	98.25	0.00	0.00	0.00	98.25	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2084	0.00	0.00	14.90	0.00	10.59	0.16	25.66	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2087	0.00	0.00	73.75	0.00	28.87	1.47	104.09	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2088	0.00	0.00	100.73	0.00	20.54	4.40	125.68	30.40	46.24	180.15	67.07	192.62	121.38	-200.91
2089	0.00	0.00	15.28	0.00	16.76	4.40	36.44	30.40	49.14	180.15	67.07	192.62	121.38	-200.91
2090	0.00	0.00	0.00	0.00	15.37	4.56	19.93	30.40	49.14	180.15	67.07	192.62	121.38	-200.91
Salvage Value	0.00	0.00	22.22	0.00	5.37	1.28	28.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	1097.53	0.00	259.43	66.04	4280.05	404.31	445.49	5771.41	1778.52	1353.35	2032.47	607.06

Net Present Value -4523

K19/C31/250MW

TABLE 143
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	221.41	0.00	0.00	21.01	3.97	277.46	1.40	0.00	235.04	102.84	15.48	80.73	35.99
2015	39.22	485.83	0.00	0.00	18.92	2.72	546.70	4.13	0.00	253.15	101.12	17.24	85.38	49.41
2016	10.66	643.32	0.00	0.00	25.89	3.96	683.82	7.55	0.00	259.84	99.24	17.80	86.94	55.86
2017	10.72	779.65	0.00	0.00	37.88	5.94	834.19	11.72	0.00	270.49	97.30	19.03	88.21	65.95
2018	12.74	549.74	0.00	0.00	39.82	17.82	620.12	14.83	0.00	258.86	94.70	21.46	87.75	54.95
2019	12.82	393.19	0.00	0.00	47.18	17.82	471.00	17.18	13.01	274.12	94.28	21.25	88.65	69.94
2020	12.89	160.55	0.36	0.00	0.01	18.48	192.29	18.14	13.22	408.76	102.59	13.84	86.49	205.84
2021	16.30	55.71	0.00	0.00	0.00	0.00	72.02	18.50	12.98	487.12	103.15	14.20	88.40	281.38
2022	164.90	0.00	93.75	0.00	0.00	0.00	258.64	19.68	13.20	487.91	101.67	14.04	89.21	282.99
2023	251.53	0.00	120.06	0.00	9.28	0.00	380.87	21.48	13.02	490.26	100.52	11.86	92.16	285.72
2024	273.27	0.00	14.90	0.00	0.00	0.00	288.17	22.92	16.96	498.14	98.64	18.46	96.14	284.90
2025	278.50	0.00	0.00	0.00	3.53	0.00	282.03	24.33	16.74	365.37	96.40	13.73	92.90	162.35
2026	753.38	0.00	0.00	0.00	3.53	0.00	756.91	28.12	16.33	347.12	94.20	15.87	94.54	142.52
2027	1196.26	0.00	73.75	0.00	42.90	0.00	1312.92	34.68	16.35	312.21	92.15	17.49	95.56	107.01
2028	1074.05	0.00	100.73	0.00	31.54	0.00	1206.32	40.71	16.42	301.47	90.26	20.58	98.49	92.14
2029	766.99	0.00	15.28	0.00	37.45	0.00	819.72	44.81	23.10	295.10	88.55	28.28	100.66	77.62
2030	531.19	0.00	0.00	0.00	64.84	0.00	596.03	47.79	19.16	306.72	89.54	24.86	98.24	94.08
2031	348.90	0.00	0.00	0.00	86.88	0.00	435.78	49.97	33.47	340.43	92.65	20.09	84.98	142.71
2032	128.50	0.00	0.00	0.00	102.39	0.00	230.89	51.12	33.68	438.35	99.45	19.88	83.06	235.95
2033	40.55	0.00	0.00	0.00	0.00	0.00	40.55	51.33	33.55	457.06	99.61	20.56	87.50	249.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	33.76	441.41	97.87	21.08	88.26	234.20
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.93	389.88	96.20	21.34	87.41	184.94
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.88	366.98	94.62	21.80	87.48	163.09
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.71	349.08	92.76	22.67	89.04	144.61
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.35	329.32	90.83	23.59	91.40	123.49
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	35.31	314.98	88.96	25.94	100.48	99.60
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.53	305.08	87.24	29.40	103.34	85.11
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	35.25	294.70	85.61	33.49	106.16	69.44
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	51.33	32.36	291.55	84.75	34.14	107.64	65.02
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.36	284.12	83.42	33.89	112.28	54.53
2044	0.00	0.00	80.28	0.00	0.00	0.00	80.28	51.73	34.10	272.88	81.88	42.08	112.31	36.62
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	52.64	34.10	263.02	80.47	46.54	115.03	20.98
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	52.72	38.09	256.98	79.11	53.00	119.52	5.35
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	36.57	247.99	77.72	53.69	126.43	-9.84
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	35.70	256.00	79.10	51.08	120.33	5.49
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	52.72	38.59	256.00	79.10	51.08	120.33	5.49
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	52.72	35.70	256.00	79.10	51.08	120.33	5.49
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	52.72	38.60	256.00	79.10	51.08	120.33	5.49
2052	0.00	0.00	71.94	0.00	28.87	1.47	102.27	52.72	35.71	256.00	79.10	51.08	120.33	5.49
2053	0.00	0.00	98.25	0.00	20.54	4.40	123.20	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2054	0.00	0.00	14.90	0.00	16.76	4.40	36.07	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2055	0.00	0.00	0.00	0.00	0.00	4.56	4.56	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2057	0.00	0.00	73.75	0.00	0.00	0.00	73.75	52.72	37.46	256.00	79.10	51.08	120.33	5.49
2058	0.00	0.00	100.73	0.00	9.28	0.00	110.01	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2059	0.00	0.00	15.28	0.00	0.00	0.00	15.28	52.72	40.35	256.00	79.10	51.08	120.33	5.49
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2061	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.72	38.62	256.00	79.10	51.08	120.33	5.49
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2063	0.00	0.00	0.00	0.00	14.51	2.80	17.32	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2064	0.00	0.00	0.00	0.00	19.14	3.81	22.95	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2065	0.00	0.00	0.00	0.00	23.47	2.40	25.87	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2066	0.00	0.00	0.00	0.00	21.97	2.98	24.95	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2067	0.00	0.00	0.00	0.00	34.31	4.47	38.78	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2068	0.00	0.00	0.00	0.00	19.28	13.42	32.70	52.72	66.71	256.00	79.10	51.08	120.33	5.49
2069	0.00	0.00	0.00	0.00	30.42	13.42	43.84	52.72	38.62	256.00	79.10	51.08	120.33	5.49
2070	0.00	0.00	0.00	0.00	0.01	13.91	13.92	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	40.35	256.00	79.10	51.08	120.33	5.49
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	36.59	256.00	79.10	51.08	120.33	5.49
2074	0.00	0.00	80.28	0.00	0.00	0.00	80.28	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2075	0.00	0.00	109.64	0.00	2.66	0.00	112.30	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2076	0.00	0.00	16.63	0.00	2.66	0.00	19.29	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2077	0.00	0.00	0.00	0.00	32.44	0.00	32.44	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2078	0.00	0.00	0.00	0.00	17.02	0.00	17.02	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2079	0.00	0.00	0.00	0.00	28.73	0.00	28.73	52.72	38.62	256.00	79.10	51.08	120.33	5.49
2080	0.00	0.00	0.00	0.00	104.82	0.00	104.82	52.72	51.21	256.00	79.10	51.08	120.33	5.49
2081	0.00	0.00	0.00	0.00	65.95	0.00	65.95	52.72	38.62	256.00	79.10	51.08	120.33	5.49
2082	0.00	0.00	71.94	0.00	77.10	0.00	149.03	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2083	0.00	0.00	98.25	0.00	0.00	0.00	98.25	52.72	37.46	256.00	79.10	51.08	120.33	5.49
2084	0.00	0.00	14.90	0.00	10.59	0.16	25.66	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	52.72	37.46	256.00	79.10	51.08	120.33	5.49
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	52.72	52.95	256.00	79.10	51.08	120.33	5.49
2087	0.00	0.00	73.75	0.00	28.87	1.47	104.09	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2088	0.00	0.00	100.73	0.00	20.54	4.40	125.68	52.72	35.72	256.00	79.10	51.08	120.33	5.49
2089	0.00	0.00	15.28	0.00	16.76	4.40	36.44	52.72	38.62	256.00	79.10	51.08	120.33	5.49
2090	0.00	0.00	0.00	0.00	0.00	4.56	4.56	52.72	38.62	256.00	79.10	51.08	120.33	5.49
Salvage Value	17.09	0.00	10.66	0.00	11.35	1.28	40.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3127.55	2857.05	353.00	0.00	392.78	66.04	6796.42	670.23	428.42	6612.56	1885.89	528.43	1970.46	2227.79

Net Present Value -5667

All Gas

TABLE 144
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	261.04	99.23	17.83	86.91	57.07
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	273.83	97.64	18.34	87.61	70.23
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	262.93	94.94	20.48	88.16	59.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	256.72	92.97	18.31	87.82	57.62
2020	0.00	0.00	93.03	0.00	0.00	0.00	93.03	0.87	0.00	262.56	92.87	13.05	89.67	66.97
2021	0.00	0.00	119.13	0.00	9.28	0.00	128.41	1.40	0.00	263.25	91.07	12.33	94.73	65.13
2022	0.00	0.00	14.76	0.00	0.00	0.00	14.76	1.47	3.98	257.48	88.87	21.86	96.22	50.53
2023	0.00	0.00	72.30	0.00	0.00	0.00	72.30	1.84	3.98	254.45	86.66	26.93	101.41	39.45
2024	0.00	0.00	100.82	0.00	73.08	0.00	173.89	2.70	3.98	260.17	85.11	31.52	107.60	35.94
2025	0.00	0.00	14.98	0.00	0.00	0.00	14.98	2.77	7.98	167.99	84.56	26.45	99.59	-42.61
2026	0.00	0.00	73.39	0.00	0.00	0.00	73.39	3.14	7.98	154.02	83.26	26.93	100.25	-56.42
2027	0.00	0.00	100.23	0.00	0.00	0.00	100.23	3.64	7.98	143.65	81.42	27.11	106.61	-71.50
2028	0.00	0.00	168.00	0.00	0.00	0.00	168.00	4.48	11.97	135.86	79.51	41.45	106.20	-91.31
2029	0.00	0.00	220.75	0.00	0.00	0.00	220.75	5.58	11.97	126.01	78.08	47.02	108.16	-107.25
2030	0.00	0.00	98.87	0.00	9.28	0.00	108.15	6.12	11.98	132.76	78.92	43.22	105.81	-95.18
2031	0.00	0.00	7.27	0.00	0.00	0.00	7.27	6.16	18.90	139.83	76.62	71.81	103.07	-111.66
2032	0.00	0.00	75.62	0.00	0.00	0.00	75.62	6.54	18.90	126.09	74.73	79.09	106.48	-134.21
2033	0.00	0.00	103.28	0.00	61.48	0.00	164.75	7.36	18.90	114.04	73.02	87.60	109.44	-156.03
2034	0.00	0.00	173.11	0.00	0.00	0.00	173.11	8.23	22.90	105.72	71.61	99.54	111.52	-176.95
2035	0.00	0.00	227.45	0.00	0.00	0.00	227.45	9.36	22.90	98.07	70.69	105.86	112.41	-190.89
2036	0.00	0.00	101.87	0.00	0.00	0.00	101.87	9.87	22.90	97.09	70.57	103.26	115.74	-192.49
2037	0.00	0.00	167.31	0.00	0.00	0.00	167.31	10.71	29.82	95.05	68.67	130.49	110.01	-214.13
2038	0.00	0.00	230.88	0.00	0.00	0.00	230.88	11.86	29.82	86.35	67.45	140.84	112.97	-234.92
2039	0.00	0.00	103.41	0.00	0.00	0.00	103.41	12.38	29.83	82.96	67.30	143.02	119.44	-246.81
2040	0.00	0.00	7.60	0.00	0.00	0.00	7.60	12.42	36.75	82.24	65.52	166.63	118.48	-268.37
2041	0.00	0.00	163.04	0.00	0.00	0.00	163.04	13.23	36.76	76.56	63.74	186.29	123.24	-296.70
2042	0.00	0.00	235.53	0.00	0.00	0.00	235.53	14.41	36.76	74.18	62.67	202.25	125.81	-316.55
2043	0.00	0.00	105.49	0.00	61.48	0.00	166.97	15.25	36.76	74.56	62.58	206.20	125.86	-320.08
2044	0.00	0.00	7.76	0.00	0.00	0.00	7.76	15.29	43.68	74.72	61.14	230.08	124.53	-341.03
2045	0.00	0.00	35.49	0.00	0.00	0.00	35.49	15.46	43.68	69.62	59.60	252.02	128.00	-370.00
2046	0.00	0.00	48.47	0.00	0.00	0.00	48.47	15.71	43.68	66.37	58.47	269.57	131.24	-392.91
2047	0.00	0.00	7.35	0.00	0.00	0.00	7.35	15.74	45.13	61.95	57.62	283.71	133.33	-412.71
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.13	65.98	58.56	268.43	130.85	-391.87
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	15.74	45.14	65.98	58.56	268.43	130.85	-391.87
2050	0.00	0.00	71.22	0.00	9.87	0.00	81.09	15.74	45.14	65.98	58.56	268.43	130.85	-391.87
2051	0.00	0.00	97.28	0.00	9.87	0.00	107.14	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2052	0.00	0.00	14.76	0.00	9.87	0.00	24.62	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2053	0.00	0.00	72.30	0.00	0.00	0.00	72.30	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2054	0.00	0.00	98.74	0.00	0.00	0.00	98.74	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2055	0.00	0.00	14.98	0.00	0.00	0.00	14.98	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2056	0.00	0.00	73.39	0.00	9.28	0.00	82.67	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2057	0.00	0.00	100.23	0.00	0.00	0.00	100.23	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2058	0.00	0.00	168.00	0.00	0.00	0.00	168.00	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2059	0.00	0.00	220.75	0.00	54.81	0.00	275.55	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2060	0.00	0.00	98.87	0.00	0.00	0.00	98.87	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2061	0.00	0.00	7.27	0.00	0.00	0.00	7.27	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2062	0.00	0.00	75.62	0.00	0.00	0.00	75.62	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2063	0.00	0.00	103.28	0.00	0.00	0.00	103.28	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2064	0.00	0.00	173.11	0.00	0.00	0.00	173.11	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2065	0.00	0.00	227.45	0.00	9.28	0.00	236.73	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2066	0.00	0.00	101.87	0.00	0.00	0.00	101.87	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2067	0.00	0.00	167.31	0.00	0.00	0.00	167.31	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2068	0.00	0.00	230.88	0.00	46.11	0.00	276.99	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2069	0.00	0.00	103.41	0.00	0.00	0.00	103.41	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2070	0.00	0.00	7.60	0.00	0.00	0.00	7.60	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2071	0.00	0.00	163.04	0.00	0.00	0.00	163.04	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2072	0.00	0.00	235.53	0.00	0.00	0.00	235.53	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2073	0.00	0.00	105.49	0.00	0.00	0.00	105.49	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2074	0.00	0.00	7.76	0.00	18.27	0.00	26.03	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2075	0.00	0.00	35.49	0.00	0.00	0.00	35.49	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2076	0.00	0.00	48.47	0.00	0.00	0.00	48.47	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2077	0.00	0.00	7.35	0.00	0.00	0.00	7.35	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2078	0.00	0.00	0.00	0.00	46.11	0.00	46.11	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2080	0.00	0.00	71.22	0.00	0.00	0.00	71.22	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2081	0.00	0.00	97.28	0.00	0.00	0.00	97.28	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2082	0.00	0.00	14.76	0.00	0.00	0.00	14.76	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2083	0.00	0.00	72.30	0.00	15.37	0.00	87.67	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2084	0.00	0.00	98.74	0.00	9.87	0.00	108.61	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2085	0.00	0.00	14.98	0.00	9.87	0.00	24.84	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2086	0.00	0.00	73.39	0.00	9.87	0.00	83.25	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2087	0.00	0.00	100.23	0.00	9.87	0.00	110.10	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2088	0.00	0.00	15.20	0.00	0.00	0.00	15.20	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	65.98	58.56	268.43	130.85	-391.87
Salvage Value	0.00	0.00	41.11	0.00	2.72	0.00	43.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1405.03	0.00	150.53	0.00	1618.51	130.92	343.48	3401.41	1623.89	1941.59	2152.00	-2316.07

Net Present Value: -4409

Wind/Gas

TABLE 145
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	261.04	99.23	17.83	86.91	57.07
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	273.84	97.64	18.34	87.61	70.24
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	262.93	94.94	20.48	88.16	59.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	256.72	92.97	18.31	87.82	57.62
2020	0.00	0.00	0.00	9.58	13.53	0.00	23.11	0.63	0.00	260.13	92.44	14.12	89.99	63.57
2021	0.00	0.00	0.36	292.47	22.55	0.00	315.39	2.20	0.00	260.33	90.65	13.66	94.65	61.37
2022	0.00	0.00	0.00	297.95	27.23	0.00	325.18	3.83	6.21	263.62	89.00	13.76	94.73	66.13
2023	0.00	0.00	166.40	288.37	14.18	0.00	468.95	6.06	12.42	267.26	86.53	15.81	98.08	66.84
2024	0.00	0.00	219.34	5.47	25.01	0.00	249.82	7.20	18.63	281.62	84.67	16.18	103.90	76.88
2025	0.00	0.00	29.96	4.79	3.89	0.00	38.64	7.40	26.60	196.59	84.65	18.45	94.97	-1.48
2026	0.00	0.00	73.39	146.24	9.78	0.00	229.40	8.54	26.60	186.01	83.67	17.52	94.83	-10.01
2027	0.00	0.00	102.31	148.97	88.61	0.00	339.89	10.23	29.70	177.18	81.36	21.34	96.69	-22.21
2028	0.00	0.00	15.20	148.97	21.53	0.00	185.71	11.16	36.81	177.17	79.61	27.59	99.06	-29.09
2029	0.00	0.00	74.49	148.97	21.61	0.00	245.08	12.39	39.91	172.51	78.04	29.75	100.82	-36.11
2030	0.00	0.00	101.74	148.97	21.61	0.00	272.32	13.75	43.02	173.73	77.14	31.18	101.31	-35.90
2031	0.00	0.00	90.67	148.97	21.61	0.00	261.26	15.06	50.10	174.03	75.93	36.92	102.07	-40.88
2032	0.00	0.00	102.76	148.97	83.09	0.00	334.82	16.73	53.22	171.59	74.82	37.23	103.92	-44.37
2033	0.00	0.00	15.59	148.97	21.61	0.00	186.17	17.66	60.32	173.87	74.15	39.29	104.87	-44.46
2034	0.00	0.00	76.37	148.97	21.61	0.00	246.96	18.90	63.43	165.92	72.38	45.47	105.88	-57.81
2035	0.00	0.00	104.31	148.97	21.61	0.00	274.89	20.27	66.55	158.12	70.74	49.45	107.77	-69.84
2036	0.00	0.00	92.96	148.97	21.61	0.00	263.55	21.59	73.63	154.59	69.40	57.01	109.09	-80.90
2037	0.00	0.00	105.36	148.97	21.61	0.00	275.94	22.97	76.75	148.79	68.13	60.51	111.19	-91.04
2038	0.00	0.00	93.90	148.97	21.61	0.00	264.48	24.29	83.84	147.40	67.10	66.54	113.47	-99.72
2039	0.00	0.00	106.41	148.97	83.09	0.00	338.47	25.98	86.95	142.18	65.97	65.55	125.01	-114.34
2040	0.00	0.00	16.14	158.55	21.61	0.00	196.31	26.96	94.06	142.74	65.16	69.13	128.01	-119.56
2041	0.00	0.00	79.09	441.45	21.61	0.00	542.15	29.67	97.17	133.42	63.69	81.41	126.13	-137.81
2042	0.00	0.00	108.02	446.92	21.61	0.00	576.55	32.56	100.27	126.25	62.35	87.31	129.31	-152.71
2043	0.00	0.00	96.27	437.34	21.45	0.00	555.06	35.33	107.36	122.74	61.20	96.84	131.47	-166.76
2044	0.00	0.00	109.10	154.45	20.96	0.00	284.51	36.75	110.47	119.21	60.26	100.45	134.21	-175.70
2045	0.00	0.00	52.04	153.76	19.66	0.00	225.47	37.88	117.57	117.08	59.19	106.48	139.32	-187.91
2046	0.00	0.00	48.47	290.42	17.72	0.00	356.61	39.67	120.68	113.94	58.17	106.92	146.97	-198.12
2047	0.00	0.00	7.35	151.71	11.83	0.00	170.90	40.52	125.23	109.39	57.12	110.78	148.43	-206.95
2048	0.00	0.00	0.00	148.97	6.08	0.00	155.05	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2049	0.00	0.00	0.00	148.97	9.95	0.00	158.92	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2050	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2051	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2052	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2053	0.00	0.00	144.60	148.97	0.00	0.00	293.57	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2054	0.00	0.00	197.48	148.97	0.00	0.00	346.46	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2055	0.00	0.00	29.96	148.97	3.38	0.00	182.32	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2056	0.00	0.00	73.39	148.97	5.64	0.00	228.00	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2057	0.00	0.00	100.23	148.97	6.85	0.00	256.05	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2058	0.00	0.00	15.20	148.97	3.79	0.00	167.97	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2059	0.00	0.00	74.49	148.97	20.42	0.00	243.88	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2060	0.00	0.00	101.74	158.55	1.70	0.00	262.00	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2061	0.00	0.00	90.67	441.45	2.73	0.00	534.85	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2062	0.00	0.00	102.76	446.92	58.75	0.00	608.43	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2063	0.00	0.00	15.59	437.34	5.40	0.00	458.33	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2064	0.00	0.00	76.37	154.45	5.40	0.00	236.23	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2065	0.00	0.00	104.31	153.76	5.40	0.00	263.48	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2066	0.00	0.00	92.96	290.42	5.40	0.00	388.79	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2067	0.00	0.00	105.36	151.71	51.51	0.00	308.58	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2068	0.00	0.00	93.90	148.97	5.40	0.00	248.27	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2069	0.00	0.00	106.41	148.97	5.40	0.00	260.79	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2070	0.00	0.00	16.14	148.97	15.55	0.00	180.67	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2071	0.00	0.00	79.09	148.97	22.32	0.00	250.38	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2072	0.00	0.00	108.02	148.97	25.78	0.00	282.77	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2073	0.00	0.00	96.27	148.97	15.79	0.00	261.04	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2074	0.00	0.00	109.10	148.97	56.11	0.00	314.18	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2075	0.00	0.00	52.04	148.97	7.59	0.00	208.60	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2076	0.00	0.00	48.47	148.97	12.45	0.00	209.90	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2077	0.00	0.00	7.35	148.97	35.26	0.00	191.59	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2078	0.00	0.00	0.00	148.97	21.45	0.00	170.42	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2079	0.00	0.00	0.00	148.97	21.20	0.00	170.18	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2080	0.00	0.00	0.00	158.55	20.88	0.00	179.43	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2081	0.00	0.00	0.00	441.45	19.91	0.00	461.36	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2082	0.00	0.00	0.00	446.92	34.25	0.00	481.17	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2083	0.00	0.00	144.60	437.34	17.67	0.00	599.60	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2084	0.00	0.00	197.48	154.45	25.99	0.00	377.92	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2085	0.00	0.00	29.96	153.76	25.83	0.00	209.55	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2086	0.00	0.00	73.39	290.42	24.86	0.00	388.67	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2087	0.00	0.00	100.23	151.71	23.88	0.00	275.83	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2088	0.00	0.00	15.20	148.97	9.16	0.00	173.34	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2089	0.00	0.00	0.00	144.18	19.99	0.00	164.17	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
2090	0.00	0.00	0.00	2.74	0.08	0.00	2.82	40.52	125.23	113.47	58.16	108.06	144.91	-197.66
Salvage Value	0.00	0.00	21.35	52.69	9.71	0.00	83.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1026.26	2582.12	374.98	0.00	4046.32	315.52	974.12	3969.06	1619.55	924.20	2184.29	-758.99

Net Present Value -6095

K22/Gas

TABLE 146
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	104.90	0.00	0.00	9.87	0.00	114.77	0.57	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	31.84	0.00	0.00	10.78	0.00	42.62	0.79	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	28.25	0.00	0.00	10.87	0.00	39.11	0.98	0.00	260.79	99.23	17.83	86.92	56.81
2017	0.00	210.82	0.00	0.00	27.15	0.00	237.97	2.17	0.00	273.24	97.65	18.34	87.64	69.61
2018	0.00	411.14	0.00	0.00	8.86	0.00	420.01	4.27	0.00	261.68	94.95	20.49	88.21	58.03
2019	0.00	670.60	0.00	0.00	15.43	0.00	686.04	7.70	0.00	255.45	92.98	18.31	87.85	56.30
2020	0.00	746.81	0.00	0.00	28.08	0.00	774.89	11.58	0.00	257.29	92.28	14.54	90.17	60.31
2021	0.00	610.51	0.00	0.00	39.84	0.00	650.35	14.83	0.00	258.77	90.59	13.95	95.34	58.89
2022	0.00	354.56	0.00	0.00	47.18	0.00	401.74	16.84	13.01	262.08	90.57	15.91	90.84	64.76
2023	0.00	164.83	0.00	0.00	0.01	0.00	164.84	17.66	13.22	349.92	96.19	15.83	88.51	149.40
2024	0.00	56.99	0.00	0.00	0.00	0.00	56.99	17.95	12.93	376.96	95.99	18.03	94.19	168.76
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	17.95	13.15	296.21	95.88	12.67	89.19	98.48
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.95	12.97	283.04	94.03	12.82	90.33	85.85
2027	0.00	0.00	95.56	0.00	0.00	0.00	95.56	18.32	12.93	243.77	92.19	12.27	89.67	49.64
2028	0.00	0.00	122.58	0.00	9.28	0.00	131.86	18.87	12.69	231.54	90.64	12.79	91.25	36.86
2029	0.00	0.00	15.28	0.00	0.00	0.00	15.28	18.94	16.24	227.75	89.76	15.82	91.32	30.85
2030	0.00	0.00	74.87	0.00	0.00	0.00	74.87	19.32	16.24	220.66	88.08	19.17	92.95	20.46
2031	0.00	0.00	259.43	0.00	73.08	0.00	332.51	20.97	16.28	212.71	86.45	22.01	95.28	8.97
2032	0.00	0.00	239.59	0.00	0.00	0.00	239.59	22.17	22.98	206.49	84.86	29.92	97.56	-5.85
2033	0.00	0.00	100.36	0.00	9.28	0.00	109.64	22.71	19.04	209.67	84.95	26.18	97.75	0.79
2034	0.00	0.00	7.38	0.00	0.00	0.00	7.38	22.75	25.96	215.84	82.63	53.01	96.16	-15.96
2035	0.00	0.00	158.23	0.00	0.00	0.00	158.23	23.54	25.96	201.47	80.58	58.19	98.71	-36.02
2036	0.00	0.00	228.59	0.00	0.00	0.00	228.59	24.69	25.96	193.16	79.09	64.65	100.83	-51.41
2037	0.00	0.00	102.38	0.00	0.00	0.00	102.38	25.20	25.97	194.79	79.47	58.75	99.70	-43.14
2038	0.00	0.00	168.14	0.00	0.00	0.00	168.14	26.04	32.23	194.78	77.15	84.27	100.58	-67.22
2039	0.00	0.00	232.04	0.00	0.00	0.00	232.04	27.20	32.24	188.57	75.79	93.00	109.81	-90.03
2040	0.00	0.00	103.92	0.00	61.48	0.00	165.40	28.03	32.24	185.66	75.28	95.22	110.14	-94.98
2041	0.00	0.00	7.64	0.00	0.00	0.00	7.64	28.06	39.16	188.93	73.40	121.75	109.98	-116.19
2042	0.00	0.00	163.85	0.00	0.00	0.00	163.85	28.88	42.06	180.11	71.62	135.49	113.46	-140.46
2043	0.00	0.00	236.71	0.00	0.00	0.00	236.71	30.07	39.16	172.65	70.28	145.33	116.06	-159.02
2044	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.60	39.16	169.99	69.84	148.64	116.41	-164.89
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	30.64	46.09	173.97	68.32	177.21	115.07	-186.63
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.09	168.49	67.10	188.96	118.42	-206.01
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	47.84	161.09	65.77	202.42	121.32	-228.43
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	47.84	167.85	67.07	189.53	118.27	-207.02
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	47.84	167.85	67.07	189.53	118.27	-207.02
2050	0.00	0.00	0.00	0.00	10.27	0.00	10.27	30.64	46.97	167.85	67.07	189.53	118.27	-207.02
2051	0.00	0.00	0.00	0.00	10.32	0.00	10.32	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2052	0.00	0.00	0.00	0.00	10.34	0.00	10.34	30.64	49.00	167.85	67.07	189.53	118.27	-207.02
2053	0.00	0.00	0.00	0.00	0.44	0.00	0.44	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2054	0.00	0.00	0.00	0.00	14.33	0.00	14.33	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2055	0.00	0.00	0.00	0.00	19.00	0.00	19.00	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2056	0.00	0.00	0.00	0.00	20.54	0.00	20.54	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2057	0.00	0.00	73.75	0.00	16.76	0.00	90.51	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2058	0.00	0.00	100.73	0.00	0.00	0.00	100.73	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2059	0.00	0.00	15.28	0.00	0.00	0.00	15.28	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2060	0.00	0.00	74.87	0.00	0.00	0.00	74.87	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2061	0.00	0.00	257.35	0.00	0.00	0.00	257.35	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2062	0.00	0.00	239.59	0.00	0.00	0.00	239.59	30.64	49.00	167.85	67.07	189.53	118.27	-207.02
2063	0.00	0.00	100.36	0.00	9.28	0.00	109.64	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2064	0.00	0.00	7.38	0.00	0.00	0.00	7.38	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2065	0.00	0.00	158.23	0.00	0.51	0.00	158.74	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2066	0.00	0.00	228.59	0.00	55.35	0.00	283.94	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2067	0.00	0.00	102.38	0.00	16.82	0.00	119.20	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2068	0.00	0.00	168.14	0.00	17.71	0.00	185.85	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2069	0.00	0.00	232.04	0.00	1.11	0.00	233.14	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2070	0.00	0.00	103.92	0.00	9.08	0.00	113.01	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2071	0.00	0.00	7.64	0.00	19.30	0.00	26.94	30.64	61.60	167.85	67.07	189.53	118.27	-207.02
2072	0.00	0.00	163.85	0.00	30.42	0.00	194.27	30.64	49.00	167.85	67.07	189.53	118.27	-207.02
2073	0.00	0.00	236.71	0.00	0.01	0.00	236.72	30.64	47.84	167.85	67.07	189.53	118.27	-207.02
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.64	47.84	167.85	67.07	189.53	118.27	-207.02
2075	0.00	0.00	7.80	0.00	46.12	0.00	53.91	30.64	47.84	167.85	67.07	189.53	118.27	-207.02
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.97	167.85	67.07	189.53	118.27	-207.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2081	0.00	0.00	0.00	0.00	18.27	0.00	18.27	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	49.00	167.85	67.07	189.53	118.27	-207.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2087	0.00	0.00	73.75	0.00	9.87	0.00	83.62	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2088	0.00	0.00	100.73	0.00	0.00	0.00	100.73	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2089	0.00	0.00	15.28	0.00	0.00	0.00	15.28	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
2090	0.00	0.00	0.00	0.00	15.37	0.00	15.37	30.64	46.10	167.85	67.07	189.53	118.27	-207.02
Salvage Value	0.00	0.00	19.65	0.00	4.12	0.00	23.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2572.26	1020.22	0.00	238.16	0.00	3830.64	360.75	393.87	4714.14	1748.91	1286.08	1989.65	-310.51

Net Present Value: -4896

K22/C29

TABLE 147
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	104.90	0.00	0.00	9.87	0.00	145.84	0.73	0.00	235.42	102.83	15.46	80.72	36.42
2015	39.75	31.84	0.00	0.00	10.78	0.00	82.37	1.14	0.00	254.26	101.10	17.25	85.37	50.54
2016	11.18	28.25	0.00	0.00	10.87	0.00	50.30	1.39	0.00	260.79	99.23	17.83	86.92	56.81
2017	11.92	210.82	0.00	0.00	27.15	0.00	249.88	2.64	0.00	273.24	97.65	18.34	87.64	69.61
2018	11.99	411.14	0.00	0.00	8.86	0.00	431.99	4.80	0.00	261.68	94.95	20.49	88.21	58.03
2019	14.33	670.60	0.00	0.00	15.43	0.00	700.37	8.30	0.00	255.45	92.98	18.31	87.85	56.30
2020	166.16	746.81	0.00	0.00	28.08	0.00	941.05	13.01	0.00	257.29	92.28	14.54	90.17	60.31
2021	251.80	610.51	0.00	0.00	39.84	0.00	902.15	17.52	0.00	258.64	90.59	13.95	95.43	58.67
2022	270.08	354.56	0.00	0.00	47.18	0.00	671.81	20.88	13.01	261.92	90.58	15.89	90.94	64.51
2023	275.25	164.83	0.00	0.00	3.54	0.00	443.62	23.10	13.22	349.42	96.19	15.87	88.56	148.81
2024	744.58	56.99	0.00	0.00	3.53	0.00	805.11	27.12	12.93	375.82	95.98	18.03	94.24	167.57
2025	1182.29	0.00	0.00	0.00	42.90	0.00	1225.20	33.25	13.15	294.81	95.90	12.69	89.29	96.94
2026	1061.52	0.00	0.00	0.00	22.26	0.00	1083.77	38.67	12.97	281.32	94.03	12.86	90.48	83.96
2027	758.04	0.00	0.00	0.00	37.45	0.00	795.49	42.64	12.93	242.57	92.41	11.76	89.60	48.81
2028	524.99	0.00	0.00	0.00	64.84	0.00	589.83	45.59	12.69	227.38	90.53	12.94	91.59	32.32
2029	344.82	0.00	0.00	0.00	86.88	0.00	431.70	47.75	26.56	291.24	94.31	14.78	82.56	99.60
2030	127.00	0.00	0.00	0.00	102.39	0.00	229.39	48.90	26.78	384.46	101.31	14.48	79.27	189.40
2031	40.08	0.00	0.00	0.00	0.00	0.00	40.08	49.10	26.68	397.12	101.23	14.84	81.48	199.58
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	29.59	384.41	99.57	14.69	82.34	187.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.48	372.21	97.96	14.60	83.93	175.72
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.44	360.15	96.37	14.86	85.02	163.91
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.27	347.52	94.83	14.91	85.68	152.10
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	49.10	24.90	332.95	93.29	14.93	86.48	138.25
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	24.97	317.94	91.77	14.96	87.55	123.66
2038	0.00	0.00	99.72	0.00	0.00	0.00	99.72	49.49	24.43	303.23	90.26	14.93	89.46	108.58
2039	0.00	0.00	128.22	0.00	9.28	0.00	137.50	50.07	27.15	296.63	88.92	14.51	99.37	93.83
2040	0.00	0.00	16.14	0.00	0.00	0.00	16.14	50.15	28.24	288.06	87.21	24.67	99.64	76.54
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.15	28.24	279.76	85.76	27.64	102.00	64.35
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	50.55	31.13	271.64	84.37	28.57	105.82	52.88
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	51.14	28.24	262.85	82.92	28.85	110.91	40.18
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	51.62	32.22	255.31	81.48	43.87	108.96	21.00
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	52.53	31.56	247.40	80.24	47.00	111.58	8.58
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	52.62	35.56	252.59	79.84	46.30	114.80	11.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.30	234.26	77.68	60.97	116.29	-20.68
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.30	244.75	79.25	51.42	114.22	-0.15
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	40.20	244.75	79.25	51.42	114.22	-0.15
2050	0.00	0.00	0.00	0.00	10.27	0.00	10.27	52.62	36.44	244.75	79.25	51.42	114.22	-0.15
2051	0.00	0.00	0.00	0.00	10.32	0.00	10.32	52.62	35.57	244.75	79.25	51.42	114.22	-0.15
2052	0.00	0.00	0.00	0.00	10.34	0.00	10.34	52.62	38.48	244.75	79.25	51.42	114.22	-0.15
2053	0.00	0.00	0.00	0.00	0.44	0.00	0.44	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2054	0.00	0.00	0.00	0.00	14.33	0.00	14.33	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2055	0.00	0.00	0.00	0.00	19.00	0.00	19.00	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2056	0.00	0.00	0.00	0.00	20.54	0.00	20.54	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2057	0.00	0.00	0.00	0.00	16.76	0.00	16.76	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2058	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2059	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.62	53.98	244.75	79.25	51.42	114.22	-0.15
2060	0.00	0.00	0.00	0.00	10.47	0.00	10.47	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2061	0.00	0.00	0.00	0.00	5.23	0.00	5.23	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2062	0.00	0.00	0.00	0.00	8.72	0.00	8.72	52.62	38.48	244.75	79.25	51.42	114.22	-0.15
2063	0.00	0.00	0.00	0.00	14.83	0.00	14.83	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2064	0.00	0.00	0.00	0.00	20.93	0.00	20.93	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2065	0.00	0.00	0.00	0.00	25.81	0.00	25.81	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2066	0.00	0.00	0.00	0.00	0.54	0.00	0.54	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2067	0.00	0.00	0.00	0.00	16.82	0.00	16.82	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2068	0.00	0.00	77.91	0.00	8.43	0.00	86.34	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2069	0.00	0.00	106.41	0.00	1.11	0.00	107.52	52.62	53.98	244.75	79.25	51.42	114.22	-0.15
2070	0.00	0.00	16.14	0.00	9.08	0.00	25.22	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2071	0.00	0.00	0.00	0.00	19.30	0.00	19.30	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2072	0.00	0.00	79.48	0.00	30.42	0.00	109.91	52.62	53.98	244.75	79.25	51.42	114.22	-0.15
2073	0.00	0.00	108.56	0.00	2.67	0.00	111.22	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2074	0.00	0.00	96.75	0.00	11.94	0.00	108.69	52.62	52.82	244.75	79.25	51.42	114.22	-0.15
2075	0.00	0.00	109.64	0.00	32.44	0.00	142.08	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2076	0.00	0.00	16.63	0.00	17.02	0.00	33.66	52.62	51.95	244.75	79.25	51.42	114.22	-0.15
2077	0.00	0.00	0.00	0.00	28.73	0.00	28.73	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2078	0.00	0.00	0.00	0.00	59.30	0.00	59.30	52.62	51.08	244.75	79.25	51.42	114.22	-0.15
2079	0.00	0.00	0.00	0.00	65.95	0.00	65.95	52.62	38.48	244.75	79.25	51.42	114.22	-0.15
2080	0.00	0.00	0.00	0.00	131.90	0.00	131.90	52.62	52.82	244.75	79.25	51.42	114.22	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	55.71	244.75	79.25	51.42	114.22	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.32	244.75	79.25	51.42	114.22	-0.15
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	52.82	244.75	79.25	51.42	114.22	-0.15
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	38.48	244.75	79.25	51.42	114.22	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	35.59	244.75	79.25	51.42	114.22	-0.15
Salvage Value	11.98	0.00	6.36	0.00	9.70	0.00	28.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3392.16	2572.26	197.32	0.00	391.93	0.00	6553.68	650.13	364.53	5715.47	1866.34	482.47	1911.78	1454.88

Net Present Value: -6113

SCGT/C26

TABLE 148
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	235.42	102.83	15.46	80.72	36.42
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	254.26	101.10	17.25	85.37	50.54
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	261.04	99.23	17.83	86.91	57.07
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	273.84	97.64	18.34	87.61	70.24
2018	213.28	0.00	0.36	0.00	0.00	0.00	213.64	3.29	0.00	262.67	94.94	20.49	88.17	59.07
2019	256.36	0.00	0.00	0.00	0.00	0.00	256.36	4.57	0.00	256.33	92.97	18.31	87.83	57.22
2020	262.51	0.00	93.03	0.00	0.00	0.00	355.54	6.24	0.00	261.86	92.85	13.13	89.68	66.21
2021	723.60	0.00	119.08	0.00	9.28	0.00	851.97	10.39	0.00	262.64	91.05	12.47	94.97	64.15
2022	1161.65	0.00	14.76	0.00	0.54	0.00	1176.95	16.27	3.98	256.76	88.89	22.16	96.47	49.24
2023	1042.98	0.00	0.00	0.00	1.07	0.00	1044.05	21.49	3.98	252.82	86.52	27.93	101.84	36.52
2024	744.80	0.00	0.00	0.00	2.14	0.00	746.95	25.23	3.98	260.19	85.29	31.24	107.82	35.85
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	27.83	3.98	170.20	85.68	19.09	103.11	-37.67
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	29.54	18.29	209.19	89.63	14.00	87.62	17.94
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	30.16	18.51	294.71	97.20	13.59	81.50	102.42
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	30.36	18.21	318.33	97.45	14.87	86.49	119.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.43	305.69	95.75	15.32	87.62	106.99
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.26	295.92	94.55	15.19	87.73	98.45
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.21	281.68	92.63	16.31	89.48	83.25
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.97	265.07	90.73	17.50	91.16	65.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.54	253.91	88.83	20.57	93.94	50.57
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.54	245.58	87.24	23.83	96.07	38.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.58	239.48	85.96	26.55	97.61	29.36
2036	0.00	0.00	77.14	0.00	0.00	0.00	77.14	30.74	20.30	234.36	84.90	26.90	99.88	22.68
2037	0.00	0.00	105.40	0.00	9.28	0.00	114.68	31.32	17.41	225.62	83.40	27.30	105.07	9.85
2038	0.00	0.00	15.98	0.00	0.00	0.00	15.98	31.40	21.39	218.19	81.93	41.64	103.72	-9.11
2039	0.00	0.00	78.30	0.00	0.00	0.00	78.30	31.79	21.39	209.91	80.70	44.33	112.89	-28.01
2040	0.00	0.00	109.02	0.00	73.08	0.00	182.10	32.69	21.39	203.40	79.37	43.93	120.06	-39.96
2041	0.00	0.00	95.31	0.00	0.00	0.00	95.31	33.17	25.39	193.49	77.74	61.18	118.45	-63.88
2042	0.00	0.00	108.02	0.00	0.00	0.00	108.02	33.71	24.73	184.70	76.40	68.76	121.11	-81.57
2043	0.00	0.00	96.27	0.00	0.00	0.00	96.27	34.19	28.71	179.52	75.10	77.21	126.05	-98.84
2044	0.00	0.00	109.10	0.00	61.48	0.00	170.58	35.04	28.71	172.74	73.80	77.83	135.50	-114.38
2045	0.00	0.00	16.55	0.00	0.00	0.00	16.55	35.12	32.72	165.95	72.46	106.93	128.04	-141.48
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	35.62	159.35	71.29	118.08	130.13	-160.15
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.73	153.01	69.99	119.71	141.31	-178.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.73	159.44	71.25	114.91	133.16	-159.87
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.74	159.44	71.25	114.91	133.16	-159.87
2050	0.00	0.00	71.22	0.00	9.87	0.00	81.09	35.12	32.75	159.44	71.25	114.91	133.16	-159.87
2051	0.00	0.00	97.28	0.00	9.87	0.00	107.14	35.12	34.49	159.44	71.25	114.91	133.16	-159.87
2052	0.00	0.00	14.76	0.00	9.87	0.00	24.62	35.12	34.50	159.44	71.25	114.91	133.16	-159.87
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	159.44	71.25	114.91	133.16	-159.87
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	159.44	71.25	114.91	133.16	-159.87
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	159.44	71.25	114.91	133.16	-159.87
2056	0.00	0.00	0.00	0.00	9.28	0.00	9.28	35.12	35.65	159.44	71.25	114.91	133.16	-159.87
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2066	0.00	0.00	77.14	0.00	0.00	0.00	77.14	35.12	35.65	159.44	71.25	114.91	133.16	-159.87
2067	0.00	0.00	105.36	0.00	0.00	0.00	105.36	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2068	0.00	0.00	15.98	0.00	0.00	0.00	15.98	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2069	0.00	0.00	78.30	0.00	0.00	0.00	78.30	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2070	0.00	0.00	106.94	0.00	0.00	0.00	106.94	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2071	0.00	0.00	95.31	0.00	0.00	0.00	95.31	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2072	0.00	0.00	108.02	0.00	9.82	0.00	117.83	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2073	0.00	0.00	96.27	0.00	1.07	0.00	97.34	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2074	0.00	0.00	109.10	0.00	2.14	0.00	111.24	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2075	0.00	0.00	16.55	0.00	59.63	0.00	76.18	35.12	48.25	159.44	71.25	114.91	133.16	-159.87
2076	0.00	0.00	0.00	0.00	2.14	0.00	2.14	35.12	35.65	159.44	71.25	114.91	133.16	-159.87
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	49.99	159.44	71.25	114.91	133.16	-159.87
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	159.44	71.25	114.91	133.16	-159.87
2079	0.00	0.00	0.00	0.00	46.12	0.00	46.12	35.12	49.99	159.44	71.25	114.91	133.16	-159.87
2080	0.00	0.00	71.22	0.00	0.00	0.00	71.22	35.12	34.50	159.44	71.25	114.91	133.16	-159.87
2081	0.00	0.00	97.28	0.00	0.00	0.00	97.28	35.12	49.99	159.44	71.25	114.91	133.16	-159.87
2082	0.00	0.00	14.76	0.00	0.00	0.00	14.76	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	35.65	159.44	71.25	114.91	133.16	-159.87
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
2090	0.00	0.00	0.00	0.00	18.27	0.00	18.27	35.12	32.76	159.44	71.25	114.91	133.16	-159.87
Salvage Value	4.70	0.00	10.58	0.00	3.05	0.00	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	462.69	0.00	98.87	0.00	4490.74	438.50	293.52	4721.64	1778.09	844.50	2075.46	23.58

Net Present Value: -5199

CCGT/C26

TABLE 149
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	235.42	102.83	15.46	80.72	36.42
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	254.26	101.10	17.25	85.37	50.54
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	261.04	99.23	17.83	86.91	57.07
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	273.84	97.64	18.34	87.61	70.24
2018	213.28	0.00	0.36	0.00	0.00	0.00	213.64	3.29	0.00	262.67	94.94	20.49	88.17	59.07
2019	256.36	0.00	146.09	0.00	0.00	0.00	402.45	5.30	0.00	256.33	92.97	18.31	87.83	57.22
2020	262.51	0.00	232.87	0.00	0.00	0.00	495.38	7.67	0.00	261.86	92.85	13.13	89.68	66.21
2021	723.60	0.00	116.34	0.00	9.28	0.00	849.22	11.81	0.00	266.59	91.75	10.97	93.98	69.90
2022	1161.65	0.00	6.95	0.00	0.54	0.00	1169.14	17.65	6.91	266.59	89.43	31.66	87.31	58.18
2023	1042.98	0.00	0.00	0.00	1.07	0.00	1044.05	22.87	6.91	267.63	87.36	38.03	91.66	50.57
2024	744.80	0.00	0.00	0.00	2.14	0.00	746.95	26.61	6.91	282.72	86.26	46.08	96.02	54.35
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	29.21	6.91	191.31	85.80	36.85	93.47	-24.81
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	30.91	21.22	222.90	89.52	28.20	83.64	21.54
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	31.54	21.44	303.37	97.16	20.38	79.75	106.08
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	31.74	21.14	328.21	97.53	21.79	84.05	124.84
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.36	316.89	95.86	23.06	85.21	112.75
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.19	300.50	93.77	24.75	86.99	95.00
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.14	301.41	93.68	22.09	85.71	99.93
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.90	279.09	90.92	25.83	88.55	73.80
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.47	269.99	89.20	28.85	90.72	61.23
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.47	259.52	87.23	32.81	93.74	45.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.51	252.58	85.78	35.35	95.71	35.74
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	23.23	243.63	84.17	40.75	97.58	21.13
2037	0.00	0.00	77.53	0.00	0.00	0.00	77.53	32.12	20.34	240.16	83.43	42.12	98.07	16.54
2038	0.00	0.00	105.93	0.00	9.28	0.00	115.21	32.70	20.34	233.85	82.25	42.85	101.92	6.82
2039	0.00	0.00	16.06	0.00	0.00	0.00	16.06	32.78	24.32	224.94	80.52	55.70	109.23	-20.52
2040	0.00	0.00	78.69	0.00	0.00	0.00	78.69	33.17	24.32	217.35	79.11	61.96	111.94	-35.67
2041	0.00	0.00	109.56	0.00	73.08	0.00	182.63	34.08	24.32	208.36	77.81	64.28	115.84	-49.56
2042	0.00	0.00	95.79	0.00	0.00	0.00	95.79	34.55	27.66	202.86	76.48	71.83	120.55	-66.00
2043	0.00	0.00	108.56	0.00	0.00	0.00	108.56	35.10	27.66	193.57	75.10	85.21	118.89	-85.64
2044	0.00	0.00	16.47	0.00	0.00	0.00	16.47	35.18	31.64	187.17	73.79	97.32	121.04	-104.99
2045	0.00	0.00	80.68	0.00	0.00	0.00	80.68	35.58	31.64	180.41	72.49	101.05	128.25	-121.38
2046	0.00	0.00	110.19	0.00	61.48	0.00	171.67	36.44	34.55	177.63	71.59	100.40	135.89	-130.25
2047	0.00	0.00	16.72	0.00	0.00	0.00	16.72	36.52	35.65	164.89	70.02	126.26	129.24	-160.64
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.66	174.31	71.37	109.24	131.13	-137.42
2049	0.00	0.00	146.09	0.00	9.87	0.00	155.96	36.52	35.66	174.31	71.37	109.24	131.13	-137.42
2050	0.00	0.00	211.06	0.00	9.87	0.00	220.92	36.52	35.66	174.31	71.37	109.24	131.13	-137.42
2051	0.00	0.00	94.53	0.00	9.87	0.00	104.39	36.52	37.41	174.31	71.37	109.24	131.13	-137.42
2052	0.00	0.00	6.95	0.00	9.87	0.00	16.82	36.52	37.41	174.31	71.37	109.24	131.13	-137.42
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.42	174.31	71.37	109.24	131.13	-137.42
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	174.31	71.37	109.24	131.13	-137.42
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	174.31	71.37	109.24	131.13	-137.42
2056	0.00	0.00	0.00	0.00	9.28	0.00	9.28	36.52	38.58	174.31	71.37	109.24	131.13	-137.42
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	38.58	174.31	71.37	109.24	131.13	-137.42
2067	0.00	0.00	77.53	0.00	0.00	0.00	77.53	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2068	0.00	0.00	105.88	0.00	0.00	0.00	105.88	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2069	0.00	0.00	16.06	0.00	0.00	0.00	16.06	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2070	0.00	0.00	78.69	0.00	0.00	0.00	78.69	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2071	0.00	0.00	107.48	0.00	0.00	0.00	107.48	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2072	0.00	0.00	95.79	0.00	0.54	0.00	96.32	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2073	0.00	0.00	108.56	0.00	10.35	0.00	118.91	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2074	0.00	0.00	16.47	0.00	2.14	0.00	18.61	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2075	0.00	0.00	80.68	0.00	4.82	0.00	85.50	36.52	51.18	174.31	71.37	109.24	131.13	-137.42
2076	0.00	0.00	110.19	0.00	56.95	0.00	167.14	36.52	38.58	174.31	71.37	109.24	131.13	-137.42
2077	0.00	0.00	16.72	0.00	0.00	0.00	16.72	36.52	52.92	174.31	71.37	109.24	131.13	-137.42
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	174.31	71.37	109.24	131.13	-137.42
2079	0.00	0.00	146.09	0.00	0.00	0.00	146.09	36.52	52.92	174.31	71.37	109.24	131.13	-137.42
2080	0.00	0.00	211.06	0.00	0.00	0.00	211.06	36.52	37.43	174.31	71.37	109.24	131.13	-137.42
2081	0.00	0.00	94.53	0.00	46.11	0.00	140.64	36.52	52.92	174.31	71.37	109.24	131.13	-137.42
2082	0.00	0.00	6.95	0.00	0.00	0.00	6.95	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	38.58	174.31	71.37	109.24	131.13	-137.42
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	174.31	71.37	109.24	131.13	-137.42
Salvage Value	4.70	0.00	16.67	0.00	2.74	0.00	24.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	712.52	0.00	95.97	0.00	4737.68	458.33	328.31	4917.89	1780.68	917.37	2017.04	202.79

Net Present Value: -5322

Wind/C26

TABLE 150
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	235.42	102.83	15.46	80.72	36.42
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	254.26	101.10	17.25	85.37	50.54
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	261.04	99.23	17.83	86.91	57.07
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	273.84	97.64	18.34	87.61	70.24
2018	213.28	0.00	0.00	0.00	0.00	0.00	213.28	3.29	0.00	262.67	94.94	20.49	88.17	59.07
2019	256.36	0.00	0.00	0.00	0.00	0.00	256.36	4.57	0.00	256.33	92.97	18.31	87.83	57.22
2020	262.51	0.00	0.00	9.58	13.53	0.00	285.62	6.00	0.00	259.67	92.45	14.09	89.99	63.14
2021	723.60	0.00	0.00	292.47	22.55	0.00	1038.63	11.19	0.00	259.93	90.65	13.72	94.90	60.67
2022	1161.65	0.00	0.00	297.95	27.60	0.00	1487.20	18.63	6.21	263.01	89.00	13.75	95.22	65.03
2023	1042.98	0.00	0.00	288.37	14.60	0.00	1345.96	25.36	12.42	266.63	86.54	15.77	98.60	65.71
2024	744.80	0.00	0.00	5.47	6.65	0.00	756.93	29.14	18.63	279.91	84.58	16.38	105.10	73.85
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	31.75	18.63	188.60	84.40	10.75	120.96	-27.51
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	33.45	32.93	242.22	88.44	12.78	87.10	53.88
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	34.07	33.15	328.38	95.99	11.53	81.31	139.55
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	34.27	32.86	348.38	96.05	12.65	85.63	154.05
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	33.07	337.72	94.39	12.86	87.53	142.94
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.90	329.65	93.32	12.58	87.51	136.24
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.85	320.66	91.91	12.90	88.64	127.21
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	34.27	32.61	308.08	90.48	12.93	89.60	115.08
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.18	293.11	88.95	12.82	90.75	100.58
2034	0.00	0.00	98.18	0.00	0.00	0.00	98.18	34.65	32.18	278.46	87.50	12.84	91.56	86.56
2035	0.00	0.00	126.12	0.00	9.28	0.00	135.40	35.22	32.22	272.47	86.48	11.72	92.83	81.43
2036	0.00	0.00	92.96	0.00	0.00	0.00	92.96	35.69	38.93	260.94	84.44	21.11	93.94	61.45
2037	0.00	0.00	105.40	0.00	9.28	0.00	114.68	36.26	36.03	251.41	82.99	23.83	96.12	48.46
2038	0.00	0.00	15.98	0.00	0.00	0.00	15.98	36.34	40.02	245.76	81.76	31.05	97.99	34.96
2039	0.00	0.00	78.30	0.00	0.00	0.00	78.30	36.73	40.02	238.61	80.58	30.25	108.58	19.20
2040	0.00	0.00	109.02	9.58	73.08	0.00	191.68	37.68	40.02	227.22	78.93	38.14	109.92	0.23
2041	0.00	0.00	95.31	292.47	0.00	0.00	387.79	39.62	44.02	220.25	77.54	47.05	112.41	-16.75
2042	0.00	0.00	108.02	297.95	0.00	0.00	405.96	41.65	43.36	212.30	76.27	49.16	117.18	-30.31
2043	0.00	0.00	96.27	288.37	0.00	0.00	384.64	43.57	47.34	207.15	74.99	55.01	123.09	-45.93
2044	0.00	0.00	109.10	5.47	61.48	0.00	176.05	44.45	47.34	196.08	73.64	68.16	120.93	-66.65
2045	0.00	0.00	16.55	0.00	0.00	0.00	16.55	44.53	51.35	189.15	72.37	79.65	123.27	-86.14
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	54.25	181.87	71.10	81.06	131.52	-101.81
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.36	175.07	69.87	81.85	141.51	-118.15
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.36	182.03	71.11	80.85	132.10	-102.03
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.37	182.03	71.11	80.85	132.10	-102.03
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.38	182.03	71.11	80.85	132.10	-102.03
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	53.12	182.03	71.11	80.85	132.10	-102.03
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	53.13	182.03	71.11	80.85	132.10	-102.03
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	182.03	71.11	80.85	132.10	-102.03
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	182.03	71.11	80.85	132.10	-102.03
2055	0.00	0.00	0.00	0.00	3.38	0.00	3.38	44.53	53.13	182.03	71.11	80.85	132.10	-102.03
2056	0.00	0.00	0.00	0.00	5.64	0.00	5.64	44.53	54.28	182.03	71.11	80.85	132.10	-102.03
2057	0.00	0.00	0.00	0.00	6.77	0.00	6.77	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2058	0.00	0.00	0.00	0.00	3.38	0.00	3.38	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2059	0.00	0.00	0.00	0.00	1.13	0.00	1.13	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2060	0.00	0.00	0.00	9.58	0.00	0.00	9.58	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2061	0.00	0.00	0.00	292.47	0.00	0.00	292.47	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2062	0.00	0.00	0.00	297.95	0.00	0.00	297.95	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2063	0.00	0.00	0.00	288.37	0.00	0.00	288.37	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2064	0.00	0.00	76.37	5.47	0.00	0.00	81.85	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2065	0.00	0.00	104.31	0.00	0.00	0.00	104.31	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2066	0.00	0.00	92.96	0.00	0.00	0.00	92.96	44.53	54.28	182.03	71.11	80.85	132.10	-102.03
2067	0.00	0.00	105.36	0.00	0.00	0.00	105.36	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2068	0.00	0.00	15.98	0.00	0.00	0.00	15.98	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2069	0.00	0.00	78.30	0.00	0.00	0.00	78.30	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2070	0.00	0.00	106.94	0.00	19.43	0.00	126.37	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2071	0.00	0.00	95.31	0.00	16.92	0.00	112.23	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2072	0.00	0.00	108.02	0.00	30.11	0.00	138.13	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2073	0.00	0.00	96.27	0.00	11.22	0.00	107.49	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2074	0.00	0.00	109.10	0.00	5.53	0.00	114.63	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2075	0.00	0.00	16.55	0.00	59.63	0.00	76.18	44.53	66.88	182.03	71.11	80.85	132.10	-102.03
2076	0.00	0.00	0.00	0.00	2.14	0.00	2.14	44.53	54.28	182.03	71.11	80.85	132.10	-102.03
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	68.62	182.03	71.11	80.85	132.10	-102.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	182.03	71.11	80.85	132.10	-102.03
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	44.53	68.62	182.03	71.11	80.85	132.10	-102.03
2080	0.00	0.00	0.00	9.58	0.00	0.00	9.58	44.53	53.13	182.03	71.11	80.85	132.10	-102.03
2081	0.00	0.00	0.00	292.47	0.00	0.00	292.47	44.53	68.62	182.03	71.11	80.85	132.10	-102.03
2082	0.00	0.00	0.00	297.95	0.00	0.00	297.95	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2083	0.00	0.00	0.00	288.37	0.00	0.00	288.37	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2084	0.00	0.00	0.00	5.47	9.87	0.00	15.34	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	54.28	182.03	71.11	80.85	132.10	-102.03
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
2090	0.00	0.00	0.00	0.00	18.27	0.00	18.27	44.53	51.39	182.03	71.11	80.85	132.10	-102.03
Salvage Value	4.70	0.00	8.17	13.34	4.15	0.00	30.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	367.50	931.16	155.69	0.00	5383.54	519.43	505.89	5067.79	1771.95	631.70	2053.16	610.98

Net Present Value -5798

K19/C25/750MW (WPS Sale &Inv)

TABLE 151
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	4.85	313.82	1.57	0.00	242.21	102.83	15.48	80.87	43.02
2015	88.09	546.76	0.00	0.00	21.74	8.74	665.32	4.90	0.00	260.10	101.13	17.25	85.39	56.32
2016	199.23	726.88	0.00	0.00	30.88	22.51	979.50	9.79	0.00	267.99	99.25	17.82	86.97	63.95
2017	235.75	881.35	0.00	0.00	46.60	32.83	1196.53	15.78	0.00	279.67	97.32	19.03	88.23	75.09
2018	283.83	628.16	0.00	0.00	52.22	132.68	1096.88	21.26	0.00	272.60	95.25	19.93	88.09	69.34
2019	291.12	440.82	0.00	0.00	66.10	110.86	908.90	25.80	13.01	288.25	95.16	18.80	86.88	87.42
2020	803.86	182.49	0.00	0.00	4.25	198.41	1189.00	31.75	44.86	449.38	102.30	13.40	94.38	239.31
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	38.79	42.99	525.13	102.85	14.78	98.96	308.54
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	44.74	41.65	526.20	101.62	14.84	99.99	309.75
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	49.12	39.80	516.71	99.30	14.70	102.60	300.11
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	52.41	38.24	516.11	97.04	16.33	107.99	294.75
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	54.83	50.89	459.61	101.54	14.61	91.00	252.47
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	56.14	49.35	600.80	109.54	14.54	90.54	386.17
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	56.36	47.92	630.74	109.76	14.26	95.62	411.10
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	46.91	631.44	108.10	14.77	97.28	411.29
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	48.20	620.79	106.19	14.77	99.06	400.78
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	43.02	614.61	104.84	14.44	100.06	395.26
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	41.70	606.74	103.20	14.79	101.68	387.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	40.22	595.17	101.50	14.81	103.31	375.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	39.21	581.21	99.71	14.78	105.06	361.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	38.27	567.19	97.99	14.84	106.63	347.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	39.54	515.63	96.32	14.67	104.60	300.04
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	36.10	437.00	94.66	14.92	97.63	229.78
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	56.36	35.57	411.37	93.04	15.02	98.34	204.97
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	35.06	395.40	91.40	14.96	100.88	188.14
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	56.93	37.47	380.48	89.79	14.92	109.91	165.86
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	57.75	34.09	359.66	88.53	14.17	114.48	142.48
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	57.87	36.95	341.61	86.53	24.36	114.53	116.18
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	58.44	36.51	331.48	85.01	27.29	117.13	102.06
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	59.29	36.07	323.61	83.65	28.88	120.56	90.52
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	59.99	41.37	320.59	82.43	33.29	124.83	80.03
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	61.26	43.86	303.22	80.60	42.00	124.59	56.02
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	61.38	44.56	295.19	79.17	51.41	126.95	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	43.31	286.90	77.89	53.82	131.36	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	42.07	295.10	79.22	49.08	127.63	39.17
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	61.38	44.61	295.10	79.22	49.08	127.63	39.17
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	61.38	43.11	295.10	79.22	49.08	127.63	39.17
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	61.38	42.78	295.10	79.22	49.08	127.63	39.17
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	61.38	42.46	295.10	79.22	49.08	127.63	39.17
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	61.38	42.15	295.10	79.22	49.08	127.63	39.17
2054	0.00	0.00	0.00	0.00	23.02	24.33	47.35	61.38	41.84	295.10	79.22	49.08	127.63	39.17
2055	0.00	0.00	0.00	0.00	1.05	25.23	26.28	61.38	42.71	295.10	79.22	49.08	127.63	39.17
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	61.38	55.02	295.10	79.22	49.08	127.63	39.17
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	61.38	39.25	295.10	79.22	49.08	127.63	39.17
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	61.38	54.48	295.10	79.22	49.08	127.63	39.17
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	61.38	41.62	295.10	79.22	49.08	127.63	39.17
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	61.38	51.26	295.10	79.22	49.08	127.63	39.17
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	66.75	295.10	79.22	49.08	127.63	39.17
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	61.38	66.75	295.10	79.22	49.08	127.63	39.17
2065	0.00	0.00	0.00	0.00	11.34	5.49	16.83	61.38	38.66	295.10	79.22	49.08	127.63	39.17
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	61.38	66.75	295.10	79.22	49.08	127.63	39.17
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	61.38	66.75	295.10	79.22	49.08	127.63	39.17
2069	0.00	0.00	112.14	0.00	43.08	74.17	229.39	61.38	38.66	295.10	79.22	49.08	127.63	39.17
2070	0.00	0.00	153.46	0.00	3.20	76.92	233.57	61.38	53.00	295.10	79.22	49.08	127.63	39.17
2071	0.00	0.00	23.33	0.00	39.09	0.00	62.41	61.38	37.50	295.10	79.22	49.08	127.63	39.17
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	61.38	53.00	295.10	79.22	49.08	127.63	39.17
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	61.38	36.63	295.10	79.22	49.08	127.63	39.17
2074	0.00	0.00	139.93	0.00	61.47	0.00	201.40	61.38	51.26	295.10	79.22	49.08	127.63	39.17
2075	0.00	0.00	158.90	0.00	91.86	0.00	250.76	61.38	38.66	295.10	79.22	49.08	127.63	39.17
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	61.38	53.00	295.10	79.22	49.08	127.63	39.17
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	37.50	295.10	79.22	49.08	127.63	39.17
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	61.38	53.00	295.10	79.22	49.08	127.63	39.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	40.40	295.10	79.22	49.08	127.63	39.17
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	61.38	53.00	295.10	79.22	49.08	127.63	39.17
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	61.38	38.66	295.10	79.22	49.08	127.63	39.17
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	61.38	35.76	295.10	79.22	49.08	127.63	39.17
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	61.38	38.66	295.10	79.22	49.08	127.63	39.17
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	61.38	38.66	295.10	79.22	49.08	127.63	39.17
Salvage Value	2.58	0.00	9.43	0.00	12.68	6.30	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	272.89	0.00	551.46	432.79	8953.82	888.95	651.85	8218.72	1937.33	468.68	2089.97	3722.73

Net Present Value -6772

K19/C25/750MW

TABLE 152
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	6.66	315.63	1.58	0.00	235.04	102.84	15.48	80.73	35.99
2015	88.09	546.76	0.00	0.00	21.74	10.91	667.49	4.92	0.00	253.15	101.12	17.24	85.38	49.41
2016	199.23	726.88	0.00	0.00	30.88	23.45	980.43	9.82	0.00	259.84	99.24	17.80	86.94	55.86
2017	235.75	881.35	0.00	0.00	46.60	32.83	1196.53	15.80	0.00	270.25	97.31	19.03	88.21	65.70
2018	283.83	628.16	0.00	0.00	52.22	183.95	1148.15	21.54	0.00	261.92	95.24	19.90	88.12	58.66
2019	291.12	440.82	0.00	0.00	66.10	129.40	927.44	26.18	13.01	276.27	95.15	18.76	86.90	75.45
2020	803.86	182.49	0.00	0.00	4.25	342.80	1333.39	32.85	47.98	427.19	102.30	13.38	94.29	217.23
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	39.88	46.21	512.43	102.85	14.88	99.04	295.66
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	45.83	44.90	516.02	101.61	14.84	100.01	299.56
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	50.22	42.92	507.21	99.29	14.70	102.63	290.59
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	53.50	41.22	507.90	97.02	16.38	108.04	286.46
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	55.92	53.76	450.55	101.54	14.63	90.99	243.39
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	57.24	52.09	554.42	109.53	14.59	88.69	341.61
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	57.46	50.55	550.50	109.77	14.17	91.03	335.52
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	49.42	548.21	108.10	14.75	92.34	333.03
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	50.61	539.20	106.18	14.76	94.21	324.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	45.33	534.45	104.82	14.48	95.38	319.78
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	43.90	528.29	103.18	14.86	97.08	313.16
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	42.32	518.49	101.49	14.87	98.98	303.15
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	41.21	506.40	99.71	14.76	100.93	291.00
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	40.19	494.28	98.00	14.81	102.77	278.70
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	41.37	427.29	96.35	14.84	95.98	220.12
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	37.85	402.80	94.67	14.98	96.41	196.73
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	57.46	37.25	388.49	93.02	14.97	98.37	182.12
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	36.67	373.34	91.40	14.94	100.87	166.12
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	58.02	39.01	359.20	89.79	14.95	109.86	144.59
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	58.85	35.57	355.41	88.53	14.19	114.45	138.25
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	58.97	38.37	341.61	86.53	24.36	114.52	116.19
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	59.54	37.86	331.48	85.01	27.29	117.12	102.07
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	60.38	37.36	323.62	83.65	28.88	120.56	90.53
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	61.08	42.61	320.60	82.43	33.29	124.82	80.05
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	62.35	45.04	303.20	80.60	42.00	124.56	56.03
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	62.47	45.69	295.13	79.17	51.41	126.90	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	44.39	286.86	77.89	53.82	131.32	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	43.10	295.07	79.22	49.08	127.59	39.17
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	62.47	45.59	295.07	79.22	49.08	127.59	39.17
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	62.47	44.04	295.07	79.22	49.08	127.59	39.17
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	62.47	43.67	295.07	79.22	49.08	127.59	39.17
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	62.47	43.30	295.07	79.22	49.08	127.59	39.17
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	62.47	42.95	295.07	79.22	49.08	127.59	39.17
2054	0.00	0.00	0.00	0.00	23.02	24.33	47.35	62.47	42.61	295.07	79.22	49.08	127.59	39.17
2055	0.00	0.00	0.00	0.00	1.05	25.23	26.28	62.47	43.43	295.07	79.22	49.08	127.59	39.17
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	62.47	55.71	295.07	79.22	49.08	127.59	39.17
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	62.47	39.90	295.07	79.22	49.08	127.59	39.17
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	62.47	55.10	295.07	79.22	49.08	127.59	39.17
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	62.47	42.21	295.07	79.22	49.08	127.59	39.17
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	62.47	51.26	295.07	79.22	49.08	127.59	39.17
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	66.75	295.07	79.22	49.08	127.59	39.17
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	62.47	66.75	295.07	79.22	49.08	127.59	39.17
2065	0.00	0.00	0.00	0.00	11.34	5.49	16.83	62.47	38.66	295.07	79.22	49.08	127.59	39.17
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	62.47	66.75	295.07	79.22	49.08	127.59	39.17
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	62.47	66.75	295.07	79.22	49.08	127.59	39.17
2069	0.00	0.00	112.14	0.00	43.08	74.17	229.39	62.47	38.66	295.07	79.22	49.08	127.59	39.17
2070	0.00	0.00	153.46	0.00	3.20	76.92	233.57	62.47	53.00	295.07	79.22	49.08	127.59	39.17
2071	0.00	0.00	23.33	0.00	39.09	0.00	62.41	62.47	37.50	295.07	79.22	49.08	127.59	39.17
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	62.47	53.00	295.07	79.22	49.08	127.59	39.17
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	62.47	36.63	295.07	79.22	49.08	127.59	39.17
2074	0.00	0.00	139.93	0.00	61.47	0.00	201.40	62.47	51.26	295.07	79.22	49.08	127.59	39.17
2075	0.00	0.00	158.90	0.00	91.86	0.00	250.76	62.47	38.66	295.07	79.22	49.08	127.59	39.17
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	62.47	53.00	295.07	79.22	49.08	127.59	39.17
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	37.50	295.07	79.22	49.08	127.59	39.17
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	62.47	53.00	295.07	79.22	49.08	127.59	39.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	40.40	295.07	79.22	49.08	127.59	39.17
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	62.47	53.00	295.07	79.22	49.08	127.59	39.17
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	62.47	38.66	295.07	79.22	49.08	127.59	39.17
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	62.47	35.76	295.07	79.22	49.08	127.59	39.17
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	62.47	38.66	295.07	79.22	49.08	127.59	39.17
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	62.47	38.66	295.07	79.22	49.08	127.59	39.17
Salvage Value	2.58	0.00	9.43	0.00	12.68	6.30	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	272.89	0.00	551.46	601.54	9122.57	905.99	680.39	7750.65	1937.26	468.79	2068.98	3275.62

Net Present Value -7433

K19/Gas25/750MW (WPS Sale & INV)

TABLE 153
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	4.85	281.90	1.41	0.00	242.21	102.83	15.48	80.87	43.02
2015	0.00	546.76	0.00	0.00	21.74	8.74	577.24	4.30	0.00	260.11	101.13	17.25	85.39	56.34
2016	0.00	726.88	0.00	0.00	30.88	22.51	780.27	8.20	0.00	268.02	99.25	17.81	86.97	63.99
2017	0.00	881.35	0.00	0.00	46.60	32.83	960.79	13.00	0.00	279.87	97.31	19.02	88.21	75.33
2018	0.00	628.16	0.00	0.00	52.22	132.68	813.06	17.07	0.00	272.90	95.25	19.89	88.06	69.71
2019	0.00	440.82	0.00	0.00	61.87	110.86	613.54	20.13	13.01	288.76	95.16	18.79	86.87	87.95
2020	0.00	182.49	0.00	0.00	0.01	198.41	380.91	22.04	44.86	450.11	102.30	13.39	94.34	240.09
2021	0.00	63.43	0.36	0.00	0.00	0.00	63.79	22.36	42.99	526.41	102.85	14.77	98.89	309.90
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	22.36	41.65	527.62	101.61	14.81	99.90	311.30
2023	0.00	0.00	122.10	0.00	0.00	0.00	122.10	22.86	39.80	516.96	98.83	15.69	103.11	299.33
2024	0.00	0.00	260.05	0.00	12.08	0.00	272.13	24.11	38.24	518.44	96.72	17.26	108.32	296.14
2025	0.00	0.00	161.15	0.00	95.12	0.00	256.27	25.38	40.58	407.70	96.38	16.66	99.91	194.76
2026	0.00	0.00	123.42	0.00	0.00	0.00	123.42	26.00	42.81	436.08	95.06	19.74	102.82	218.47
2027	0.00	0.00	140.15	0.00	0.00	0.00	140.15	26.70	41.52	435.35	93.10	19.37	107.25	215.63
2028	0.00	0.00	21.30	0.00	0.00	0.00	21.30	26.80	44.28	427.72	90.77	28.45	109.90	198.60
2029	0.00	0.00	104.58	0.00	0.00	0.00	104.58	27.33	45.74	418.45	89.00	31.85	112.95	184.64
2030	0.00	0.00	143.12	0.00	80.02	0.00	223.14	28.44	40.62	416.77	87.91	34.97	115.44	178.44
2031	0.00	0.00	127.80	0.00	0.00	0.00	127.80	29.08	43.47	420.45	87.52	38.02	116.35	178.57
2032	0.00	0.00	145.13	0.00	0.00	0.00	145.13	29.81	42.36	407.34	85.18	45.35	120.92	155.89
2033	0.00	0.00	22.06	0.00	0.00	0.00	22.06	29.92	45.27	401.28	83.65	54.36	123.98	139.30
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	44.22	397.76	82.88	56.79	125.92	132.17
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	42.77	327.85	80.76	54.97	121.35	70.76
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	42.23	234.95	79.31	55.99	109.50	-9.85
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	41.71	210.09	77.89	61.43	110.05	-39.29
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	41.21	206.91	77.14	60.04	115.48	-45.75
2039	0.00	0.00	234.92	0.00	0.00	0.00	234.92	31.09	43.61	187.52	75.22	71.84	122.10	-81.64
2040	0.00	0.00	340.07	0.00	0.00	0.00	340.07	32.79	40.24	168.22	73.88	79.52	125.06	-110.25
2041	0.00	0.00	152.61	0.00	12.08	0.00	164.69	33.62	39.77	170.65	74.09	77.86	124.79	-106.10
2042	0.00	0.00	11.24	0.00	0.00	0.00	11.24	33.67	46.24	187.38	71.91	111.85	126.46	-122.85
2043	0.00	0.00	115.31	0.00	0.00	0.00	115.31	34.25	45.80	173.87	70.18	122.40	130.42	-149.13
2044	0.00	0.00	157.80	0.00	80.02	0.00	237.82	35.44	47.12	158.19	68.58	130.87	134.36	-175.63
2045	0.00	0.00	75.42	0.00	0.00	0.00	75.42	35.82	50.71	151.11	67.25	146.06	137.45	-199.64
2046	0.00	0.00	70.39	0.00	0.00	0.00	70.39	36.17	50.31	142.96	66.04	158.46	140.50	-222.04
2047	0.00	0.00	10.70	0.00	0.00	0.00	10.70	36.22	50.50	139.63	65.22	163.56	146.17	-235.33
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	49.26	144.57	66.17	156.03	141.37	-219.00
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	36.22	51.80	144.57	66.17	156.03	141.37	-219.00
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	36.22	48.56	144.57	66.17	156.03	141.37	-219.00
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	36.22	48.23	144.57	66.17	156.03	141.37	-219.00
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	36.22	47.91	144.57	66.17	156.03	141.37	-219.00
2053	0.00	0.00	100.29	0.00	26.94	24.33	151.56	36.22	47.60	144.57	66.17	156.03	141.37	-219.00
2054	0.00	0.00	238.25	0.00	21.98	24.33	284.55	36.22	47.29	144.57	66.17	156.03	141.37	-219.00
2055	0.00	0.00	159.07	0.00	0.00	25.23	184.31	36.22	47.00	144.57	66.17	156.03	141.37	-219.00
2056	0.00	0.00	123.42	0.00	0.00	0.00	123.42	36.22	62.21	144.57	66.17	156.03	141.37	-219.00
2057	0.00	0.00	140.15	0.00	0.00	0.00	140.15	36.22	46.44	144.57	66.17	156.03	141.37	-219.00
2058	0.00	0.00	21.30	0.00	0.00	0.00	21.30	36.22	61.67	144.57	66.17	156.03	141.37	-219.00
2059	0.00	0.00	104.58	0.00	12.08	0.00	116.66	36.22	48.81	144.57	66.17	156.03	141.37	-219.00
2060	0.00	0.00	143.12	0.00	71.34	0.00	214.46	36.22	58.45	144.57	66.17	156.03	141.37	-219.00
2061	0.00	0.00	127.80	0.00	0.00	0.00	127.80	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2062	0.00	0.00	145.13	0.00	0.00	0.00	145.13	36.22	58.45	144.57	66.17	156.03	141.37	-219.00
2063	0.00	0.00	22.06	0.00	0.00	0.00	22.06	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	36.22	58.45	144.57	66.17	156.03	141.37	-219.00
2065	0.00	0.00	0.00	0.00	71.35	5.49	76.85	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	36.22	58.45	144.57	66.17	156.03	141.37	-219.00
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	36.22	58.45	144.57	66.17	156.03	141.37	-219.00
2069	0.00	0.00	234.92	0.00	39.89	74.17	348.98	36.22	45.85	144.57	66.17	156.03	141.37	-219.00
2070	0.00	0.00	340.07	0.00	0.01	76.92	416.99	36.22	44.69	144.57	66.17	156.03	141.37	-219.00
2071	0.00	0.00	152.61	0.00	0.00	0.00	152.61	36.22	44.69	144.57	66.17	156.03	141.37	-219.00
2072	0.00	0.00	11.24	0.00	0.00	0.00	11.24	36.22	44.69	144.57	66.17	156.03	141.37	-219.00
2073	0.00	0.00	115.31	0.00	0.00	0.00	115.31	36.22	43.82	144.57	66.17	156.03	141.37	-219.00
2074	0.00	0.00	157.80	0.00	0.00	0.00	157.80	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2075	0.00	0.00	75.42	0.00	23.78	0.00	99.20	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2076	0.00	0.00	70.39	0.00	12.08	0.00	82.47	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2077	0.00	0.00	10.70	0.00	0.00	0.00	10.70	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	36.22	45.85	144.57	66.17	156.03	141.37	-219.00
2080	0.00	0.00	0.00	0.00	20.01	0.00	20.01	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2083	0.00	0.00	100.29	0.00	0.00	0.00	100.29	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2084	0.00	0.00	238.25	0.00	10.82	0.90	249.97	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2085	0.00	0.00	159.07	0.00	10.40	1.80	171.28	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2086	0.00	0.00	123.42	0.00	29.51	5.41	158.34	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2087	0.00	0.00	140.15	0.00	34.78	8.11	183.05	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2088	0.00	0.00	21.30	0.00	26.94	24.33	72.57	36.22	42.95	144.57	66.17	156.03	141.37	-219.00
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	36.22	45.85	144.57	66.17	156.03	141.37	-219.00
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	36.22	45.85	144.57	66.17	156.03	141.37	-219.00
Salvage Value	0.00	0.00	29.53	0.00	7.12	6.30	42.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1247.35	0.00	368.56	432.79	5281.76	498.95	675.38	6287.53	1772.86	1159.47	2246.50	1108.70

Net Present Value -5347

K19/C31/750MW

TABLE 154
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	252.57	0.00	0.00	24.48	6.66	314.97	1.57	0.00	235.04	102.84	15.48	80.73	35.99
2015	39.48	546.76	0.00	0.00	21.74	10.91	618.88	4.67	0.00	253.15	101.12	17.24	85.38	49.41
2016	10.75	726.88	0.00	0.00	30.88	23.45	791.95	8.63	0.00	259.84	99.24	17.80	86.94	55.86
2017	10.83	881.35	0.00	0.00	46.60	32.83	971.62	13.49	0.00	270.49	97.30	19.03	88.21	65.95
2018	12.89	628.16	0.00	0.00	52.22	183.95	877.22	17.87	0.00	262.21	95.22	19.89	88.09	59.00
2019	13.00	440.82	0.00	0.00	61.87	129.40	645.08	21.10	13.01	276.72	95.14	18.81	86.89	75.89
2020	13.10	182.49	0.00	0.00	0.01	342.80	538.39	23.79	47.98	427.97	102.29	13.41	94.28	218.00
2021	16.59	63.43	0.00	0.00	0.00	0.00	80.02	24.19	46.21	513.52	102.84	14.85	98.93	296.90
2022	184.48	0.00	0.00	0.00	0.00	0.00	184.48	25.11	44.90	517.57	101.63	14.82	99.91	301.21
2023	279.81	0.00	0.00	0.00	0.00	0.00	279.81	26.51	42.92	507.05	98.72	15.88	103.40	289.05
2024	307.13	0.00	0.00	0.00	0.00	0.00	307.13	28.05	41.22	508.98	96.54	17.66	108.96	285.81
2025	313.64	0.00	0.00	0.00	4.24	0.00	317.88	29.64	39.45	396.48	96.40	12.81	105.63	181.63
2026	851.45	0.00	0.00	0.00	4.24	0.00	855.69	33.92	37.57	381.05	94.51	13.22	114.38	158.93
2027	1355.87	0.00	0.00	0.00	51.65	0.00	1407.52	40.95	36.17	340.15	92.59	12.42	112.80	122.35
2028	1219.64	0.00	0.00	0.00	27.03	0.00	1246.66	47.19	34.83	327.36	90.99	12.90	122.14	101.33
2029	872.58	0.00	0.00	0.00	45.58	0.00	918.16	51.78	36.18	318.05	89.38	13.28	133.01	82.38
2030	605.44	0.00	0.00	0.00	79.26	0.00	684.70	55.20	30.95	315.57	88.06	13.59	141.65	72.27
2031	398.41	0.00	0.00	0.00	104.90	0.00	503.31	57.72	44.00	362.08	92.07	15.75	93.46	160.80
2032	147.01	0.00	0.00	0.00	122.87	0.00	269.88	59.07	43.00	473.50	99.09	15.49	93.01	265.90
2033	46.48	0.00	0.00	0.00	0.00	0.00	46.48	59.30	41.68	508.23	99.80	15.14	100.93	292.36
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	40.76	494.32	98.01	14.80	102.75	278.76
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	39.05	426.72	96.35	14.76	95.92	219.69
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	38.38	402.71	94.67	15.07	96.35	196.62
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	59.30	37.61	388.66	93.03	15.01	98.34	182.28
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	36.66	373.37	91.40	14.93	100.85	166.18
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	59.86	39.07	359.24	89.79	14.94	109.84	144.67
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	60.69	35.74	355.41	88.53	14.19	114.45	138.25
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	60.80	41.92	341.61	86.53	24.36	114.52	116.19
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	61.38	38.52	331.48	85.01	27.29	117.12	102.07
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	62.22	38.02	323.62	83.65	28.88	120.56	90.53
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	62.92	43.27	320.60	82.43	33.29	124.82	80.05
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	64.19	42.80	303.20	80.60	42.00	124.56	56.03
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	64.31	46.35	295.13	79.17	51.41	126.90	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	44.39	286.86	77.89	53.82	131.32	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	43.10	295.07	79.22	49.08	127.59	39.17
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	64.31	45.59	295.07	79.22	49.08	127.59	39.17
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	64.31	42.30	295.07	79.22	49.08	127.59	39.17
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	64.31	44.82	295.07	79.22	49.08	127.59	39.17
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	64.31	41.57	295.07	79.22	49.08	127.59	39.17
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	64.31	41.22	295.07	79.22	49.08	127.59	39.17
2054	0.00	0.00	0.00	0.00	21.98	24.33	46.31	64.31	40.87	295.07	79.22	49.08	127.59	39.17
2055	0.00	0.00	0.00	0.00	0.00	25.23	25.23	64.31	40.54	295.07	79.22	49.08	127.59	39.17
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	57.45	295.07	79.22	49.08	127.59	39.17
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	41.64	295.07	79.22	49.08	127.59	39.17
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	56.83	295.07	79.22	49.08	127.59	39.17
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	43.95	295.07	79.22	49.08	127.59	39.17
2060	0.00	0.00	0.00	0.00	1.05	0.00	1.05	64.31	53.00	295.07	79.22	49.08	127.59	39.17
2061	0.00	0.00	0.00	0.00	1.05	0.00	1.05	64.31	38.66	295.07	79.22	49.08	127.59	39.17
2062	0.00	0.00	0.00	0.00	12.56	0.00	12.56	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2063	0.00	0.00	0.00	0.00	6.28	0.00	6.28	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2064	0.00	0.00	0.00	0.00	24.12	2.75	26.87	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2065	0.00	0.00	0.00	0.00	29.13	5.49	34.62	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2066	0.00	0.00	0.00	0.00	26.48	16.48	42.96	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2067	0.00	0.00	0.00	0.00	42.17	24.72	66.90	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	64.31	66.75	295.07	79.22	49.08	127.59	39.17
2069	0.00	0.00	112.14	0.00	39.89	74.17	226.20	64.31	38.66	295.07	79.22	49.08	127.59	39.17
2070	0.00	0.00	153.46	0.00	0.01	76.92	230.38	64.31	53.00	295.07	79.22	49.08	127.59	39.17
2071	0.00	0.00	23.33	0.00	0.00	0.00	23.33	64.31	40.40	295.07	79.22	49.08	127.59	39.17
2072	0.00	0.00	114.51	0.00	0.00	0.00	114.51	64.31	53.00	295.07	79.22	49.08	127.59	39.17
2073	0.00	0.00	156.70	0.00	0.00	0.00	156.70	64.31	36.63	295.07	79.22	49.08	127.59	39.17
2074	0.00	0.00	139.93	0.00	0.00	0.00	139.93	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2075	0.00	0.00	158.90	0.00	15.27	0.00	174.17	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2076	0.00	0.00	24.15	0.00	3.19	0.00	27.34	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2077	0.00	0.00	0.00	0.00	39.09	0.00	39.09	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2078	0.00	0.00	0.00	0.00	32.83	0.00	32.83	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2079	0.00	0.00	0.00	0.00	35.12	0.00	35.12	64.31	38.66	295.07	79.22	49.08	127.59	39.17
2080	0.00	0.00	0.00	0.00	132.81	0.00	132.81	64.31	51.26	295.07	79.22	49.08	127.59	39.17
2081	0.00	0.00	0.00	0.00	79.78	0.00	79.78	64.31	38.66	295.07	79.22	49.08	127.59	39.17
2082	0.00	0.00	0.00	0.00	92.52	0.00	92.52	64.31	53.00	295.07	79.22	49.08	127.59	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	37.50	295.07	79.22	49.08	127.59	39.17
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	64.31	53.00	295.07	79.22	49.08	127.59	39.17
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	64.31	37.50	295.07	79.22	49.08	127.59	39.17
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	64.31	53.00	295.07	79.22	49.08	127.59	39.17
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	64.31	35.76	295.07	79.22	49.08	127.59	39.17
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	64.31	38.66	295.07	79.22	49.08	127.59	39.17
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	64.31	38.66	295.07	79.22	49.08	127.59	39.17
Salvage Value	19.27	0.00	9.43	0.00	14.19	6.30	49.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3526.11	3233.06	272.89	0.00	474.00	601.54	8107.60	802.22	634.27	7110.28	1886.23	466.36	2154.49	2603.20

Net Present Value -6941

K19/Gas31/750MW

TABLE 155
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	6.66	283.70	1.42	0.00	235.04	102.84	15.48	80.73	35.99
2015	0.00	546.76	0.00	0.00	21.74	10.91	579.40	4.32	0.00	253.15	101.12	17.24	85.38	49.41
2016	0.00	726.88	0.00	0.00	30.88	23.45	781.20	8.22	0.00	259.84	99.24	17.80	86.94	55.86
2017	0.00	881.35	0.00	0.00	46.60	32.83	960.79	13.03	0.00	270.49	97.30	19.03	88.21	65.95
2018	0.00	628.16	0.00	0.00	52.22	183.95	864.32	17.35	0.00	262.21	95.22	19.89	88.09	59.00
2019	0.00	440.82	0.00	0.00	61.87	129.40	632.08	20.51	13.01	276.72	95.14	18.81	86.89	75.89
2020	0.00	182.49	0.00	0.00	0.01	342.80	525.29	23.13	47.98	427.97	102.29	13.41	94.28	218.00
2021	0.00	63.43	0.00	0.00	0.00	0.00	63.43	23.45	46.21	513.52	102.84	14.85	98.93	296.90
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	44.90	517.53	101.62	14.84	99.92	301.15
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	42.92	507.32	98.72	15.88	103.38	289.34
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	41.22	509.51	96.54	17.67	108.94	286.35
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	39.45	397.76	96.40	12.82	105.83	182.71
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	37.57	383.42	94.50	13.31	114.79	160.82
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	23.45	36.17	343.20	92.58	12.46	113.14	125.03
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	23.45	34.83	331.98	90.98	12.91	122.94	105.15
2029	0.00	0.00	230.97	0.00	0.00	0.00	230.97	24.50	36.18	322.00	89.43	13.08	133.00	86.48
2030	0.00	0.00	413.35	0.00	24.16	0.00	437.51	26.58	30.95	323.09	88.83	11.60	139.32	83.35
2031	0.00	0.00	189.70	0.00	95.12	0.00	284.83	27.99	37.66	315.44	86.70	25.87	110.03	92.84
2032	0.00	0.00	128.70	0.00	0.00	0.00	128.70	28.63	40.44	308.62	85.12	32.96	112.29	78.26
2033	0.00	0.00	146.14	0.00	0.00	0.00	146.14	29.36	39.27	299.91	83.68	36.37	114.96	64.91
2034	0.00	0.00	22.21	0.00	0.00	0.00	22.21	29.47	42.11	299.40	82.88	39.34	117.75	59.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.47	40.58	225.74	80.78	47.05	107.30	-9.40
2036	0.00	0.00	230.06	0.00	0.00	0.00	230.06	30.62	39.95	204.04	79.36	51.57	107.78	-34.66
2037	0.00	0.00	333.02	0.00	0.00	0.00	333.02	32.29	39.36	194.52	78.04	56.53	110.11	-50.16
2038	0.00	0.00	149.45	0.00	80.02	0.00	229.48	33.44	38.79	197.75	77.88	51.71	115.25	-47.09
2039	0.00	0.00	11.01	0.00	0.00	0.00	11.01	33.49	48.06	210.73	75.67	86.71	119.60	-71.25
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.49	44.62	196.96	73.80	95.38	123.43	-95.65
2041	0.00	0.00	113.71	0.00	0.00	0.00	113.71	34.06	44.09	186.96	72.34	104.01	126.60	-115.98
2042	0.00	0.00	395.50	0.00	0.00	0.00	395.50	36.04	43.58	177.38	70.99	113.43	129.64	-136.68
2043	0.00	0.00	370.91	0.00	0.00	0.00	370.91	37.89	47.08	174.09	70.13	121.23	132.80	-150.05
2044	0.00	0.00	155.84	0.00	80.02	0.00	235.86	39.07	48.34	171.40	69.76	113.37	139.08	-150.80
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	39.13	54.81	181.88	67.85	153.08	134.30	-173.35
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	54.37	173.04	66.65	162.01	137.27	-192.89
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	53.07	162.28	65.39	171.80	140.32	-215.24
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	51.78	172.40	66.63	162.29	137.30	-193.82
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	39.13	54.27	172.40	66.63	162.29	137.30	-193.82
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	39.13	50.99	172.40	66.63	162.29	137.30	-193.82
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	39.13	50.61	172.40	66.63	162.29	137.30	-193.82
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	39.13	50.25	172.40	66.63	162.29	137.30	-193.82
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	39.13	49.89	172.40	66.63	162.29	137.30	-193.82
2054	0.00	0.00	0.00	0.00	21.98	24.33	46.31	39.13	49.55	172.40	66.63	162.29	137.30	-193.82
2055	0.00	0.00	0.00	0.00	0.00	25.23	25.23	39.13	49.22	172.40	66.63	162.29	137.30	-193.82
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	64.39	172.40	66.63	162.29	137.30	-193.82
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	48.58	172.40	66.63	162.29	137.30	-193.82
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	63.78	172.40	66.63	162.29	137.30	-193.82
2059	0.00	0.00	209.16	0.00	0.00	0.00	209.16	39.13	50.89	172.40	66.63	162.29	137.30	-193.82
2060	0.00	0.00	391.55	0.00	0.00	0.00	391.55	39.13	59.94	172.40	66.63	162.29	137.30	-193.82
2061	0.00	0.00	187.63	0.00	0.00	0.00	187.63	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2062	0.00	0.00	128.70	0.00	0.00	0.00	128.70	39.13	59.94	172.40	66.63	162.29	137.30	-193.82
2063	0.00	0.00	146.14	0.00	0.00	0.00	146.14	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2064	0.00	0.00	22.21	0.00	13.66	2.75	38.62	39.13	59.94	172.40	66.63	162.29	137.30	-193.82
2065	0.00	0.00	0.00	0.00	35.49	5.49	40.99	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2066	0.00	0.00	230.06	0.00	72.71	16.48	319.25	39.13	59.94	172.40	66.63	162.29	137.30	-193.82
2067	0.00	0.00	333.02	0.00	11.82	24.72	369.57	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2068	0.00	0.00	149.45	0.00	25.28	74.17	248.90	39.13	59.94	172.40	66.63	162.29	137.30	-193.82
2069	0.00	0.00	11.01	0.00	39.89	74.17	125.07	39.13	47.34	172.40	66.63	162.29	137.30	-193.82
2070	0.00	0.00	0.00	0.00	0.01	76.92	76.93	39.13	46.18	172.40	66.63	162.29	137.30	-193.82
2071	0.00	0.00	113.71	0.00	0.00	0.00	113.71	39.13	46.18	172.40	66.63	162.29	137.30	-193.82
2072	0.00	0.00	395.50	0.00	0.00	0.00	395.50	39.13	46.18	172.40	66.63	162.29	137.30	-193.82
2073	0.00	0.00	370.91	0.00	60.02	0.00	430.93	39.13	45.31	172.40	66.63	162.29	137.30	-193.82
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2075	0.00	0.00	11.48	0.00	0.00	0.00	11.48	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	39.13	47.34	172.40	66.63	162.29	137.30	-193.82
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2081	0.00	0.00	0.00	0.00	23.78	0.00	23.78	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2088	0.00	0.00	0.00	0.00	46.94	24.33	71.28	39.13	44.44	172.40	66.63	162.29	137.30	-193.82
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	39.13	47.34	172.40	66.63	162.29	137.30	-193.82
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	39.13	47.34	172.40	66.63	162.29	137.30	-193.82
Salvage Value	0.00	0.00	18.17	0.00	7.84	6.30	32.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1192.51	0.00	338.28	601.54	5365.39	509.50	668.78	5891.03	1774.24	1127.89	2253.82	735.08

Net Present Value -5809

K19/C25/250MW

TABLE 156
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	4.18	313.15	1.58	0.00	235.04	102.84	15.48	80.73	35.99
2015	88.09	546.76	0.00	0.00	21.74	3.13	659.72	4.88	0.00	253.15	101.12	17.24	85.38	49.41
2016	199.23	726.88	0.00	0.00	30.88	5.20	962.18	9.69	0.00	259.84	99.24	17.80	86.94	55.86
2017	235.75	881.35	0.00	0.00	46.60	7.80	1171.50	15.55	0.00	270.25	97.31	19.03	88.21	65.70
2018	283.83	628.16	0.00	0.00	52.22	23.39	987.59	20.48	0.00	258.53	94.70	21.50	87.78	54.56
2019	291.12	440.82	0.00	0.00	66.10	23.39	821.43	24.59	13.01	273.60	94.28	21.25	88.67	69.40
2020	803.86	182.49	0.00	0.00	4.25	24.25	1014.85	29.67	13.22	407.99	102.59	13.84	86.50	205.06
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	36.71	12.98	485.90	103.17	14.19	88.44	280.10
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	42.65	13.20	484.56	101.28	14.84	89.91	278.53
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	47.04	13.02	481.76	99.07	14.83	95.80	272.07
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	50.32	12.98	486.69	96.71	16.48	104.61	268.88
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	52.74	27.06	421.59	101.38	14.73	83.92	221.56
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	54.06	26.87	511.91	108.87	14.35	81.57	307.12
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	54.28	26.75	497.29	108.45	13.61	83.15	292.07
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	27.03	492.33	106.73	14.16	84.34	287.10
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	29.55	483.71	104.93	14.34	86.07	278.36
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.57	477.54	103.68	14.14	86.28	273.43
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.40	469.13	102.08	14.49	87.25	265.31
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.04	458.13	100.45	14.57	88.43	254.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.11	445.77	98.77	14.61	90.05	242.34
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.22	432.55	97.14	14.71	91.21	229.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	27.29	381.69	95.51	14.77	90.20	181.22
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	54.28	24.39	357.66	93.94	15.05	90.26	158.41
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	24.39	341.86	92.37	14.98	91.21	143.30
2038	0.00	0.00	133.16	0.00	0.00	0.00	133.16	54.84	24.39	325.27	90.81	14.96	92.72	126.77
2039	0.00	0.00	174.20	0.00	12.08	0.00	186.28	55.66	27.29	318.25	89.63	14.01	101.61	113.00
2040	0.00	0.00	23.16	0.00	0.00	0.00	23.16	55.78	28.37	306.80	87.63	23.77	103.02	92.37
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.78	27.72	297.48	86.14	26.81	105.46	79.07
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	56.35	27.72	289.81	84.81	28.62	108.21	68.17
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	57.19	27.72	281.87	83.43	28.35	113.22	56.88
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	57.89	33.44	272.79	81.87	42.09	112.30	36.53
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	59.16	36.33	262.97	80.47	46.56	115.03	20.91
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	59.28	37.43	256.94	79.10	53.02	119.53	5.29
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	36.57	247.99	77.72	53.69	126.43	-9.84
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.70	255.97	79.09	51.09	120.33	5.45
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	59.28	38.59	255.97	79.09	51.09	120.33	5.45
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	59.28	37.44	255.97	79.09	51.09	120.33	5.45
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	59.28	37.45	255.97	79.09	51.09	120.33	5.45
2052	0.00	0.00	0.00	0.00	34.78	1.93	36.71	59.28	37.45	255.97	79.09	51.09	120.33	5.45
2053	0.00	0.00	0.00	0.00	26.94	5.78	32.72	59.28	37.46	255.97	79.09	51.09	120.33	5.45
2054	0.00	0.00	0.00	0.00	23.02	5.78	28.80	59.28	37.46	255.97	79.09	51.09	120.33	5.45
2055	0.00	0.00	0.00	0.00	1.05	5.99	7.04	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	59.28	51.21	255.97	79.09	51.09	120.33	5.45
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	59.28	51.21	255.97	79.09	51.09	120.33	5.45
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	59.28	51.21	255.97	79.09	51.09	120.33	5.45
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	66.71	255.97	79.09	51.09	120.33	5.45
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2064	0.00	0.00	0.00	0.00	13.66	3.96	17.62	59.28	66.71	255.97	79.09	51.09	120.33	5.45
2065	0.00	0.00	0.00	0.00	11.34	2.71	14.04	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2066	0.00	0.00	0.00	0.00	1.36	3.91	5.28	59.28	66.71	255.97	79.09	51.09	120.33	5.45
2067	0.00	0.00	0.00	0.00	11.82	5.87	17.69	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2068	0.00	0.00	111.36	0.00	25.28	17.61	154.25	59.28	66.71	255.97	79.09	51.09	120.33	5.45
2069	0.00	0.00	152.39	0.00	43.08	17.61	213.08	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2070	0.00	0.00	23.16	0.00	3.20	18.26	44.63	59.28	52.95	255.97	79.09	51.09	120.33	5.45
2071	0.00	0.00	0.00	0.00	39.09	0.00	39.09	59.28	37.46	255.97	79.09	51.09	120.33	5.45
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	59.28	52.95	255.97	79.09	51.09	120.33	5.45
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	59.28	36.59	255.97	79.09	51.09	120.33	5.45
2074	0.00	0.00	139.93	0.00	73.54	0.00	213.48	59.28	51.21	255.97	79.09	51.09	120.33	5.45
2075	0.00	0.00	158.90	0.00	79.78	0.00	238.68	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	59.28	52.95	255.97	79.09	51.09	120.33	5.45
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	37.46	255.97	79.09	51.09	120.33	5.45
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	59.28	52.95	255.97	79.09	51.09	120.33	5.45
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	40.35	255.97	79.09	51.09	120.33	5.45
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	59.28	52.95	255.97	79.09	51.09	120.33	5.45
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2084	0.00	0.00	0.00	0.00	10.82	0.21	11.03	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2087	0.00	0.00	0.00	0.00	34.78	1.93	36.71	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2088	0.00	0.00	0.00	0.00	26.94	5.78	32.72	59.28	35.72	255.97	79.09	51.09	120.33	5.45
2089	0.00	0.00	0.00	0.00	21.98	5.78	27.75	59.28	38.62	255.97	79.09	51.09	120.33	5.45
2090	0.00	0.00	0.00	0.00	0.00	5.99	5.99	59.28	38.62	255.97	79.09	51.09	120.33	5.45
Salvage Value	2.58	0.00	9.17	0.00	12.67	1.63	26.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	278.11	0.00	551.66	84.15	8610.60	856.19	426.24	7128.03	1929.38	484.10	1948.85	2765.71

Net Present Value -7127

K19/Gas24/250MW

TABLE 157
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	4.18	281.22	1.42	0.00	235.04	102.84	15.48	80.73	35.99
2015	0.00	546.76	0.00	0.00	21.74	3.13	571.63	4.28	0.00	253.15	101.12	17.24	85.38	49.41
2016	0.00	726.88	0.00	0.00	30.88	5.20	762.96	8.09	0.00	259.84	99.24	17.80	86.94	55.86
2017	0.00	881.35	0.00	0.00	46.60	7.80	935.75	12.77	0.00	270.49	97.30	19.03	88.21	65.95
2018	0.00	628.16	0.00	0.00	52.22	23.39	703.76	16.29	0.00	258.86	94.70	21.46	87.75	54.95
2019	0.00	440.82	0.00	0.00	61.87	23.39	526.07	18.92	13.01	274.12	94.28	21.25	88.65	69.94
2020	0.00	182.49	0.36	0.00	0.01	24.25	207.11	19.95	13.22	408.76	102.59	13.84	86.49	205.84
2021	0.00	63.43	0.00	0.00	0.00	0.00	63.43	20.27	12.98	487.12	103.15	14.20	88.40	281.38
2022	0.00	0.00	121.40	0.00	0.00	0.00	121.40	20.77	13.20	487.98	101.68	14.02	89.20	283.08
2023	0.00	0.00	158.10	0.00	12.08	0.00	170.18	21.51	13.02	490.56	100.55	11.77	92.04	286.20
2024	0.00	0.00	20.72	0.00	0.00	0.00	20.72	21.62	16.96	498.54	98.67	18.35	95.96	285.56
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.62	16.74	366.05	96.43	13.62	92.71	163.28
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.62	16.33	347.75	94.21	15.72	94.32	143.50
2027	0.00	0.00	103.13	0.00	0.00	0.00	103.13	22.13	16.35	313.27	92.16	17.22	95.38	108.51
2028	0.00	0.00	143.21	0.00	95.12	0.00	238.33	23.31	16.42	303.01	90.33	20.10	98.10	94.47
2029	0.00	0.00	240.55	0.00	0.00	0.00	240.55	24.51	23.11	297.05	88.58	27.66	100.26	80.54
2030	0.00	0.00	317.15	0.00	0.00	0.00	317.15	26.10	19.18	296.21	87.68	30.20	101.57	76.77
2031	0.00	0.00	142.33	0.00	12.08	0.00	154.41	26.87	19.18	303.64	88.15	25.75	101.07	88.66
2032	0.00	0.00	10.49	0.00	0.00	0.00	10.49	26.93	26.09	312.36	85.72	53.57	99.70	73.37
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.93	26.10	304.90	84.19	58.13	102.23	60.34
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.93	26.10	297.73	82.71	63.59	104.64	46.78
2035	0.00	0.00	228.46	0.00	0.00	0.00	228.46	28.07	25.45	226.95	80.72	60.85	102.49	-17.11
2036	0.00	0.00	330.71	0.00	0.00	0.00	330.71	29.72	25.46	205.30	79.24	65.63	103.20	-42.77
2037	0.00	0.00	148.41	0.00	0.00	0.00	148.41	30.46	25.46	207.14	79.62	60.15	102.01	-34.63
2038	0.00	0.00	244.23	0.00	0.00	0.00	244.23	31.68	32.37	208.47	77.26	87.54	102.85	-59.18
2039	0.00	0.00	337.70	0.00	0.00	0.00	337.70	33.37	35.27	202.39	75.88	96.53	112.16	-82.18
2040	0.00	0.00	151.55	0.00	80.02	0.00	231.58	34.53	32.37	197.91	75.23	99.21	112.92	-89.46
2041	0.00	0.00	11.17	0.00	0.00	0.00	11.17	34.59	39.30	202.47	73.46	125.92	112.50	-109.41
2042	0.00	0.00	239.89	0.00	0.00	0.00	239.89	35.79	39.30	193.85	71.71	138.85	116.04	-132.75
2043	0.00	0.00	347.26	0.00	0.00	0.00	347.26	37.52	39.30	185.84	70.38	148.02	118.65	-151.21
2044	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.30	41.04	180.37	69.80	151.37	119.35	-160.16
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	38.36	47.96	182.15	67.64	187.42	119.87	-192.78
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	47.96	185.44	67.70	186.35	120.25	-188.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	47.10	172.85	65.87	204.08	124.01	-221.11
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	38.36	49.14	180.15	67.07	192.62	121.38	-200.91
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2052	0.00	0.00	99.60	0.00	34.78	1.93	136.31	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2053	0.00	0.00	136.30	0.00	26.94	5.78	169.01	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2054	0.00	0.00	20.72	0.00	21.98	5.78	48.47	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2055	0.00	0.00	0.00	0.00	0.00	5.99	5.99	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2057	0.00	0.00	103.13	0.00	0.00	0.00	103.13	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2058	0.00	0.00	141.13	0.00	12.08	0.00	153.21	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2059	0.00	0.00	240.55	0.00	0.00	0.00	240.55	38.36	49.14	180.15	67.07	192.62	121.38	-200.91
2060	0.00	0.00	317.15	0.00	0.00	0.00	317.15	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2061	0.00	0.00	142.33	0.00	0.00	0.00	142.33	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2062	0.00	0.00	10.49	0.00	0.00	0.00	10.49	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2063	0.00	0.00	0.00	0.00	71.34	2.80	74.15	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2064	0.00	0.00	0.00	0.00	13.66	3.96	17.62	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2065	0.00	0.00	228.46	0.00	11.34	2.71	242.50	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2066	0.00	0.00	330.71	0.00	13.44	3.91	348.06	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2067	0.00	0.00	148.41	0.00	11.82	5.87	166.10	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2068	0.00	0.00	244.23	0.00	25.28	17.61	287.12	38.36	61.73	180.15	67.07	192.62	121.38	-200.91
2069	0.00	0.00	337.70	0.00	39.89	17.61	395.20	38.36	49.14	180.15	67.07	192.62	121.38	-200.91
2070	0.00	0.00	151.55	0.00	0.01	18.26	169.83	38.36	47.98	180.15	67.07	192.62	121.38	-200.91
2071	0.00	0.00	11.17	0.00	0.00	0.00	11.17	38.36	47.98	180.15	67.07	192.62	121.38	-200.91
2072	0.00	0.00	239.89	0.00	0.00	0.00	239.89	38.36	47.98	180.15	67.07	192.62	121.38	-200.91
2073	0.00	0.00	347.26	0.00	0.00	0.00	347.26	38.36	47.11	180.15	67.07	192.62	121.38	-200.91
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2075	0.00	0.00	11.48	0.00	60.02	0.00	71.50	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2078	0.00	0.00	0.00	0.00	23.78	0.00	23.78	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	49.14	180.15	67.07	192.62	121.38	-200.91
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2082	0.00	0.00	99.60	0.00	0.00	0.00	99.60	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2083	0.00	0.00	136.30	0.00	0.00	0.00	136.30	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2084	0.00	0.00	20.72	0.00	10.82	0.21	31.75	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2087	0.00	0.00	103.13	0.00	34.78	1.93	139.84	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2088	0.00	0.00	141.13	0.00	26.94	5.78	173.85	38.36	46.24	180.15	67.07	192.62	121.38	-200.91
2089	0.00	0.00	21.45	0.00	21.98	5.78	49.21	38.36	49.14	180.15	67.07	192.62	121.38	-200.91
2090	0.00	0.00	0.00	0.00	20.01	5.99	26.00	38.36	49.14	180.15	67.07	192.62	121.38	-200.91
Salvage Value	0.00	0.00	31.87	0.00	6.75	1.63	40.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1559.35	0.00	325.94	84.15	5202.50	487.11	445.49	5771.41	1778.52	1353.35	2032.47	607.06

Net Present Value -5528

K19/C31/250MW

TABLE 158
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	252.57	0.00	0.00	24.48	4.18	312.49	1.58	0.00	235.04	102.84	15.48	80.73	35.99
2015	39.48	546.76	0.00	0.00	21.74	3.13	611.11	4.63	0.00	253.15	101.12	17.24	85.38	49.41
2016	10.75	726.88	0.00	0.00	30.88	5.20	773.70	8.50	0.00	259.84	99.24	17.80	86.94	55.86
2017	10.83	881.35	0.00	0.00	46.60	7.80	946.58	13.23	0.00	270.49	97.30	19.03	88.21	65.95
2018	12.89	628.16	0.00	0.00	52.22	23.39	716.66	16.82	0.00	258.86	94.70	21.46	87.75	54.95
2019	13.00	440.82	0.00	0.00	61.87	23.39	539.07	19.51	13.01	274.12	94.28	21.25	88.65	69.94
2020	13.10	182.49	0.36	0.00	0.01	24.25	220.21	20.61	13.22	408.76	102.59	13.84	86.49	205.84
2021	16.59	63.43	0.00	0.00	0.00	0.00	80.02	21.01	12.98	487.12	103.15	14.20	88.40	281.38
2022	184.48	0.00	121.40	0.00	0.00	0.00	305.88	22.43	13.20	487.91	101.67	14.04	89.21	282.99
2023	279.81	0.00	158.10	0.00	12.08	0.00	449.99	24.57	13.02	490.26	100.52	11.86	92.16	285.72
2024	307.13	0.00	20.72	0.00	0.00	0.00	327.85	26.21	16.96	498.14	98.64	18.46	96.14	284.90
2025	313.64	0.00	0.00	0.00	4.24	0.00	317.88	27.80	16.74	365.37	96.40	13.73	92.90	162.35
2026	851.45	0.00	0.00	0.00	4.24	0.00	855.69	32.08	16.33	347.12	94.20	15.87	94.54	142.52
2027	1355.87	0.00	103.13	0.00	51.65	0.00	1510.65	39.63	16.35	312.21	92.15	17.49	95.56	107.01
2028	1219.64	0.00	141.13	0.00	39.11	0.00	1399.88	46.63	16.42	301.47	90.26	20.58	98.49	92.14
2029	872.58	0.00	21.45	0.00	45.58	0.00	939.61	51.33	23.10	295.10	88.55	28.28	100.66	77.62
2030	605.44	0.00	0.00	0.00	79.26	0.00	684.70	54.75	19.16	306.72	89.54	24.86	98.24	94.08
2031	398.41	0.00	0.00	0.00	104.90	0.00	503.31	57.27	33.47	340.43	92.65	20.09	84.98	142.71
2032	147.01	0.00	0.00	0.00	122.87	0.00	269.88	58.62	33.68	438.35	99.45	19.88	83.06	235.95
2033	46.48	0.00	0.00	0.00	0.00	0.00	46.48	58.85	33.55	457.06	99.61	20.56	87.50	249.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	33.76	441.41	97.87	21.08	88.26	234.20
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.93	389.88	96.20	21.34	87.41	184.94
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.88	366.98	94.62	21.80	87.48	163.09
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.71	349.08	92.76	22.67	89.04	144.61
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.35	329.32	90.83	23.59	91.40	123.49
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	35.31	314.98	88.96	25.94	100.48	99.60
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.53	305.08	87.24	29.40	103.34	85.11
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	35.25	294.70	85.61	33.49	106.16	69.44
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	58.85	32.36	291.55	84.75	34.14	107.64	65.02
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.36	284.12	83.42	33.89	112.28	54.53
2044	0.00	0.00	116.12	0.00	0.00	0.00	116.12	59.43	34.10	272.88	81.88	42.08	112.31	36.62
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	60.70	34.10	263.02	80.47	46.54	115.03	20.98
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	60.82	38.09	256.98	79.11	53.00	119.52	5.35
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	36.57	247.99	77.72	53.69	126.43	-9.84
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.70	256.00	79.10	51.08	120.33	5.49
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	60.82	38.59	256.00	79.10	51.08	120.33	5.49
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	60.82	35.70	256.00	79.10	51.08	120.33	5.49
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	60.82	38.60	256.00	79.10	51.08	120.33	5.49
2052	0.00	0.00	99.60	0.00	34.78	1.93	136.31	60.82	35.71	256.00	79.10	51.08	120.33	5.49
2053	0.00	0.00	136.30	0.00	26.94	5.78	169.01	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2054	0.00	0.00	20.72	0.00	21.98	5.78	48.47	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2055	0.00	0.00	0.00	0.00	0.00	5.99	5.99	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2057	0.00	0.00	103.13	0.00	0.00	0.00	103.13	60.82	37.46	256.00	79.10	51.08	120.33	5.49
2058	0.00	0.00	141.13	0.00	12.08	0.00	153.21	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2059	0.00	0.00	21.45	0.00	0.00	0.00	21.45	60.82	40.35	256.00	79.10	51.08	120.33	5.49
2060	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2061	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	38.62	256.00	79.10	51.08	120.33	5.49
2062	0.00	0.00	0.00	0.00	12.56	0.00	12.56	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2063	0.00	0.00	0.00	0.00	18.36	2.80	21.16	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2064	0.00	0.00	0.00	0.00	24.12	3.96	28.09	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2065	0.00	0.00	0.00	0.00	29.13	2.71	31.84	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2066	0.00	0.00	0.00	0.00	26.48	3.91	30.40	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2067	0.00	0.00	0.00	0.00	42.17	5.87	48.04	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2068	0.00	0.00	0.00	0.00	25.28	17.61	42.89	60.82	66.71	256.00	79.10	51.08	120.33	5.49
2069	0.00	0.00	0.00	0.00	39.89	17.61	57.50	60.82	38.62	256.00	79.10	51.08	120.33	5.49
2070	0.00	0.00	0.00	0.00	0.01	18.26	18.27	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	40.35	256.00	79.10	51.08	120.33	5.49
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	36.59	256.00	79.10	51.08	120.33	5.49
2074	0.00	0.00	116.12	0.00	0.00	0.00	116.12	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2075	0.00	0.00	158.90	0.00	3.19	0.00	162.09	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2076	0.00	0.00	24.15	0.00	3.19	0.00	27.34	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2077	0.00	0.00	0.00	0.00	39.09	0.00	39.09	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2078	0.00	0.00	0.00	0.00	20.75	0.00	20.75	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2079	0.00	0.00	0.00	0.00	35.12	0.00	35.12	60.82	38.62	256.00	79.10	51.08	120.33	5.49
2080	0.00	0.00	0.00	0.00	132.81	0.00	132.81	60.82	51.21	256.00	79.10	51.08	120.33	5.49
2081	0.00	0.00	0.00	0.00	79.78	0.00	79.78	60.82	38.62	256.00	79.10	51.08	120.33	5.49
2082	0.00	0.00	99.60	0.00	92.52	0.00	192.11	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2083	0.00	0.00	136.30	0.00	0.00	0.00	136.30	60.82	37.46	256.00	79.10	51.08	120.33	5.49
2084	0.00	0.00	20.72	0.00	10.82	0.21	31.75	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	60.82	37.46	256.00	79.10	51.08	120.33	5.49
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	60.82	52.95	256.00	79.10	51.08	120.33	5.49
2087	0.00	0.00	103.13	0.00	34.78	1.93	139.84	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2088	0.00	0.00	141.13	0.00	26.94	5.78	173.85	60.82	35.72	256.00	79.10	51.08	120.33	5.49
2089	0.00	0.00	21.45	0.00	21.98	5.78	49.21	60.82	38.62	256.00	79.10	51.08	120.33	5.49
2090	0.00	0.00	0.00	0.00	0.00	5.99	5.99	60.82	38.62	256.00	79.10	51.08	120.33	5.49
Salvage Value	19.27	0.00	15.00	0.00	13.93	1.63	49.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3526.11	3233.06	482.96	0.00	483.18	84.15	7809.46	768.50	428.42	6612.56	1885.89	528.43	1970.46	2227.79

Net Present Value -6779

All Gas

TABLE 159
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	261.04	99.23	17.83	86.91	57.07
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	273.83	97.64	18.34	87.61	70.23
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	262.93	94.94	20.48	88.16	59.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	256.72	92.97	18.31	87.82	57.62
2020	0.00	0.00	120.02	0.00	0.00	0.00	120.02	1.00	0.00	262.56	92.87	13.05	89.67	66.97
2021	0.00	0.00	156.26	0.00	12.08	0.00	168.34	1.74	0.00	263.25	91.07	12.33	94.73	65.13
2022	0.00	0.00	20.43	0.00	0.00	0.00	20.43	1.84	3.98	257.48	88.87	21.86	96.22	50.53
2023	0.00	0.00	100.29	0.00	0.00	0.00	100.29	2.34	3.98	254.45	86.66	26.93	101.41	39.45
2024	0.00	0.00	139.33	0.00	95.12	0.00	234.45	3.50	3.98	260.17	85.11	31.52	107.60	35.94
2025	0.00	0.00	20.86	0.00	0.00	0.00	20.86	3.61	7.98	167.99	84.56	26.45	99.59	-42.61
2026	0.00	0.00	102.41	0.00	0.00	0.00	102.41	4.12	7.98	154.02	83.26	26.93	100.25	-56.42
2027	0.00	0.00	140.15	0.00	0.00	0.00	140.15	4.82	7.98	143.65	81.42	27.11	106.61	-71.50
2028	0.00	0.00	238.87	0.00	0.00	0.00	238.87	6.01	11.97	135.86	79.51	41.45	106.20	-91.31
2029	0.00	0.00	314.95	0.00	0.00	0.00	314.95	7.59	11.97	126.01	78.08	47.02	108.16	-107.25
2030	0.00	0.00	141.34	0.00	12.08	0.00	153.42	8.35	11.98	132.76	78.92	43.22	105.81	-95.18
2031	0.00	0.00	10.41	0.00	0.00	0.00	10.41	8.41	18.90	139.83	76.62	71.81	103.07	-111.66
2032	0.00	0.00	106.79	0.00	0.00	0.00	106.79	8.94	18.90	126.09	74.73	79.09	106.48	-134.21
2033	0.00	0.00	146.14	0.00	80.02	0.00	226.17	10.07	18.90	114.04	73.02	87.60	109.44	-156.03
2034	0.00	0.00	249.08	0.00	0.00	0.00	249.08	11.32	22.90	105.72	71.61	99.54	111.52	-176.95
2035	0.00	0.00	328.41	0.00	0.00	0.00	328.41	12.96	22.90	98.07	70.69	105.86	112.41	-190.89
2036	0.00	0.00	147.38	0.00	0.00	0.00	147.38	13.70	22.90	97.09	70.57	103.26	115.74	-192.49
2037	0.00	0.00	242.53	0.00	0.00	0.00	242.53	14.91	29.82	95.05	68.67	130.49	110.01	-214.13
2038	0.00	0.00	335.35	0.00	0.00	0.00	335.35	16.59	29.82	86.35	67.45	140.84	112.97	-234.92
2039	0.00	0.00	150.50	0.00	0.00	0.00	150.50	17.34	29.83	82.96	67.30	143.02	119.44	-246.81
2040	0.00	0.00	11.09	0.00	0.00	0.00	11.09	17.39	36.75	82.24	65.52	166.63	118.48	-268.37
2041	0.00	0.00	238.22	0.00	0.00	0.00	238.22	18.58	36.76	76.56	63.74	186.29	123.24	-296.70
2042	0.00	0.00	344.84	0.00	0.00	0.00	344.84	20.31	36.76	74.18	62.67	202.25	125.81	-316.55
2043	0.00	0.00	154.76	0.00	80.02	0.00	234.78	21.48	36.76	74.56	62.58	206.20	125.86	-320.08
2044	0.00	0.00	11.40	0.00	0.00	0.00	11.40	21.54	43.68	74.72	61.14	230.08	124.53	-341.03
2045	0.00	0.00	51.43	0.00	0.00	0.00	51.43	21.80	43.68	69.62	59.60	252.02	128.00	-370.00
2046	0.00	0.00	70.39	0.00	0.00	0.00	70.39	22.15	43.68	66.37	58.47	269.57	131.24	-392.91
2047	0.00	0.00	10.70	0.00	0.00	0.00	10.70	22.20	45.13	61.95	57.62	283.71	133.33	-412.71
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.13	65.98	58.56	268.43	130.85	-391.87
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	22.20	45.14	65.98	58.56	268.43	130.85	-391.87
2050	0.00	0.00	98.22	0.00	9.87	0.00	108.08	22.20	45.14	65.98	58.56	268.43	130.85	-391.87
2051	0.00	0.00	134.41	0.00	9.87	0.00	144.27	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2052	0.00	0.00	20.43	0.00	9.87	0.00	30.30	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2053	0.00	0.00	100.29	0.00	0.00	0.00	100.29	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2054	0.00	0.00	137.25	0.00	0.00	0.00	137.25	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2055	0.00	0.00	20.86	0.00	0.00	0.00	20.86	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2056	0.00	0.00	102.41	0.00	12.08	0.00	114.49	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2057	0.00	0.00	140.15	0.00	0.00	0.00	140.15	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2058	0.00	0.00	238.87	0.00	0.00	0.00	238.87	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2059	0.00	0.00	314.95	0.00	71.34	0.00	386.29	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2060	0.00	0.00	141.34	0.00	0.00	0.00	141.34	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2061	0.00	0.00	10.41	0.00	0.00	0.00	10.41	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2062	0.00	0.00	106.79	0.00	0.00	0.00	106.79	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2063	0.00	0.00	146.14	0.00	0.00	0.00	146.14	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2064	0.00	0.00	249.08	0.00	0.00	0.00	249.08	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2065	0.00	0.00	328.41	0.00	12.08	0.00	340.49	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2066	0.00	0.00	147.38	0.00	0.00	0.00	147.38	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2067	0.00	0.00	242.53	0.00	0.00	0.00	242.53	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2068	0.00	0.00	335.35	0.00	60.02	0.00	395.37	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2069	0.00	0.00	150.50	0.00	0.00	0.00	150.50	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2070	0.00	0.00	11.09	0.00	0.00	0.00	11.09	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2071	0.00	0.00	238.22	0.00	0.00	0.00	238.22	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2072	0.00	0.00	344.84	0.00	0.00	0.00	344.84	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2073	0.00	0.00	154.76	0.00	0.00	0.00	154.76	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2074	0.00	0.00	11.40	0.00	23.78	0.00	35.18	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2075	0.00	0.00	51.43	0.00	0.00	0.00	51.43	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2076	0.00	0.00	70.39	0.00	0.00	0.00	70.39	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2077	0.00	0.00	10.70	0.00	0.00	0.00	10.70	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2078	0.00	0.00	0.00	0.00	60.02	0.00	60.02	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2080	0.00	0.00	98.22	0.00	0.00	0.00	98.22	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2081	0.00	0.00	134.41	0.00	0.00	0.00	134.41	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2082	0.00	0.00	20.43	0.00	0.00	0.00	20.43	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2083	0.00	0.00	100.29	0.00	20.01	0.00	120.30	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2084	0.00	0.00	137.25	0.00	9.87	0.00	147.12	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2085	0.00	0.00	20.86	0.00	9.87	0.00	30.73	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2086	0.00	0.00	102.41	0.00	9.87	0.00	112.28	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2087	0.00	0.00	140.15	0.00	9.87	0.00	150.02	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2088	0.00	0.00	21.30	0.00	0.00	0.00	21.30	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	65.98	58.56	268.43	130.85	-391.87
Salvage Value	0.00	0.00	51.90	0.00	3.28	0.00	55.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1993.71	0.00	182.81	0.00	2239.47	181.03	343.48	3401.41	1623.89	1941.59	2152.00	-2316.07

Net Present Value: -5080

Wind/Gas

TABLE 160
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	261.04	99.23	17.83	86.91	57.07
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	273.84	97.64	18.34	87.61	70.24
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	262.93	94.94	20.48	88.16	59.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	256.72	92.97	18.31	87.82	57.62
2020	0.00	0.00	0.00	12.81	20.76	0.00	33.57	0.68	0.00	260.13	92.44	14.12	89.99	63.57
2021	0.00	0.00	0.36	391.21	34.60	0.00	426.17	2.81	0.00	260.33	90.65	13.66	94.65	61.37
2022	0.00	0.00	0.00	398.53	41.80	0.00	440.33	5.01	6.21	263.62	89.00	13.76	94.73	66.13
2023	0.00	0.00	222.39	385.72	21.87	0.00	629.98	8.05	12.42	267.26	86.53	15.81	98.08	66.84
2024	0.00	0.00	296.35	7.32	34.41	0.00	338.09	9.63	18.63	281.62	84.67	16.18	103.90	76.88
2025	0.00	0.00	41.72	6.41	6.66	0.00	54.80	9.91	26.60	196.59	84.65	18.45	94.97	-1.48
2026	0.00	0.00	102.41	195.61	16.75	0.00	314.77	11.48	26.60	186.01	83.67	17.52	94.83	-10.01
2027	0.00	0.00	142.23	199.27	121.74	0.00	463.23	13.79	29.70	177.18	81.36	21.34	96.69	-22.21
2028	0.00	0.00	21.30	199.27	36.89	0.00	257.46	15.07	36.81	177.17	79.61	27.59	99.06	-29.09
2029	0.00	0.00	104.58	199.27	37.03	0.00	340.87	16.78	39.91	172.51	78.04	29.75	100.82	-36.11
2030	0.00	0.00	143.12	199.27	37.03	0.00	379.41	18.68	43.02	173.73	77.14	31.18	101.31	-35.90
2031	0.00	0.00	127.80	199.27	37.03	0.00	364.10	20.50	50.10	174.03	75.93	36.92	102.07	-40.88
2032	0.00	0.00	145.13	199.27	117.05	0.00	461.45	22.80	53.22	171.59	74.82	37.23	103.92	-44.37
2033	0.00	0.00	22.06	199.27	37.03	0.00	258.35	24.09	60.32	173.87	74.15	39.29	104.87	-44.46
2034	0.00	0.00	108.29	199.27	37.03	0.00	344.59	25.82	63.43	165.92	72.38	45.47	105.88	-57.81
2035	0.00	0.00	148.20	199.27	37.03	0.00	384.49	27.74	66.55	158.12	70.74	49.45	107.77	-69.84
2036	0.00	0.00	132.34	199.27	37.03	0.00	368.63	29.58	73.63	154.59	69.40	57.01	109.09	-80.90
2037	0.00	0.00	150.28	199.27	37.03	0.00	386.57	31.52	76.75	148.79	68.13	60.51	111.19	-91.04
2038	0.00	0.00	134.20	199.27	37.03	0.00	370.49	33.37	83.84	147.40	67.10	66.54	113.47	-99.72
2039	0.00	0.00	152.39	199.27	117.05	0.00	468.71	35.71	86.95	142.18	65.97	65.55	125.01	-114.34
2040	0.00	0.00	23.16	212.08	37.03	0.00	272.27	37.07	94.06	142.74	65.16	69.13	128.01	-119.56
2041	0.00	0.00	113.71	590.48	37.03	0.00	741.22	40.78	97.17	133.42	63.69	81.41	126.13	-137.81
2042	0.00	0.00	155.61	597.80	37.03	0.00	790.44	44.73	100.27	126.25	62.35	87.31	129.31	-152.71
2043	0.00	0.00	138.96	584.98	36.75	0.00	760.70	48.54	107.36	122.74	61.20	96.84	131.47	-166.76
2044	0.00	0.00	157.80	206.59	35.92	0.00	400.30	50.54	110.47	119.21	60.26	100.45	134.21	-175.70
2045	0.00	0.00	75.42	205.67	33.69	0.00	314.79	52.11	117.57	117.08	59.19	106.48	139.32	-187.91
2046	0.00	0.00	70.39	388.46	30.36	0.00	489.21	54.56	120.68	113.94	58.17	106.92	146.97	-198.12
2047	0.00	0.00	10.70	202.93	20.27	0.00	233.90	55.73	125.23	109.39	57.12	110.78	148.43	-206.95
2048	0.00	0.00	0.00	199.27	10.41	0.00	209.68	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2049	0.00	0.00	0.00	199.27	10.00	0.00	209.27	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2050	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2051	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2052	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2053	0.00	0.00	200.59	199.27	0.00	0.00	399.85	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2054	0.00	0.00	274.50	199.27	0.00	0.00	473.77	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2055	0.00	0.00	41.72	199.27	5.19	0.00	246.18	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2056	0.00	0.00	102.41	199.27	8.65	0.00	310.33	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2057	0.00	0.00	140.15	199.27	10.52	0.00	349.94	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2058	0.00	0.00	21.30	199.27	5.88	0.00	226.45	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2059	0.00	0.00	104.58	199.27	27.14	0.00	330.98	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2060	0.00	0.00	143.12	212.08	2.92	0.00	358.11	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2061	0.00	0.00	127.80	590.48	4.67	0.00	722.95	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2062	0.00	0.00	145.13	597.80	78.10	0.00	821.03	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2063	0.00	0.00	22.06	584.98	9.26	0.00	616.30	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2064	0.00	0.00	108.29	206.59	9.26	0.00	324.14	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2065	0.00	0.00	148.20	205.67	9.26	0.00	363.13	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2066	0.00	0.00	132.34	388.46	9.26	0.00	530.06	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2067	0.00	0.00	150.28	202.93	69.27	0.00	422.48	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2068	0.00	0.00	134.20	199.27	9.26	0.00	342.72	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2069	0.00	0.00	152.39	199.27	9.26	0.00	360.91	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2070	0.00	0.00	23.16	199.27	24.83	0.00	247.26	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2071	0.00	0.00	113.71	199.27	35.21	0.00	348.18	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2072	0.00	0.00	155.61	199.27	40.53	0.00	395.41	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2073	0.00	0.00	138.96	199.27	25.24	0.00	363.47	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2074	0.00	0.00	157.80	199.27	76.55	0.00	433.61	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2075	0.00	0.00	75.42	199.27	13.01	0.00	287.69	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2076	0.00	0.00	70.39	199.27	21.34	0.00	290.99	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2077	0.00	0.00	10.70	199.27	52.89	0.00	262.86	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2078	0.00	0.00	0.00	199.27	36.75	0.00	236.02	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2079	0.00	0.00	0.00	199.27	36.33	0.00	235.60	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2080	0.00	0.00	0.00	212.08	35.78	0.00	247.86	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2081	0.00	0.00	0.00	590.48	34.11	0.00	624.59	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2082	0.00	0.00	0.00	597.80	52.36	0.00	650.16	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2083	0.00	0.00	200.59	584.98	30.27	0.00	815.84	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2084	0.00	0.00	274.50	206.59	37.50	0.00	518.59	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2085	0.00	0.00	41.72	205.67	37.22	0.00	284.62	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2086	0.00	0.00	102.41	388.46	35.55	0.00	526.43	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2087	0.00	0.00	140.15	202.93	33.89	0.00	376.97	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2088	0.00	0.00	21.30	199.27	15.69	0.00	236.26	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2089	0.00	0.00	0.00	192.86	27.92	0.00	220.78	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
2090	0.00	0.00	0.00	3.66	0.14	0.00	3.80	55.73	125.23	113.47	58.16	108.06	144.91	-197.66
Salvage Value	0.00	0.00	30.14	70.48	14.94	0.00	115.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1435.66	3453.82	557.04	0.00	5509.47	430.90	974.12	3969.06	1619.55	924.20	2184.29	-758.99

Net Present Value -7673

K22/Gas

TABLE 161
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	105.39	0.00	0.00	9.87	0.00	115.25	0.58	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	34.73	0.00	0.00	11.07	0.00	45.80	0.81	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	37.30	0.00	0.00	11.18	0.00	48.48	1.05	0.00	260.79	99.23	17.83	86.92	56.81
2017	0.00	243.59	0.00	0.00	32.53	0.00	276.12	2.43	0.00	273.24	97.65	18.34	87.64	69.61
2018	0.00	475.71	0.00	0.00	11.62	0.00	487.33	4.86	0.00	261.68	94.95	20.49	88.21	58.03
2019	0.00	760.82	0.00	0.00	20.24	0.00	781.05	8.77	0.00	255.45	92.98	18.31	87.85	56.30
2020	0.00	855.73	0.00	0.00	36.83	0.00	892.55	13.23	0.00	257.29	92.28	14.54	90.17	60.31
2021	0.00	696.05	0.00	0.00	52.24	0.00	748.29	16.97	0.00	258.77	90.59	13.95	95.34	58.89
2022	0.00	405.11	0.00	0.00	61.87	0.00	466.98	19.31	13.01	262.08	90.57	15.91	90.84	64.76
2023	0.00	188.58	0.00	0.00	0.01	0.00	188.60	20.25	13.22	349.92	96.19	15.83	88.51	149.40
2024	0.00	65.35	0.00	0.00	0.00	0.00	65.35	20.58	12.93	376.96	95.99	18.03	94.19	168.76
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	20.58	13.15	296.21	95.88	12.67	89.19	98.48
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.58	12.97	283.04	94.03	12.82	90.33	85.85
2027	0.00	0.00	124.94	0.00	0.00	0.00	124.94	21.09	12.93	243.77	92.19	12.27	89.67	49.64
2028	0.00	0.00	162.99	0.00	12.08	0.00	175.07	21.86	12.69	231.54	90.64	12.79	91.25	36.86
2029	0.00	0.00	21.45	0.00	0.00	0.00	21.45	21.97	16.24	227.75	89.76	15.82	91.32	30.85
2030	0.00	0.00	105.31	0.00	0.00	0.00	105.31	22.49	16.24	220.66	88.08	19.17	92.95	20.46
2031	0.00	0.00	368.37	0.00	95.12	0.00	463.49	24.80	16.28	212.71	86.45	22.01	95.28	8.97
2032	0.00	0.00	343.51	0.00	0.00	0.00	343.51	26.52	22.98	206.49	84.86	29.92	97.56	-5.85
2033	0.00	0.00	144.33	0.00	12.08	0.00	156.41	27.30	19.04	209.67	84.95	26.18	97.75	0.79
2034	0.00	0.00	10.63	0.00	0.00	0.00	10.63	27.35	25.96	215.84	82.63	53.01	96.16	-15.96
2035	0.00	0.00	228.46	0.00	0.00	0.00	228.46	28.50	25.96	201.47	80.58	58.19	98.71	-36.02
2036	0.00	0.00	330.71	0.00	0.00	0.00	330.71	30.15	25.96	193.16	79.09	64.65	100.83	-51.41
2037	0.00	0.00	148.41	0.00	0.00	0.00	148.41	30.89	25.97	194.79	79.47	58.75	99.70	-43.14
2038	0.00	0.00	244.23	0.00	0.00	0.00	244.23	32.11	32.23	194.78	77.15	84.27	100.58	-67.22
2039	0.00	0.00	337.70	0.00	0.00	0.00	337.70	33.80	32.24	188.57	75.79	93.00	109.81	-90.03
2040	0.00	0.00	151.55	0.00	80.02	0.00	231.58	34.96	32.24	185.66	75.28	95.22	110.14	-94.98
2041	0.00	0.00	11.17	0.00	0.00	0.00	11.17	35.02	39.16	188.93	73.40	121.75	109.98	-116.19
2042	0.00	0.00	239.89	0.00	0.00	0.00	239.89	36.22	42.06	180.11	71.62	135.49	113.46	-140.46
2043	0.00	0.00	347.26	0.00	0.00	0.00	347.26	37.95	39.16	172.65	70.28	145.33	116.06	-159.02
2044	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.73	39.16	169.99	69.84	148.64	116.41	-164.89
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	38.79	46.09	173.97	68.32	177.21	115.07	-186.63
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.09	168.49	67.10	188.96	118.42	-206.01
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	47.84	161.09	65.77	202.42	121.32	-228.43
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	47.84	167.85	67.07	189.53	118.27	-207.02
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	47.84	167.85	67.07	189.53	118.27	-207.02
2050	0.00	0.00	0.00	0.00	10.40	0.00	10.40	38.79	46.97	167.85	67.07	189.53	118.27	-207.02
2051	0.00	0.00	0.00	0.00	10.47	0.00	10.47	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2052	0.00	0.00	0.00	0.00	10.48	0.00	10.48	38.79	49.00	167.85	67.07	189.53	118.27	-207.02
2053	0.00	0.00	0.00	0.00	0.57	0.00	0.57	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2054	0.00	0.00	0.00	0.00	18.78	0.00	18.78	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2055	0.00	0.00	0.00	0.00	24.92	0.00	24.92	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2056	0.00	0.00	0.00	0.00	26.94	0.00	26.94	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2057	0.00	0.00	103.13	0.00	21.98	0.00	125.11	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2058	0.00	0.00	141.13	0.00	0.00	0.00	141.13	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2059	0.00	0.00	21.45	0.00	0.00	0.00	21.45	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2060	0.00	0.00	105.31	0.00	0.00	0.00	105.31	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2061	0.00	0.00	366.29	0.00	0.00	0.00	366.29	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2062	0.00	0.00	343.51	0.00	0.00	0.00	343.51	38.79	49.00	167.85	67.07	189.53	118.27	-207.02
2063	0.00	0.00	144.33	0.00	12.08	0.00	156.41	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2064	0.00	0.00	10.63	0.00	0.00	0.00	10.63	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2065	0.00	0.00	228.46	0.00	0.67	0.00	229.13	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2066	0.00	0.00	330.71	0.00	72.05	0.00	402.76	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2067	0.00	0.00	148.41	0.00	22.05	0.00	170.46	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2068	0.00	0.00	244.23	0.00	23.13	0.00	267.36	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2069	0.00	0.00	337.70	0.00	1.45	0.00	339.15	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2070	0.00	0.00	151.55	0.00	11.91	0.00	163.46	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2071	0.00	0.00	11.17	0.00	25.30	0.00	36.47	38.79	61.60	167.85	67.07	189.53	118.27	-207.02
2072	0.00	0.00	239.89	0.00	39.89	0.00	279.78	38.79	49.00	167.85	67.07	189.53	118.27	-207.02
2073	0.00	0.00	347.26	0.00	0.01	0.00	347.27	38.79	47.84	167.85	67.07	189.53	118.27	-207.02
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.79	47.84	167.85	67.07	189.53	118.27	-207.02
2075	0.00	0.00	11.48	0.00	60.02	0.00	71.50	38.79	47.84	167.85	67.07	189.53	118.27	-207.02
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.97	167.85	67.07	189.53	118.27	-207.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2081	0.00	0.00	0.00	0.00	23.78	0.00	23.78	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	49.00	167.85	67.07	189.53	118.27	-207.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2087	0.00	0.00	103.13	0.00	9.87	0.00	113.00	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2088	0.00	0.00	141.13	0.00	0.00	0.00	141.13	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2089	0.00	0.00	21.45	0.00	0.00	0.00	21.45	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
2090	0.00	0.00	0.00	0.00	20.01	0.00	20.01	38.79	46.10	167.85	67.07	189.53	118.27	-207.02
Salvage Value	0.00	0.00	28.36	0.00	5.11	0.00	33.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2931.58	1457.36	0.00	298.13	0.00	4687.07	437.47	393.87	4714.14	1748.91	1286.08	1989.65	-310.51

Net Present Value: -5829

K22/C29

TABLE 162
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	105.39	0.00	0.00	9.87	0.00	146.52	0.73	0.00	235.42	102.83	15.46	80.72	36.42
2015	40.00	34.73	0.00	0.00	11.07	0.00	85.80	1.16	0.00	254.26	101.10	17.25	85.37	50.54
2016	11.28	37.30	0.00	0.00	11.18	0.00	59.76	1.46	0.00	260.79	99.23	17.83	86.92	56.81
2017	12.04	243.59	0.00	0.00	32.53	0.00	288.16	2.90	0.00	273.24	97.65	18.34	87.64	69.61
2018	12.13	475.71	0.00	0.00	11.62	0.00	499.46	5.40	0.00	261.68	94.95	20.49	88.21	58.03
2019	14.53	760.82	0.00	0.00	20.24	0.00	795.59	9.38	0.00	255.45	92.98	18.31	87.85	56.30
2020	184.88	855.73	0.00	0.00	36.83	0.00	1077.44	14.76	0.00	257.29	92.28	14.54	90.17	60.31
2021	278.78	696.05	0.00	0.00	52.24	0.00	1027.06	19.90	0.00	258.64	90.59	13.95	95.43	58.67
2022	302.41	405.11	0.00	0.00	61.87	0.00	769.39	23.75	13.01	261.92	90.58	15.89	90.94	64.51
2023	308.82	188.58	0.00	0.00	4.25	0.00	501.66	26.25	13.22	349.42	96.19	15.87	88.56	148.81
2024	838.38	65.35	0.00	0.00	4.24	0.00	907.97	30.79	12.93	375.82	95.98	18.03	94.24	167.57
2025	1335.05	0.00	0.00	0.00	51.65	0.00	1386.70	37.73	13.15	294.81	95.90	12.69	89.29	96.94
2026	1200.91	0.00	0.00	0.00	27.03	0.00	1227.94	43.87	12.97	281.32	94.03	12.86	90.48	83.96
2027	859.18	0.00	0.00	0.00	45.58	0.00	904.76	48.39	12.93	242.57	92.41	11.76	89.60	48.81
2028	596.14	0.00	0.00	0.00	79.26	0.00	675.40	51.77	12.69	227.38	90.53	12.94	91.59	32.32
2029	392.30	0.00	0.00	0.00	104.90	0.00	497.20	54.25	26.56	291.24	94.31	14.78	82.56	99.60
2030	144.76	0.00	0.00	0.00	122.87	0.00	267.62	55.59	26.78	384.46	101.31	14.48	79.27	189.40
2031	45.77	0.00	0.00	0.00	0.00	0.00	45.77	55.82	26.68	397.12	101.23	14.84	81.48	199.58
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	29.59	384.41	99.57	14.69	82.34	187.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.48	372.21	97.96	14.60	83.93	175.72
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.44	360.15	96.37	14.86	85.02	163.91
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.27	347.52	94.83	14.91	85.68	152.10
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	55.82	24.90	332.95	93.29	14.93	86.48	138.25
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	24.97	317.94	91.77	14.96	87.55	123.66
2038	0.00	0.00	133.16	0.00	0.00	0.00	133.16	56.38	24.43	303.23	90.26	14.93	89.46	108.58
2039	0.00	0.00	174.20	0.00	12.08	0.00	186.28	57.20	27.15	296.63	88.92	14.51	99.37	93.83
2040	0.00	0.00	23.16	0.00	0.00	0.00	23.16	57.32	28.24	288.06	87.21	24.67	99.64	76.54
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.32	28.24	279.76	85.76	27.64	102.00	64.35
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	57.89	31.13	271.64	84.37	28.57	105.82	52.88
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	58.73	28.24	262.85	82.92	28.85	110.91	40.18
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	59.43	32.22	255.31	81.48	43.87	108.96	21.00
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	60.70	31.56	247.40	80.24	47.00	111.58	8.58
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	60.82	35.56	252.59	79.84	46.30	114.80	11.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.30	234.26	77.68	60.97	116.29	-20.68
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.30	244.75	79.25	51.42	114.22	-0.15
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	40.20	244.75	79.25	51.42	114.22	-0.15
2050	0.00	0.00	0.00	0.00	10.40	0.00	10.40	60.82	36.44	244.75	79.25	51.42	114.22	-0.15
2051	0.00	0.00	0.00	0.00	10.47	0.00	10.47	60.82	35.57	244.75	79.25	51.42	114.22	-0.15
2052	0.00	0.00	0.00	0.00	10.48	0.00	10.48	60.82	38.48	244.75	79.25	51.42	114.22	-0.15
2053	0.00	0.00	0.00	0.00	0.57	0.00	0.57	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2054	0.00	0.00	0.00	0.00	18.78	0.00	18.78	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2055	0.00	0.00	0.00	0.00	24.92	0.00	24.92	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2056	0.00	0.00	0.00	0.00	26.94	0.00	26.94	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2057	0.00	0.00	0.00	0.00	21.98	0.00	21.98	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2058	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2059	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	53.98	244.75	79.25	51.42	114.22	-0.15
2060	0.00	0.00	0.00	0.00	12.56	0.00	12.56	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2061	0.00	0.00	0.00	0.00	6.28	0.00	6.28	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	60.82	38.48	244.75	79.25	51.42	114.22	-0.15
2063	0.00	0.00	0.00	0.00	17.79	0.00	17.79	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2064	0.00	0.00	0.00	0.00	25.12	0.00	25.12	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2065	0.00	0.00	0.00	0.00	31.02	0.00	31.02	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2066	0.00	0.00	0.00	0.00	0.71	0.00	0.71	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2067	0.00	0.00	0.00	0.00	22.05	0.00	22.05	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2068	0.00	0.00	111.36	0.00	11.05	0.00	122.41	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2069	0.00	0.00	152.39	0.00	1.45	0.00	153.84	60.82	53.98	244.75	79.25	51.42	114.22	-0.15
2070	0.00	0.00	23.16	0.00	11.91	0.00	35.07	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2071	0.00	0.00	0.00	0.00	25.30	0.00	25.30	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2072	0.00	0.00	114.51	0.00	39.89	0.00	154.40	60.82	53.98	244.75	79.25	51.42	114.22	-0.15
2073	0.00	0.00	156.70	0.00	3.20	0.00	159.90	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2074	0.00	0.00	139.93	0.00	15.27	0.00	155.20	60.82	52.82	244.75	79.25	51.42	114.22	-0.15
2075	0.00	0.00	158.90	0.00	39.09	0.00	197.99	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2076	0.00	0.00	24.15	0.00	20.75	0.00	44.90	60.82	51.95	244.75	79.25	51.42	114.22	-0.15
2077	0.00	0.00	0.00	0.00	35.12	0.00	35.12	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2078	0.00	0.00	0.00	0.00	73.54	0.00	73.54	60.82	51.08	244.75	79.25	51.42	114.22	-0.15
2079	0.00	0.00	0.00	0.00	79.78	0.00	79.78	60.82	38.48	244.75	79.25	51.42	114.22	-0.15
2080	0.00	0.00	0.00	0.00	163.86	0.00	163.86	60.82	52.82	244.75	79.25	51.42	114.22	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	55.71	244.75	79.25	51.42	114.22	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.32	244.75	79.25	51.42	114.22	-0.15
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	52.82	244.75	79.25	51.42	114.22	-0.15
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	38.48	244.75	79.25	51.42	114.22	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.59	244.75	79.25	51.42	114.22	-0.15
Salvage Value	13.46	0.00	9.17	0.00	11.80	0.00	34.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3813.51	2931.58	278.11	0.00	480.15	0.00	7503.35	743.12	364.53	5715.47	1866.34	482.47	1911.78	1454.88

Net Present Value: -7156

SCGT/C26

TABLE 163
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	235.42	102.83	15.46	80.72	36.42
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	254.26	101.10	17.25	85.37	50.54
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	261.04	99.23	17.83	86.91	57.07
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	273.84	97.64	18.34	87.61	70.24
2018	237.84	0.00	0.36	0.00	0.00	0.00	238.20	3.51	0.00	262.67	94.94	20.49	88.17	59.07
2019	286.35	0.00	0.00	0.00	0.00	0.00	286.35	4.94	0.00	256.33	92.97	18.31	87.83	57.22
2020	293.68	0.00	120.02	0.00	0.00	0.00	413.70	6.90	0.00	261.86	92.85	13.13	89.68	66.21
2021	811.02	0.00	156.22	0.00	12.08	0.00	979.32	11.68	0.00	262.64	91.05	12.47	94.97	64.15
2022	1304.42	0.00	20.43	0.00	0.80	0.00	1325.66	18.31	3.98	256.76	88.89	22.16	96.47	49.24
2023	1173.36	0.00	0.00	0.00	1.61	0.00	1174.96	24.19	3.98	252.82	86.52	27.93	101.84	36.52
2024	839.47	0.00	0.00	0.00	3.21	0.00	842.68	28.40	3.98	260.19	85.29	31.24	107.82	35.85
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	31.35	3.98	170.20	85.68	19.09	103.11	-37.67
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	33.28	18.29	209.19	89.63	14.00	87.62	17.94
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	33.99	18.51	294.71	97.20	13.59	81.50	102.42
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	34.21	18.21	318.33	97.45	14.87	86.49	119.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.43	305.69	95.75	15.32	87.62	106.99
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.26	295.92	94.55	15.19	87.73	98.45
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.21	281.68	92.63	16.31	89.48	83.25
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.97	265.07	90.73	17.50	91.16	65.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.54	253.91	88.83	20.57	93.94	50.57
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.54	245.58	87.24	23.83	96.07	38.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.58	239.48	85.96	26.55	97.61	29.36
2036	0.00	0.00	109.81	0.00	0.00	0.00	109.81	34.76	20.30	234.36	84.90	26.90	99.88	22.68
2037	0.00	0.00	150.32	0.00	12.08	0.00	162.40	35.57	17.41	225.62	83.40	27.30	105.07	9.85
2038	0.00	0.00	22.84	0.00	0.00	0.00	22.84	35.69	21.39	218.19	81.93	41.64	103.72	-9.11
2039	0.00	0.00	112.14	0.00	0.00	0.00	112.14	36.25	21.39	209.91	80.70	44.33	112.89	-28.01
2040	0.00	0.00	155.53	0.00	95.12	0.00	250.66	37.49	21.39	203.40	79.37	43.93	120.06	-39.96
2041	0.00	0.00	137.04	0.00	0.00	0.00	137.04	38.18	25.39	193.49	77.74	61.18	118.45	-63.88
2042	0.00	0.00	155.61	0.00	0.00	0.00	155.61	38.95	24.73	184.70	76.40	68.76	121.11	-81.57
2043	0.00	0.00	138.96	0.00	0.00	0.00	138.96	39.65	28.71	179.52	75.10	77.21	126.05	-98.84
2044	0.00	0.00	157.80	0.00	80.02	0.00	237.82	40.84	28.71	172.74	73.80	77.83	135.50	-114.38
2045	0.00	0.00	23.99	0.00	0.00	0.00	23.99	40.96	32.72	165.95	72.46	106.93	128.04	-141.48
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	35.62	159.35	71.29	118.08	130.13	-160.15
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.73	153.01	69.99	119.71	141.31	-178.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.73	159.44	71.25	114.91	133.16	-159.87
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.74	159.44	71.25	114.91	133.16	-159.87
2050	0.00	0.00	98.22	0.00	9.87	0.00	108.08	40.96	32.75	159.44	71.25	114.91	133.16	-159.87
2051	0.00	0.00	134.41	0.00	9.87	0.00	144.27	40.96	34.49	159.44	71.25	114.91	133.16	-159.87
2052	0.00	0.00	20.43	0.00	9.87	0.00	30.30	40.96	34.50	159.44	71.25	114.91	133.16	-159.87
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	159.44	71.25	114.91	133.16	-159.87
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	159.44	71.25	114.91	133.16	-159.87
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	159.44	71.25	114.91	133.16	-159.87
2056	0.00	0.00	0.00	0.00	12.08	0.00	12.08	40.96	35.65	159.44	71.25	114.91	133.16	-159.87
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2066	0.00	0.00	109.81	0.00	0.00	0.00	109.81	40.96	35.65	159.44	71.25	114.91	133.16	-159.87
2067	0.00	0.00	150.28	0.00	0.00	0.00	150.28	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2068	0.00	0.00	22.84	0.00	0.00	0.00	22.84	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2069	0.00	0.00	112.14	0.00	0.00	0.00	112.14	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2070	0.00	0.00	153.46	0.00	0.00	0.00	153.46	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2071	0.00	0.00	137.04	0.00	0.00	0.00	137.04	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2072	0.00	0.00	155.61	0.00	12.88	0.00	168.50	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2073	0.00	0.00	138.96	0.00	1.61	0.00	140.57	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2074	0.00	0.00	157.80	0.00	3.21	0.00	161.01	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2075	0.00	0.00	23.99	0.00	78.57	0.00	102.56	40.96	48.25	159.44	71.25	114.91	133.16	-159.87
2076	0.00	0.00	0.00	0.00	3.21	0.00	3.21	40.96	35.65	159.44	71.25	114.91	133.16	-159.87
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	49.99	159.44	71.25	114.91	133.16	-159.87
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	159.44	71.25	114.91	133.16	-159.87
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	40.96	49.99	159.44	71.25	114.91	133.16	-159.87
2080	0.00	0.00	98.22	0.00	0.00	0.00	98.22	40.96	34.50	159.44	71.25	114.91	133.16	-159.87
2081	0.00	0.00	134.41	0.00	0.00	0.00	134.41	40.96	49.99	159.44	71.25	114.91	133.16	-159.87
2082	0.00	0.00	20.43	0.00	0.00	0.00	20.43	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	35.65	159.44	71.25	114.91	133.16	-159.87
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
2090	0.00	0.00	0.00	0.00	23.78	0.00	23.78	40.96	32.76	159.44	71.25	114.91	133.16	-159.87
Salvage Value	5.25	0.00	15.02	0.00	3.74	0.00	24.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	640.88	0.00	116.89	0.00	5144.03	500.32	293.52	4721.64	1778.09	844.50	2075.46	23.58

Net Present Value: -5914

CCGT/C26

TABLE 164
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	235.42	102.83	15.46	80.72	36.42
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	254.26	101.10	17.25	85.37	50.54
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	261.04	99.23	17.83	86.91	57.07
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	273.84	97.64	18.34	87.61	70.24
2018	237.84	0.00	0.36	0.00	0.00	0.00	238.20	3.51	0.00	262.67	94.94	20.49	88.17	59.07
2019	286.35	0.00	204.33	0.00	0.00	0.00	490.68	5.96	0.00	256.33	92.97	18.31	87.83	57.22
2020	293.68	0.00	317.59	0.00	0.00	0.00	611.27	8.91	0.00	261.86	92.85	13.13	89.68	66.21
2021	811.02	0.00	154.55	0.00	12.08	0.00	977.65	13.68	0.00	266.59	91.75	10.97	93.98	69.90
2022	1304.42	0.00	9.78	0.00	0.80	0.00	1315.01	20.26	6.91	266.59	89.43	31.66	87.31	58.18
2023	1173.36	0.00	0.00	0.00	1.61	0.00	1174.96	26.13	6.91	267.63	87.36	38.03	91.66	50.57
2024	839.47	0.00	0.00	0.00	3.21	0.00	842.68	30.35	6.91	282.72	86.26	46.08	96.02	54.35
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	33.30	6.91	191.31	85.80	36.85	93.47	-24.81
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	35.23	21.22	222.90	89.52	28.20	83.64	21.54
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	35.94	21.44	303.37	97.16	20.38	79.75	106.08
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	36.16	21.14	328.21	97.53	21.79	84.05	124.84
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.36	316.89	95.86	23.06	85.21	112.75
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.19	300.50	93.77	24.75	86.99	95.00
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.14	301.41	93.68	22.09	85.71	99.93
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.90	279.09	90.92	25.83	88.55	73.80
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.47	269.99	89.20	28.85	90.72	61.23
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.47	259.52	87.23	32.81	93.74	45.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.51	252.58	85.78	35.35	95.71	35.74
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	23.23	243.63	84.17	40.75	97.58	21.13
2037	0.00	0.00	110.58	0.00	0.00	0.00	110.58	36.71	20.34	240.16	83.43	42.12	98.07	16.54
2038	0.00	0.00	151.38	0.00	12.08	0.00	163.45	37.53	20.34	233.85	82.25	42.85	101.92	6.82
2039	0.00	0.00	23.00	0.00	0.00	0.00	23.00	37.64	24.32	224.94	80.52	55.70	109.23	-20.52
2040	0.00	0.00	112.92	0.00	0.00	0.00	112.92	38.21	24.32	217.35	79.11	61.96	111.94	-35.67
2041	0.00	0.00	156.61	0.00	95.12	0.00	251.73	39.46	24.32	208.36	77.81	64.28	115.84	-49.56
2042	0.00	0.00	138.00	0.00	0.00	0.00	138.00	40.15	27.66	202.86	76.48	71.83	120.55	-66.00
2043	0.00	0.00	156.70	0.00	0.00	0.00	156.70	40.93	27.66	193.57	75.10	85.21	118.89	-85.64
2044	0.00	0.00	23.82	0.00	0.00	0.00	23.82	41.05	31.64	187.17	73.79	97.32	121.04	-104.99
2045	0.00	0.00	116.93	0.00	0.00	0.00	116.93	41.64	31.64	180.41	72.49	101.05	128.25	-121.38
2046	0.00	0.00	160.02	0.00	80.02	0.00	240.04	42.84	34.55	177.63	71.59	100.40	135.89	-130.25
2047	0.00	0.00	24.32	0.00	0.00	0.00	24.32	42.96	35.65	164.89	70.02	126.26	129.24	-160.64
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.66	174.31	71.37	109.24	131.13	-137.42
2049	0.00	0.00	204.33	0.00	9.87	0.00	214.20	42.96	35.66	174.31	71.37	109.24	131.13	-137.42
2050	0.00	0.00	295.78	0.00	9.87	0.00	305.65	42.96	35.66	174.31	71.37	109.24	131.13	-137.42
2051	0.00	0.00	132.74	0.00	9.87	0.00	142.60	42.96	37.41	174.31	71.37	109.24	131.13	-137.42
2052	0.00	0.00	9.78	0.00	9.87	0.00	19.65	42.96	37.41	174.31	71.37	109.24	131.13	-137.42
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.42	174.31	71.37	109.24	131.13	-137.42
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	174.31	71.37	109.24	131.13	-137.42
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	174.31	71.37	109.24	131.13	-137.42
2056	0.00	0.00	0.00	0.00	12.08	0.00	12.08	42.96	38.58	174.31	71.37	109.24	131.13	-137.42
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	38.58	174.31	71.37	109.24	131.13	-137.42
2067	0.00	0.00	110.58	0.00	0.00	0.00	110.58	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2068	0.00	0.00	151.33	0.00	0.00	0.00	151.33	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2069	0.00	0.00	23.00	0.00	0.00	0.00	23.00	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2070	0.00	0.00	112.92	0.00	0.00	0.00	112.92	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2071	0.00	0.00	154.53	0.00	0.00	0.00	154.53	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2072	0.00	0.00	138.00	0.00	0.80	0.00	138.80	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2073	0.00	0.00	156.70	0.00	13.69	0.00	170.39	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2074	0.00	0.00	23.82	0.00	3.21	0.00	27.03	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2075	0.00	0.00	116.93	0.00	7.23	0.00	124.16	42.96	51.18	174.31	71.37	109.24	131.13	-137.42
2076	0.00	0.00	160.02	0.00	74.56	0.00	234.57	42.96	38.58	174.31	71.37	109.24	131.13	-137.42
2077	0.00	0.00	24.32	0.00	0.00	0.00	24.32	42.96	52.92	174.31	71.37	109.24	131.13	-137.42
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	174.31	71.37	109.24	131.13	-137.42
2079	0.00	0.00	204.33	0.00	0.00	0.00	204.33	42.96	52.92	174.31	71.37	109.24	131.13	-137.42
2080	0.00	0.00	295.78	0.00	0.00	0.00	295.78	42.96	37.43	174.31	71.37	109.24	131.13	-137.42
2081	0.00	0.00	132.74	0.00	60.02	0.00	192.76	42.96	52.92	174.31	71.37	109.24	131.13	-137.42
2082	0.00	0.00	9.78	0.00	0.00	0.00	9.78	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	38.58	174.31	71.37	109.24	131.13	-137.42
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	174.31	71.37	109.24	131.13	-137.42
Salvage Value	5.25	0.00	23.69	0.00	3.34	0.00	32.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	994.61	0.00	113.12	0.00	5493.99	528.43	328.31	4917.89	1780.68	917.37	2017.04	202.79

Net Present Value: -6148

Wind/C26

TABLE 165
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	235.42	102.83	15.46	80.72	36.42
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	254.26	101.10	17.25	85.37	50.54
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	261.04	99.23	17.83	86.91	57.07
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	273.84	97.64	18.34	87.61	70.24
2018	237.84	0.00	0.00	0.00	0.00	0.00	237.84	3.51	0.00	262.67	94.94	20.49	88.17	59.07
2019	286.35	0.00	0.00	0.00	0.00	0.00	286.35	4.94	0.00	256.33	92.97	18.31	87.83	57.22
2020	293.68	0.00	0.00	12.81	20.76	0.00	327.25	6.57	0.00	259.67	92.45	14.09	89.99	63.14
2021	811.02	0.00	0.00	391.21	34.60	0.00	1236.83	12.76	0.00	259.93	90.65	13.72	94.90	60.67
2022	1304.42	0.00	0.00	398.53	42.32	0.00	1745.28	21.48	6.21	263.01	89.00	13.75	95.22	65.03
2023	1173.36	0.00	0.00	385.72	22.37	0.00	1581.44	29.39	12.42	266.63	86.54	15.77	98.60	65.71
2024	839.47	0.00	0.00	7.32	10.13	0.00	856.92	33.68	18.63	279.91	84.58	16.38	105.10	73.85
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	36.62	18.63	188.60	84.40	10.75	120.96	-27.51
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	38.56	32.93	242.22	88.44	12.78	87.10	53.88
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	39.26	33.15	328.38	95.99	11.53	81.31	139.55
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	39.49	32.86	348.38	96.05	12.65	85.63	154.05
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	33.07	337.72	94.39	12.86	87.53	142.94
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.90	329.65	93.32	12.58	87.51	136.24
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.85	320.66	91.91	12.90	88.64	127.21
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	39.49	32.61	308.08	90.48	12.93	89.60	115.08
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.18	293.11	88.95	12.82	90.75	100.58
2034	0.00	0.00	130.10	0.00	0.00	0.00	130.10	40.03	32.18	278.46	87.50	12.84	91.56	86.56
2035	0.00	0.00	170.00	0.00	12.08	0.00	182.08	40.83	32.22	272.47	86.48	11.72	92.83	81.43
2036	0.00	0.00	132.34	0.00	0.00	0.00	132.34	41.49	38.93	260.94	84.44	21.11	93.94	61.45
2037	0.00	0.00	150.32	0.00	12.08	0.00	162.40	42.30	36.03	251.41	82.99	23.83	96.12	48.46
2038	0.00	0.00	22.84	0.00	0.00	0.00	22.84	42.42	40.02	245.76	81.76	31.05	97.99	34.96
2039	0.00	0.00	112.14	0.00	0.00	0.00	112.14	42.98	40.02	238.61	80.58	30.25	108.58	19.20
2040	0.00	0.00	155.53	12.81	95.12	0.00	263.47	44.29	40.02	227.22	78.93	38.14	109.92	0.23
2041	0.00	0.00	137.04	391.21	0.00	0.00	528.25	46.93	44.02	220.25	77.54	47.05	112.41	-16.75
2042	0.00	0.00	155.61	398.53	0.00	0.00	554.15	49.70	43.36	212.30	76.27	49.16	117.18	-30.31
2043	0.00	0.00	138.96	385.72	0.00	0.00	524.68	52.32	47.34	207.15	74.99	55.01	123.09	-45.93
2044	0.00	0.00	157.80	7.32	80.02	0.00	245.15	53.55	47.34	196.08	73.64	68.16	120.93	-66.65
2045	0.00	0.00	23.99	0.00	0.00	0.00	23.99	53.67	51.35	189.15	72.37	79.65	123.27	-86.14
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	54.25	181.87	71.10	81.06	131.52	-101.81
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.36	175.07	69.87	81.85	141.51	-118.15
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.36	182.03	71.11	80.85	132.10	-102.03
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.37	182.03	71.11	80.85	132.10	-102.03
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.38	182.03	71.11	80.85	132.10	-102.03
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	53.12	182.03	71.11	80.85	132.10	-102.03
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	53.13	182.03	71.11	80.85	132.10	-102.03
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	182.03	71.11	80.85	132.10	-102.03
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	182.03	71.11	80.85	132.10	-102.03
2055	0.00	0.00	0.00	0.00	5.19	0.00	5.19	53.67	53.13	182.03	71.11	80.85	132.10	-102.03
2056	0.00	0.00	0.00	0.00	8.65	0.00	8.65	53.67	54.28	182.03	71.11	80.85	132.10	-102.03
2057	0.00	0.00	0.00	0.00	10.38	0.00	10.38	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2058	0.00	0.00	0.00	0.00	5.19	0.00	5.19	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2059	0.00	0.00	0.00	0.00	1.73	0.00	1.73	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2060	0.00	0.00	0.00	12.81	0.00	0.00	12.81	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2061	0.00	0.00	0.00	391.21	0.00	0.00	391.21	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2062	0.00	0.00	0.00	398.53	0.00	0.00	398.53	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2063	0.00	0.00	0.00	385.72	0.00	0.00	385.72	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2064	0.00	0.00	108.29	7.32	0.00	0.00	115.61	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2065	0.00	0.00	148.20	0.00	0.00	0.00	148.20	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2066	0.00	0.00	132.34	0.00	0.00	0.00	132.34	53.67	54.28	182.03	71.11	80.85	132.10	-102.03
2067	0.00	0.00	150.28	0.00	0.00	0.00	150.28	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2068	0.00	0.00	22.84	0.00	0.00	0.00	22.84	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2069	0.00	0.00	112.14	0.00	0.00	0.00	112.14	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2070	0.00	0.00	153.46	0.00	27.65	0.00	181.11	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2071	0.00	0.00	137.04	0.00	25.95	0.00	162.99	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2072	0.00	0.00	155.61	0.00	44.02	0.00	199.63	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2073	0.00	0.00	138.96	0.00	17.18	0.00	156.14	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2074	0.00	0.00	157.80	0.00	8.40	0.00	166.20	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2075	0.00	0.00	23.99	0.00	78.57	0.00	102.56	53.67	66.88	182.03	71.11	80.85	132.10	-102.03
2076	0.00	0.00	0.00	0.00	3.21	0.00	3.21	53.67	54.28	182.03	71.11	80.85	132.10	-102.03
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	68.62	182.03	71.11	80.85	132.10	-102.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	182.03	71.11	80.85	132.10	-102.03
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	53.67	68.62	182.03	71.11	80.85	132.10	-102.03
2080	0.00	0.00	0.00	12.81	0.00	0.00	12.81	53.67	53.13	182.03	71.11	80.85	132.10	-102.03
2081	0.00	0.00	0.00	391.21	0.00	0.00	391.21	53.67	68.62	182.03	71.11	80.85	132.10	-102.03
2082	0.00	0.00	0.00	398.53	0.00	0.00	398.53	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2083	0.00	0.00	0.00	385.72	0.00	0.00	385.72	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2084	0.00	0.00	0.00	7.32	9.87	0.00	17.19	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	54.28	182.03	71.11	80.85	132.10	-102.03
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
2090	0.00	0.00	0.00	0.00	23.78	0.00	23.78	53.67	51.39	182.03	71.11	80.85	132.10	-102.03
Salvage Value	5.25	0.00	11.73	17.84	5.41	0.00	40.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	518.88	1245.51	204.97	0.00	6355.62	609.68	505.89	5067.79	1771.95	631.70	2053.16	610.98

Net Present Value -6860

K19/C25/750MW (WPS Sale &Inv)

TABLE 166
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	3.03	253.83	1.27	0.00	242.21	102.83	15.48	80.87	43.02
2015	85.21	447.43	0.00	0.00	16.99	5.38	555.01	4.04	0.00	260.10	101.13	17.25	85.39	56.32
2016	169.37	590.03	0.00	0.00	22.47	13.57	795.44	8.02	0.00	267.99	99.25	17.82	86.97	63.95
2017	194.90	712.98	0.00	0.00	31.91	19.70	959.49	12.82	0.00	279.67	97.32	19.03	88.23	75.09
2018	232.72	501.27	0.00	0.00	31.33	82.84	848.16	17.06	0.00	272.60	95.25	19.93	88.09	69.34
2019	236.47	357.48	0.00	0.00	39.66	67.68	701.30	20.57	13.01	288.25	95.16	18.80	86.88	87.42
2020	649.94	145.55	0.00	0.00	2.55	128.14	926.17	25.20	44.86	449.38	102.30	13.40	94.38	239.31
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	30.81	42.99	525.13	102.85	14.78	98.96	308.54
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	35.54	41.65	526.20	101.62	14.84	99.99	309.75
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	39.00	39.80	516.71	99.30	14.70	102.60	300.11
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	41.52	38.24	516.11	97.04	16.33	107.99	294.75
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	43.34	50.89	459.61	101.54	14.61	91.00	252.47
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	44.26	49.35	600.80	109.54	14.54	90.54	386.17
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	44.43	47.92	630.74	109.76	14.26	95.62	411.10
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	46.91	631.44	108.10	14.77	97.28	411.29
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	48.20	620.79	106.19	14.77	99.06	400.78
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	43.02	614.61	104.84	14.44	100.06	395.26
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	41.70	606.74	103.20	14.79	101.68	387.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	40.22	595.17	101.50	14.81	103.31	375.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	39.21	581.21	99.71	14.78	105.06	361.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	38.27	567.19	97.99	14.84	106.63	347.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	39.54	515.63	96.32	14.67	104.60	300.04
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	36.10	437.00	94.66	14.92	97.63	229.78
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	44.43	35.57	411.37	93.04	15.02	98.34	204.97
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	35.06	395.40	91.40	14.96	100.88	188.14
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	44.68	37.47	380.48	89.79	14.92	109.91	165.86
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	45.06	34.09	359.66	88.53	14.17	114.48	142.48
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	45.12	36.95	341.61	86.53	24.36	114.53	116.18
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	45.37	36.51	331.48	85.01	27.29	117.13	102.06
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	45.75	36.07	323.61	83.65	28.88	120.56	90.52
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	46.06	41.37	320.59	82.43	33.29	124.83	80.03
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	46.67	43.86	303.22	80.60	42.00	124.59	56.02
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.73	44.56	295.19	79.17	51.41	126.95	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	43.31	286.90	77.89	53.82	131.36	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	42.07	295.10	79.22	49.08	127.63	39.17
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	46.73	44.61	295.10	79.22	49.08	127.63	39.17
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	46.73	43.11	295.10	79.22	49.08	127.63	39.17
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	46.73	42.78	295.10	79.22	49.08	127.63	39.17
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	46.73	42.46	295.10	79.22	49.08	127.63	39.17
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	46.73	42.15	295.10	79.22	49.08	127.63	39.17
2054	0.00	0.00	0.00	0.00	13.81	14.60	28.41	46.73	41.84	295.10	79.22	49.08	127.63	39.17
2055	0.00	0.00	0.00	0.00	0.63	15.14	15.77	46.73	42.71	295.10	79.22	49.08	127.63	39.17
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.73	55.02	295.10	79.22	49.08	127.63	39.17
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	46.73	39.25	295.10	79.22	49.08	127.63	39.17
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	46.73	54.48	295.10	79.22	49.08	127.63	39.17
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	46.73	41.62	295.10	79.22	49.08	127.63	39.17
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	46.73	51.26	295.10	79.22	49.08	127.63	39.17
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	66.75	295.10	79.22	49.08	127.63	39.17
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	46.73	66.75	295.10	79.22	49.08	127.63	39.17
2065	0.00	0.00	0.00	0.00	6.80	3.30	10.10	46.73	38.66	295.10	79.22	49.08	127.63	39.17
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	46.73	66.75	295.10	79.22	49.08	127.63	39.17
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	46.73	66.75	295.10	79.22	49.08	127.63	39.17
2069	0.00	0.00	50.82	0.00	25.85	44.50	121.17	46.73	38.66	295.10	79.22	49.08	127.63	39.17
2070	0.00	0.00	69.13	0.00	1.92	46.15	117.20	46.73	53.00	295.10	79.22	49.08	127.63	39.17
2071	0.00	0.00	10.44	0.00	23.45	0.00	33.90	46.73	37.50	295.10	79.22	49.08	127.63	39.17
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	46.73	53.00	295.10	79.22	49.08	127.63	39.17
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	46.73	36.63	295.10	79.22	49.08	127.63	39.17
2074	0.00	0.00	61.55	0.00	36.88	0.00	98.43	46.73	51.26	295.10	79.22	49.08	127.63	39.17
2075	0.00	0.00	69.47	0.00	54.62	0.00	124.09	46.73	38.66	295.10	79.22	49.08	127.63	39.17
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	46.73	53.00	295.10	79.22	49.08	127.63	39.17
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	37.50	295.10	79.22	49.08	127.63	39.17
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	46.73	53.00	295.10	79.22	49.08	127.63	39.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	40.40	295.10	79.22	49.08	127.63	39.17
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	46.73	53.00	295.10	79.22	49.08	127.63	39.17
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	46.73	38.66	295.10	79.22	49.08	127.63	39.17
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	46.73	35.76	295.10	79.22	49.08	127.63	39.17
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	46.73	38.66	295.10	79.22	49.08	127.63	39.17
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	46.73	38.66	295.10	79.22	49.08	127.63	39.17
Salvage Value	2.09	0.00	4.18	0.00	7.90	3.78	17.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	128.59	0.00	347.09	270.30	6973.03	695.12	651.85	8218.72	1937.33	468.68	2089.97	3722.73

Net Present Value -4597

K19/C25/750MW

TABLE 167
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	4.28	255.09	1.28	0.00	235.04	102.84	15.48	80.73	35.99
2015	85.21	447.43	0.00	0.00	16.99	6.89	556.52	4.06	0.00	253.15	101.12	17.24	85.38	49.41
2016	169.37	590.03	0.00	0.00	22.47	14.21	796.09	8.04	0.00	259.84	99.24	17.80	86.94	55.86
2017	194.90	712.98	0.00	0.00	31.91	19.70	959.49	12.84	0.00	270.25	97.31	19.03	88.21	65.70
2018	232.72	501.27	0.00	0.00	31.33	118.44	883.77	17.25	0.00	261.92	95.24	19.90	88.12	58.66
2019	236.47	357.48	0.00	0.00	39.66	80.56	714.18	20.83	13.01	276.27	95.15	18.76	86.90	75.45
2020	649.94	145.55	0.00	0.00	2.55	228.41	1026.44	25.96	47.98	427.19	102.30	13.38	94.29	217.23
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	31.57	46.21	512.43	102.85	14.88	99.04	295.66
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	36.30	44.90	516.02	101.61	14.84	100.01	299.56
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	39.76	42.92	507.21	99.29	14.70	102.63	290.59
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	42.28	41.22	507.90	97.02	16.38	108.04	286.46
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	44.10	53.76	450.55	101.54	14.63	90.99	243.39
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	45.02	52.09	554.42	109.53	14.59	88.69	341.61
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	45.19	50.55	550.50	109.77	14.17	91.03	335.52
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	49.42	548.21	108.10	14.75	92.34	333.03
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	50.61	539.20	106.18	14.76	94.21	324.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	45.33	534.45	104.82	14.48	95.38	319.78
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	43.90	528.29	103.18	14.86	97.08	313.16
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	42.32	518.49	101.49	14.87	98.98	303.15
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	41.21	506.40	99.71	14.76	100.93	291.00
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	40.19	494.28	98.00	14.81	102.77	278.70
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	41.37	427.29	96.35	14.84	95.98	220.12
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	37.85	402.80	94.67	14.98	96.41	196.73
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	45.19	37.25	388.49	93.02	14.97	98.37	182.12
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	36.67	373.34	91.40	14.94	100.87	166.12
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	45.45	39.01	359.20	89.79	14.95	109.86	144.59
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	45.82	35.57	355.41	88.53	14.19	114.45	138.25
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	45.88	38.37	341.61	86.53	24.36	114.52	116.19
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	46.13	37.86	331.48	85.01	27.29	117.12	102.07
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	46.51	37.36	323.62	83.65	28.88	120.56	90.53
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	46.82	42.61	320.60	82.43	33.29	124.82	80.05
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	47.43	45.04	303.20	80.60	42.00	124.56	56.03
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	47.49	45.69	295.13	79.17	51.41	126.90	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	44.39	286.86	77.89	53.82	131.32	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	43.10	295.07	79.22	49.08	127.59	39.17
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	47.49	45.59	295.07	79.22	49.08	127.59	39.17
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	47.49	44.04	295.07	79.22	49.08	127.59	39.17
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	47.49	43.67	295.07	79.22	49.08	127.59	39.17
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	47.49	43.30	295.07	79.22	49.08	127.59	39.17
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	47.49	42.95	295.07	79.22	49.08	127.59	39.17
2054	0.00	0.00	0.00	0.00	13.81	14.60	28.41	47.49	42.61	295.07	79.22	49.08	127.59	39.17
2055	0.00	0.00	0.00	0.00	0.63	15.14	15.77	47.49	43.43	295.07	79.22	49.08	127.59	39.17
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	47.49	55.71	295.07	79.22	49.08	127.59	39.17
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	47.49	39.90	295.07	79.22	49.08	127.59	39.17
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	47.49	55.10	295.07	79.22	49.08	127.59	39.17
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	47.49	42.21	295.07	79.22	49.08	127.59	39.17
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	47.49	51.26	295.07	79.22	49.08	127.59	39.17
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	66.75	295.07	79.22	49.08	127.59	39.17
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	47.49	66.75	295.07	79.22	49.08	127.59	39.17
2065	0.00	0.00	0.00	0.00	6.80	3.30	10.10	47.49	38.66	295.07	79.22	49.08	127.59	39.17
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	47.49	66.75	295.07	79.22	49.08	127.59	39.17
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	47.49	66.75	295.07	79.22	49.08	127.59	39.17
2069	0.00	0.00	50.82	0.00	25.85	44.50	121.17	47.49	38.66	295.07	79.22	49.08	127.59	39.17
2070	0.00	0.00	69.13	0.00	1.92	46.15	117.20	47.49	53.00	295.07	79.22	49.08	127.59	39.17
2071	0.00	0.00	10.44	0.00	23.45	0.00	33.90	47.49	37.50	295.07	79.22	49.08	127.59	39.17
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	47.49	53.00	295.07	79.22	49.08	127.59	39.17
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	47.49	36.63	295.07	79.22	49.08	127.59	39.17
2074	0.00	0.00	61.55	0.00	36.88	0.00	98.43	47.49	51.26	295.07	79.22	49.08	127.59	39.17
2075	0.00	0.00	69.47	0.00	54.62	0.00	124.09	47.49	38.66	295.07	79.22	49.08	127.59	39.17
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	47.49	53.00	295.07	79.22	49.08	127.59	39.17
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	37.50	295.07	79.22	49.08	127.59	39.17
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	47.49	53.00	295.07	79.22	49.08	127.59	39.17
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	40.40	295.07	79.22	49.08	127.59	39.17
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	47.49	53.00	295.07	79.22	49.08	127.59	39.17
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	47.49	38.66	295.07	79.22	49.08	127.59	39.17
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	47.49	35.76	295.07	79.22	49.08	127.59	39.17
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	47.49	38.66	295.07	79.22	49.08	127.59	39.17
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	47.49	38.66	295.07	79.22	49.08	127.59	39.17
Salvage Value	2.09	0.00	4.18	0.00	7.90	3.78	17.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	128.59	0.00	347.09	387.48	7090.21	706.95	680.39	7750.65	1937.26	468.79	2068.98	3275.62

Net Present Value -5202

K19/Gas25/750MW (WPS Sale & INV)

TABLE 168
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	3.03	223.47	1.12	0.00	242.21	102.83	15.48	80.87	43.02
2015	0.00	447.43	0.00	0.00	16.99	5.38	469.80	3.47	0.00	260.11	101.13	17.25	85.39	56.34
2016	0.00	590.03	0.00	0.00	22.47	13.57	626.07	6.60	0.00	268.02	99.25	17.81	86.97	63.99
2017	0.00	712.98	0.00	0.00	31.91	19.70	764.59	10.42	0.00	279.87	97.31	19.02	88.21	75.33
2018	0.00	501.27	0.00	0.00	31.33	82.84	615.44	13.50	0.00	272.90	95.25	19.89	88.06	69.71
2019	0.00	357.48	0.00	0.00	37.12	67.68	462.29	15.81	13.01	288.76	95.16	18.79	86.87	87.95
2020	0.00	145.55	0.00	0.00	0.01	128.14	273.69	17.18	44.86	450.11	102.30	13.39	94.34	240.09
2021	0.00	50.36	0.36	0.00	0.00	0.00	50.72	17.43	42.99	526.41	102.85	14.77	98.89	309.90
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.43	41.65	527.62	101.61	14.81	99.90	311.30
2023	0.00	0.00	71.82	0.00	0.00	0.00	71.82	17.68	39.80	516.96	98.83	15.69	103.11	299.33
2024	0.00	0.00	139.90	0.00	6.75	0.00	146.65	18.30	38.24	518.44	96.72	17.26	108.32	296.14
2025	0.00	0.00	80.45	0.00	53.19	0.00	133.64	18.96	40.58	407.70	96.38	16.66	99.91	194.76
2026	0.00	0.00	60.45	0.00	0.00	0.00	60.45	19.26	42.81	436.08	95.06	19.74	102.82	218.47
2027	0.00	0.00	68.23	0.00	0.00	0.00	68.23	19.60	41.52	435.35	93.10	19.37	107.25	215.63
2028	0.00	0.00	10.31	0.00	0.00	0.00	10.31	19.66	44.28	427.72	90.77	28.45	109.90	198.60
2029	0.00	0.00	50.31	0.00	0.00	0.00	50.31	19.91	45.74	418.45	89.00	31.85	112.95	184.64
2030	0.00	0.00	68.44	0.00	44.75	0.00	113.18	20.47	40.62	416.77	87.91	34.97	115.44	178.44
2031	0.00	0.00	60.75	0.00	0.00	0.00	60.75	20.78	43.47	420.45	87.52	38.02	116.35	178.57
2032	0.00	0.00	68.58	0.00	0.00	0.00	68.58	21.12	42.36	407.34	85.18	45.35	120.92	155.89
2033	0.00	0.00	10.36	0.00	0.00	0.00	10.36	21.17	45.27	401.28	83.65	54.36	123.98	139.30
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	44.22	397.76	82.88	56.79	125.92	132.17
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	42.77	327.85	80.76	54.97	121.35	70.76
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	42.23	234.95	79.31	55.99	109.50	-9.85
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	41.71	210.09	77.89	61.43	110.05	-39.29
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	41.21	206.91	77.14	60.04	115.48	-45.75
2039	0.00	0.00	102.19	0.00	0.00	0.00	102.19	21.68	43.61	187.52	75.22	71.84	122.10	-81.64
2040	0.00	0.00	147.04	0.00	0.00	0.00	147.04	22.42	40.24	168.22	73.88	79.52	125.06	-110.25
2041	0.00	0.00	65.60	0.00	6.75	0.00	72.35	22.78	39.77	170.65	74.09	77.86	124.79	-106.10
2042	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.80	46.24	187.38	71.91	111.85	126.46	-122.85
2043	0.00	0.00	51.02	0.00	0.00	0.00	51.02	23.06	45.80	173.87	70.18	122.40	130.42	-149.13
2044	0.00	0.00	69.40	0.00	44.75	0.00	114.15	23.63	47.12	158.19	68.58	130.87	134.36	-175.63
2045	0.00	0.00	32.97	0.00	0.00	0.00	32.97	23.79	50.71	151.11	67.25	146.06	137.45	-199.64
2046	0.00	0.00	30.59	0.00	0.00	0.00	30.59	23.95	50.31	142.96	66.04	158.46	140.50	-222.04
2047	0.00	0.00	4.62	0.00	0.00	0.00	4.62	23.97	50.50	139.63	65.22	163.56	146.17	-235.33
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	49.26	144.57	66.17	156.03	141.37	-219.00
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	23.97	51.80	144.57	66.17	156.03	141.37	-219.00
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	23.97	48.56	144.57	66.17	156.03	141.37	-219.00
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	23.97	48.23	144.57	66.17	156.03	141.37	-219.00
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	23.97	47.91	144.57	66.17	156.03	141.37	-219.00
2053	0.00	0.00	50.01	0.00	16.16	14.60	80.77	23.97	47.60	144.57	66.17	156.03	141.37	-219.00
2054	0.00	0.00	118.09	0.00	13.19	14.60	145.87	23.97	47.29	144.57	66.17	156.03	141.37	-219.00
2055	0.00	0.00	78.38	0.00	0.00	15.14	93.52	23.97	47.00	144.57	66.17	156.03	141.37	-219.00
2056	0.00	0.00	60.45	0.00	0.00	0.00	60.45	23.97	62.21	144.57	66.17	156.03	141.37	-219.00
2057	0.00	0.00	68.23	0.00	0.00	0.00	68.23	23.97	46.44	144.57	66.17	156.03	141.37	-219.00
2058	0.00	0.00	10.31	0.00	0.00	0.00	10.31	23.97	61.67	144.57	66.17	156.03	141.37	-219.00
2059	0.00	0.00	50.31	0.00	6.75	0.00	57.06	23.97	48.81	144.57	66.17	156.03	141.37	-219.00
2060	0.00	0.00	68.44	0.00	39.89	0.00	108.33	23.97	58.45	144.57	66.17	156.03	141.37	-219.00
2061	0.00	0.00	60.75	0.00	0.00	0.00	60.75	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2062	0.00	0.00	68.58	0.00	0.00	0.00	68.58	23.97	58.45	144.57	66.17	156.03	141.37	-219.00
2063	0.00	0.00	10.36	0.00	0.00	0.00	10.36	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	23.97	58.45	144.57	66.17	156.03	141.37	-219.00
2065	0.00	0.00	0.00	0.00	40.36	3.30	43.66	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	23.97	58.45	144.57	66.17	156.03	141.37	-219.00
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	23.97	58.45	144.57	66.17	156.03	141.37	-219.00
2069	0.00	0.00	102.19	0.00	23.93	44.50	170.63	23.97	45.85	144.57	66.17	156.03	141.37	-219.00
2070	0.00	0.00	147.04	0.00	0.01	46.15	193.20	23.97	44.69	144.57	66.17	156.03	141.37	-219.00
2071	0.00	0.00	65.60	0.00	0.00	0.00	65.60	23.97	44.69	144.57	66.17	156.03	141.37	-219.00
2072	0.00	0.00	4.80	0.00	0.00	0.00	4.80	23.97	44.69	144.57	66.17	156.03	141.37	-219.00
2073	0.00	0.00	51.02	0.00	0.00	0.00	51.02	23.97	43.82	144.57	66.17	156.03	141.37	-219.00
2074	0.00	0.00	69.40	0.00	0.00	0.00	69.40	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2075	0.00	0.00	32.97	0.00	13.30	0.00	46.27	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2076	0.00	0.00	30.59	0.00	6.75	0.00	37.34	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2077	0.00	0.00	4.62	0.00	0.00	0.00	4.62	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	23.97	45.85	144.57	66.17	156.03	141.37	-219.00
2080	0.00	0.00	0.00	0.00	11.19	0.00	11.19	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2083	0.00	0.00	50.01	0.00	0.00	0.00	50.01	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2084	0.00	0.00	118.09	0.00	10.44	0.54	129.07	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2085	0.00	0.00	78.38	0.00	10.19	1.08	89.64	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2086	0.00	0.00	60.45	0.00	21.65	3.24	85.35	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2087	0.00	0.00	68.23	0.00	24.82	4.87	97.92	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2088	0.00	0.00	10.31	0.00	16.16	14.60	41.07	23.97	42.95	144.57	66.17	156.03	141.37	-219.00
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	23.97	45.85	144.57	66.17	156.03	141.37	-219.00
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	23.97	45.85	144.57	66.17	156.03	141.37	-219.00
Salvage Value	0.00	0.00	13.83	0.00	4.53	3.78	22.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	603.69	0.00	232.96	270.30	3719.40	357.06	675.38	6287.53	1772.86	1159.47	2246.50	1108.70

Net Present Value -3643

K19/C31/750MW

TABLE 169
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	201.82	0.00	0.00	18.63	4.28	254.46	1.27	0.00	235.04	102.84	15.48	80.73	35.99
2015	37.44	447.43	0.00	0.00	16.99	6.89	508.74	3.82	0.00	253.15	101.12	17.24	85.38	49.41
2016	10.52	590.03	0.00	0.00	22.47	14.21	637.24	7.00	0.00	259.84	99.24	17.80	86.94	55.86
2017	10.55	712.98	0.00	0.00	31.91	19.70	775.14	10.88	0.00	270.49	97.30	19.03	88.21	65.95
2018	12.50	501.27	0.00	0.00	31.33	118.44	663.55	14.20	0.00	262.21	95.22	19.89	88.09	59.00
2019	12.54	357.48	0.00	0.00	37.12	80.56	487.70	16.63	13.01	276.72	95.14	18.81	86.89	75.89
2020	12.58	145.55	0.00	0.00	0.01	228.41	386.54	18.57	47.98	427.97	102.29	13.41	94.28	218.00
2021	15.86	50.36	0.00	0.00	0.00	0.00	66.22	18.90	46.21	513.52	102.84	14.85	98.93	296.90
2022	149.25	0.00	0.00	0.00	0.00	0.00	149.25	19.64	44.90	517.57	101.63	14.82	99.91	301.21
2023	229.26	0.00	0.00	0.00	0.00	0.00	229.26	20.79	42.92	507.05	98.72	15.88	103.40	289.05
2024	245.84	0.00	0.00	0.00	0.00	0.00	245.84	22.02	41.22	508.98	96.54	17.66	108.96	285.81
2025	248.58	0.00	0.00	0.00	2.54	0.00	251.12	23.28	39.45	396.48	96.40	12.81	105.63	181.63
2026	669.49	0.00	0.00	0.00	2.54	0.00	672.03	26.64	37.57	381.05	94.51	13.22	114.38	158.93
2027	1059.04	0.00	0.00	0.00	30.99	0.00	1090.03	32.09	36.17	340.15	92.59	12.42	112.80	122.35
2028	948.10	0.00	0.00	0.00	16.22	0.00	964.31	36.91	34.83	327.36	90.99	12.90	122.14	101.33
2029	675.08	0.00	0.00	0.00	27.35	0.00	702.43	40.42	36.18	318.05	89.38	13.28	133.01	82.38
2030	466.18	0.00	0.00	0.00	47.55	0.00	513.73	42.99	30.95	315.57	88.06	13.59	141.65	72.27
2031	305.31	0.00	0.00	0.00	62.94	0.00	368.25	44.83	44.00	362.08	92.07	15.75	93.46	160.80
2032	112.12	0.00	0.00	0.00	73.72	0.00	185.84	45.76	43.00	473.50	99.09	15.49	93.01	265.90
2033	35.28	0.00	0.00	0.00	0.00	0.00	35.28	45.93	41.68	508.23	99.80	15.14	100.93	292.36
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	40.76	494.32	98.01	14.80	102.75	278.76
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	39.05	426.72	96.35	14.76	95.92	219.69
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	38.38	402.71	94.67	15.07	96.35	196.62
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	45.93	37.61	388.66	93.03	15.01	98.34	182.28
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	36.66	373.37	91.40	14.93	100.85	166.18
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	46.19	39.07	359.24	89.79	14.94	109.84	144.67
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	46.57	35.74	355.41	88.53	14.19	114.45	138.25
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	46.62	41.92	341.61	86.53	24.36	114.52	116.19
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	46.88	38.52	331.48	85.01	27.29	117.12	102.07
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	47.26	38.02	323.62	83.65	28.88	120.56	90.53
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	47.56	43.27	320.60	82.43	33.29	124.82	80.05
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	48.18	42.80	303.20	80.60	42.00	124.56	56.03
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	48.23	46.35	295.13	79.17	51.41	126.90	37.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	44.39	286.86	77.89	53.82	131.32	23.82
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	43.10	295.07	79.22	49.08	127.59	39.17
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	48.23	45.59	295.07	79.22	49.08	127.59	39.17
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	48.23	42.30	295.07	79.22	49.08	127.59	39.17
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	48.23	44.82	295.07	79.22	49.08	127.59	39.17
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	48.23	41.57	295.07	79.22	49.08	127.59	39.17
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	48.23	41.22	295.07	79.22	49.08	127.59	39.17
2054	0.00	0.00	0.00	0.00	13.19	14.60	27.78	48.23	40.87	295.07	79.22	49.08	127.59	39.17
2055	0.00	0.00	0.00	0.00	0.00	15.14	15.14	48.23	40.54	295.07	79.22	49.08	127.59	39.17
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	57.45	295.07	79.22	49.08	127.59	39.17
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	41.64	295.07	79.22	49.08	127.59	39.17
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	56.83	295.07	79.22	49.08	127.59	39.17
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	43.95	295.07	79.22	49.08	127.59	39.17
2060	0.00	0.00	0.00	0.00	0.63	0.00	0.63	48.23	53.00	295.07	79.22	49.08	127.59	39.17
2061	0.00	0.00	0.00	0.00	0.63	0.00	0.63	48.23	38.66	295.07	79.22	49.08	127.59	39.17
2062	0.00	0.00	0.00	0.00	7.54	0.00	7.54	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2063	0.00	0.00	0.00	0.00	3.77	0.00	3.77	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2064	0.00	0.00	0.00	0.00	14.47	1.65	16.12	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2065	0.00	0.00	0.00	0.00	17.48	3.30	20.77	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2066	0.00	0.00	0.00	0.00	15.89	9.89	25.78	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2067	0.00	0.00	0.00	0.00	25.30	14.83	40.14	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	48.23	66.75	295.07	79.22	49.08	127.59	39.17
2069	0.00	0.00	50.82	0.00	23.93	44.50	119.25	48.23	38.66	295.07	79.22	49.08	127.59	39.17
2070	0.00	0.00	69.13	0.00	0.01	46.15	115.28	48.23	53.00	295.07	79.22	49.08	127.59	39.17
2071	0.00	0.00	10.44	0.00	0.00	0.00	10.44	48.23	40.40	295.07	79.22	49.08	127.59	39.17
2072	0.00	0.00	50.97	0.00	0.00	0.00	50.97	48.23	53.00	295.07	79.22	49.08	127.59	39.17
2073	0.00	0.00	69.33	0.00	0.00	0.00	69.33	48.23	36.63	295.07	79.22	49.08	127.59	39.17
2074	0.00	0.00	61.55	0.00	0.00	0.00	61.55	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2075	0.00	0.00	69.47	0.00	8.67	0.00	78.14	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2076	0.00	0.00	10.50	0.00	1.91	0.00	12.41	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2077	0.00	0.00	0.00	0.00	23.45	0.00	23.45	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2078	0.00	0.00	0.00	0.00	19.20	0.00	19.20	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2079	0.00	0.00	0.00	0.00	21.07	0.00	21.07	48.23	38.66	295.07	79.22	49.08	127.59	39.17
2080	0.00	0.00	0.00	0.00	76.77	0.00	76.77	48.23	51.26	295.07	79.22	49.08	127.59	39.17
2081	0.00	0.00	0.00	0.00	47.87	0.00	47.87	48.23	38.66	295.07	79.22	49.08	127.59	39.17
2082	0.00	0.00	0.00	0.00	55.51	0.00	55.51	48.23	53.00	295.07	79.22	49.08	127.59	39.17
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	37.50	295.07	79.22	49.08	127.59	39.17
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	48.23	53.00	295.07	79.22	49.08	127.59	39.17
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	48.23	37.50	295.07	79.22	49.08	127.59	39.17
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	48.23	53.00	295.07	79.22	49.08	127.59	39.17
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	48.23	35.76	295.07	79.22	49.08	127.59	39.17
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	48.23	38.66	295.07	79.22	49.08	127.59	39.17
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	48.23	38.66	295.07	79.22	49.08	127.59	39.17
Salvage Value	15.21	0.00	4.18	0.00	8.81	3.78	31.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	2783.06	2612.45	128.59	0.00	300.62	387.48	6212.19	617.20	634.27	7110.28	1886.23	466.36	2154.49	2603.20

Net Present Value -4860

K19/Gas31/750MW

TABLE 170
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	4.28	224.73	1.12	0.00	235.04	102.84	15.48	80.73	35.99
2015	0.00	447.43	0.00	0.00	16.99	6.89	471.30	3.48	0.00	253.15	101.12	17.24	85.38	49.41
2016	0.00	590.03	0.00	0.00	22.47	14.21	626.72	6.61	0.00	259.84	99.24	17.80	86.94	55.86
2017	0.00	712.98	0.00	0.00	31.91	19.70	764.59	10.44	0.00	270.49	97.30	19.03	88.21	65.95
2018	0.00	501.27	0.00	0.00	31.33	118.44	651.05	13.69	0.00	262.21	95.22	19.89	88.09	59.00
2019	0.00	357.48	0.00	0.00	37.12	80.56	475.16	16.07	13.01	276.72	95.14	18.81	86.89	75.89
2020	0.00	145.55	0.00	0.00	0.01	228.41	373.96	17.94	47.98	427.97	102.29	13.41	94.28	218.00
2021	0.00	50.36	0.00	0.00	0.00	0.00	50.36	18.19	46.21	513.52	102.84	14.85	98.93	296.90
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	44.90	517.53	101.62	14.84	99.92	301.15
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	42.92	507.32	98.72	15.88	103.38	289.34
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	41.22	509.51	96.54	17.67	108.94	286.35
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	39.45	397.76	96.40	12.82	105.83	182.71
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	37.57	383.42	94.50	13.31	114.79	160.82
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	18.19	36.17	343.20	92.58	12.46	113.14	125.03
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.19	34.83	331.98	90.98	12.91	122.94	105.15
2029	0.00	0.00	122.43	0.00	0.00	0.00	122.43	18.69	36.18	322.00	89.43	13.08	133.00	86.48
2030	0.00	0.00	209.04	0.00	13.51	0.00	222.55	19.70	30.95	323.09	88.83	11.60	139.32	83.35
2031	0.00	0.00	91.26	0.00	53.19	0.00	144.45	20.41	37.66	315.44	86.70	25.87	110.03	92.84
2032	0.00	0.00	60.81	0.00	0.00	0.00	60.81	20.71	40.44	308.62	85.12	32.96	112.29	78.26
2033	0.00	0.00	68.64	0.00	0.00	0.00	68.64	21.06	39.27	299.91	83.68	36.37	114.96	64.91
2034	0.00	0.00	10.37	0.00	0.00	0.00	10.37	21.11	42.11	299.40	82.88	39.34	117.75	59.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.11	40.58	225.74	80.78	47.05	107.30	-9.40
2036	0.00	0.00	101.88	0.00	0.00	0.00	101.88	21.62	39.95	204.04	79.36	51.57	107.78	-34.66
2037	0.00	0.00	146.60	0.00	0.00	0.00	146.60	22.35	39.36	194.52	78.04	56.53	110.11	-50.16
2038	0.00	0.00	65.40	0.00	44.75	0.00	110.14	22.90	38.79	197.75	77.88	51.71	115.25	-47.09
2039	0.00	0.00	4.79	0.00	0.00	0.00	4.79	22.92	48.06	210.73	75.67	86.71	119.60	-71.25
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.92	44.62	196.96	73.80	95.38	123.43	-95.65
2041	0.00	0.00	50.92	0.00	0.00	0.00	50.92	23.18	44.09	186.96	72.34	104.01	126.60	-115.98
2042	0.00	0.00	171.76	0.00	0.00	0.00	171.76	24.04	43.58	177.38	70.99	113.43	129.64	-136.68
2043	0.00	0.00	157.95	0.00	0.00	0.00	157.95	24.83	47.08	174.09	70.13	121.23	132.80	-150.05
2044	0.00	0.00	65.79	0.00	44.75	0.00	110.54	25.38	48.34	171.40	69.76	113.37	139.08	-150.80
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	25.40	54.81	181.88	67.85	153.08	134.30	-173.35
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	54.37	173.04	66.65	162.01	137.27	-192.89
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	53.07	162.28	65.39	171.80	140.32	-215.24
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	51.78	172.40	66.63	162.29	137.30	-193.82
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	25.40	54.27	172.40	66.63	162.29	137.30	-193.82
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	25.40	50.99	172.40	66.63	162.29	137.30	-193.82
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	25.40	50.61	172.40	66.63	162.29	137.30	-193.82
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	25.40	50.25	172.40	66.63	162.29	137.30	-193.82
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	25.40	49.89	172.40	66.63	162.29	137.30	-193.82
2054	0.00	0.00	0.00	0.00	13.19	14.60	27.78	25.40	49.55	172.40	66.63	162.29	137.30	-193.82
2055	0.00	0.00	0.00	0.00	0.00	15.14	15.14	25.40	49.22	172.40	66.63	162.29	137.30	-193.82
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	64.39	172.40	66.63	162.29	137.30	-193.82
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	48.58	172.40	66.63	162.29	137.30	-193.82
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	63.78	172.40	66.63	162.29	137.30	-193.82
2059	0.00	0.00	100.62	0.00	0.00	0.00	100.62	25.40	50.89	172.40	66.63	162.29	137.30	-193.82
2060	0.00	0.00	187.24	0.00	0.00	0.00	187.24	25.40	59.94	172.40	66.63	162.29	137.30	-193.82
2061	0.00	0.00	89.19	0.00	0.00	0.00	89.19	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2062	0.00	0.00	60.81	0.00	0.00	0.00	60.81	25.40	59.94	172.40	66.63	162.29	137.30	-193.82
2063	0.00	0.00	68.64	0.00	0.00	0.00	68.64	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2064	0.00	0.00	10.37	0.00	8.19	1.65	20.21	25.40	59.94	172.40	66.63	162.29	137.30	-193.82
2065	0.00	0.00	0.00	0.00	20.31	3.30	23.61	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2066	0.00	0.00	101.88	0.00	40.71	9.89	152.48	25.40	59.94	172.40	66.63	162.29	137.30	-193.82
2067	0.00	0.00	146.60	0.00	7.09	14.83	168.53	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2068	0.00	0.00	65.40	0.00	15.17	44.50	125.07	25.40	59.94	172.40	66.63	162.29	137.30	-193.82
2069	0.00	0.00	4.79	0.00	23.93	44.50	73.23	25.40	47.34	172.40	66.63	162.29	137.30	-193.82
2070	0.00	0.00	0.00	0.00	0.01	46.15	46.16	25.40	46.18	172.40	66.63	162.29	137.30	-193.82
2071	0.00	0.00	50.92	0.00	0.00	0.00	50.92	25.40	46.18	172.40	66.63	162.29	137.30	-193.82
2072	0.00	0.00	171.76	0.00	0.00	0.00	171.76	25.40	46.18	172.40	66.63	162.29	137.30	-193.82
2073	0.00	0.00	157.95	0.00	33.56	0.00	191.51	25.40	45.31	172.40	66.63	162.29	137.30	-193.82
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2075	0.00	0.00	4.82	0.00	0.00	0.00	4.82	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	25.40	47.34	172.40	66.63	162.29	137.30	-193.82
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2081	0.00	0.00	0.00	0.00	13.30	0.00	13.30	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2088	0.00	0.00	0.00	0.00	27.35	14.60	41.95	25.40	44.44	172.40	66.63	162.29	137.30	-193.82
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	25.40	47.34	172.40	66.63	162.29	137.30	-193.82
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	25.40	47.34	172.40	66.63	162.29	137.30	-193.82
Salvage Value	0.00	0.00	7.91	0.00	4.93	3.78	16.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	555.55	0.00	216.03	387.48	3771.51	364.12	668.78	5891.03	1774.24	1127.89	2253.82	735.08

Net Present Value -4069

K19/C25/250MW

TABLE 171
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	3.79	254.59	1.29	0.00	235.04	102.84	15.48	80.73	35.99
2015	85.21	447.43	0.00	0.00	16.99	2.35	551.98	4.05	0.00	253.15	101.12	17.24	85.38	49.41
2016	169.37	590.03	0.00	0.00	22.47	2.85	784.72	7.97	0.00	259.84	99.24	17.80	86.94	55.86
2017	194.90	712.98	0.00	0.00	31.91	4.27	944.06	12.69	0.00	270.25	97.31	19.03	88.21	65.70
2018	232.72	501.27	0.00	0.00	31.33	12.81	778.14	16.58	0.00	258.53	94.70	21.50	87.78	54.56
2019	236.47	357.48	0.00	0.00	39.66	12.81	646.43	19.81	13.01	273.60	94.28	21.25	88.67	69.40
2020	649.94	145.55	0.00	0.00	2.55	13.28	811.32	23.87	13.22	407.99	102.59	13.84	86.50	205.06
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	29.48	12.98	485.90	103.17	14.19	88.44	280.10
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	34.22	13.20	484.56	101.28	14.84	89.91	278.53
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	37.67	13.02	481.76	99.07	14.83	95.80	272.07
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	40.20	12.98	486.69	96.71	16.48	104.61	268.88
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	42.01	27.06	421.59	101.38	14.73	83.92	221.56
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	42.93	26.87	511.91	108.87	14.35	81.57	307.12
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	43.10	26.75	497.29	108.45	13.61	83.15	292.07
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	27.03	492.33	106.73	14.16	84.34	287.10
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	29.55	483.71	104.93	14.34	86.07	278.36
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.57	477.54	103.68	14.14	86.28	273.43
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.40	469.13	102.08	14.49	87.25	265.31
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.04	458.13	100.45	14.57	88.43	254.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.11	445.77	98.77	14.61	90.05	242.34
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.22	432.55	97.14	14.71	91.21	229.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	27.29	381.69	95.51	14.77	90.20	181.22
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	43.10	24.39	357.66	93.94	15.05	90.26	158.41
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	24.39	341.86	92.37	14.98	91.21	143.30
2038	0.00	0.00	72.57	0.00	0.00	0.00	72.57	43.36	24.39	325.27	90.81	14.96	92.72	126.77
2039	0.00	0.00	90.86	0.00	6.75	0.00	97.62	43.74	27.29	318.25	89.63	14.01	101.61	113.00
2040	0.00	0.00	10.43	0.00	0.00	0.00	10.43	43.79	28.37	306.80	87.63	23.77	103.02	92.37
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.79	27.72	297.48	86.14	26.81	105.46	79.07
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	44.04	27.72	289.81	84.81	28.62	108.21	68.17
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	44.42	27.72	281.87	83.43	28.35	113.22	56.88
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	44.73	33.44	272.79	81.87	42.09	112.30	36.53
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	45.35	36.33	262.97	80.47	46.56	115.03	20.91
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	45.40	37.43	256.94	79.10	53.02	119.53	5.29
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	36.57	247.99	77.72	53.69	126.43	-9.84
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.70	255.97	79.09	51.09	120.33	5.45
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	45.40	38.59	255.97	79.09	51.09	120.33	5.45
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	45.40	37.44	255.97	79.09	51.09	120.33	5.45
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	45.40	37.45	255.97	79.09	51.09	120.33	5.45
2052	0.00	0.00	0.00	0.00	24.82	1.05	25.87	45.40	37.45	255.97	79.09	51.09	120.33	5.45
2053	0.00	0.00	0.00	0.00	16.16	3.16	19.33	45.40	37.46	255.97	79.09	51.09	120.33	5.45
2054	0.00	0.00	0.00	0.00	13.81	3.16	16.98	45.40	37.46	255.97	79.09	51.09	120.33	5.45
2055	0.00	0.00	0.00	0.00	0.63	3.28	3.91	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	45.40	51.21	255.97	79.09	51.09	120.33	5.45
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	45.40	51.21	255.97	79.09	51.09	120.33	5.45
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	45.40	51.21	255.97	79.09	51.09	120.33	5.45
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	66.71	255.97	79.09	51.09	120.33	5.45
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2064	0.00	0.00	0.00	0.00	8.19	3.67	11.86	45.40	66.71	255.97	79.09	51.09	120.33	5.45
2065	0.00	0.00	0.00	0.00	6.80	2.12	8.92	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2066	0.00	0.00	0.00	0.00	0.82	2.14	2.96	45.40	66.71	255.97	79.09	51.09	120.33	5.45
2067	0.00	0.00	0.00	0.00	7.09	3.21	10.31	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2068	0.00	0.00	50.76	0.00	15.17	9.64	75.58	45.40	66.71	255.97	79.09	51.09	120.33	5.45
2069	0.00	0.00	69.06	0.00	25.85	9.64	104.55	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2070	0.00	0.00	10.43	0.00	1.92	10.00	22.36	45.40	52.95	255.97	79.09	51.09	120.33	5.45
2071	0.00	0.00	0.00	0.00	23.45	0.00	23.45	45.40	37.46	255.97	79.09	51.09	120.33	5.45
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	45.40	52.95	255.97	79.09	51.09	120.33	5.45
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	45.40	36.59	255.97	79.09	51.09	120.33	5.45
2074	0.00	0.00	61.55	0.00	43.63	0.00	105.18	45.40	51.21	255.97	79.09	51.09	120.33	5.45
2075	0.00	0.00	69.47	0.00	47.87	0.00	117.34	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	45.40	52.95	255.97	79.09	51.09	120.33	5.45
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	37.46	255.97	79.09	51.09	120.33	5.45
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	45.40	52.95	255.97	79.09	51.09	120.33	5.45
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.35	255.97	79.09	51.09	120.33	5.45
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	45.40	52.95	255.97	79.09	51.09	120.33	5.45
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2084	0.00	0.00	0.00	0.00	10.44	0.12	10.55	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2087	0.00	0.00	0.00	0.00	24.82	1.05	25.87	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2088	0.00	0.00	0.00	0.00	16.16	3.16	19.33	45.40	35.72	255.97	79.09	51.09	120.33	5.45
2089	0.00	0.00	0.00	0.00	13.19	3.16	16.35	45.40	38.62	255.97	79.09	51.09	120.33	5.45
2090	0.00	0.00	0.00	0.00	0.00	3.28	3.28	45.40	38.62	255.97	79.09	51.09	120.33	5.45
Salvage Value	2.09	0.00	4.07	0.00	7.89	0.96	15.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	131.57	0.00	347.21	49.75	6755.57	674.30	426.24	7128.03	1929.38	484.10	1948.85	2765.71

Net Present Value -5090

K19/Gas24/250MW

TABLE 172
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	3.79	224.23	1.14	0.00	235.04	102.84	15.48	80.73	35.99
2015	0.00	447.43	0.00	0.00	16.99	2.35	466.77	3.47	0.00	253.15	101.12	17.24	85.38	49.41
2016	0.00	590.03	0.00	0.00	22.47	2.85	615.35	6.55	0.00	259.84	99.24	17.80	86.94	55.86
2017	0.00	712.98	0.00	0.00	31.91	4.27	749.16	10.29	0.00	270.49	97.30	19.03	88.21	65.95
2018	0.00	501.27	0.00	0.00	31.33	12.81	545.41	13.02	0.00	258.86	94.70	21.46	87.75	54.95
2019	0.00	357.48	0.00	0.00	37.12	12.81	407.41	15.06	13.01	274.12	94.28	21.25	88.65	69.94
2020	0.00	145.55	0.36	0.00	0.01	13.28	159.20	15.85	13.22	408.76	102.59	13.84	86.49	205.84
2021	0.00	50.36	0.00	0.00	0.00	0.00	50.36	16.10	12.98	487.12	103.15	14.20	88.40	281.38
2022	0.00	0.00	71.77	0.00	0.00	0.00	71.77	16.35	13.20	487.98	101.68	14.02	89.20	283.08
2023	0.00	0.00	89.77	0.00	6.75	0.00	96.52	16.73	13.02	490.56	100.55	11.77	92.04	286.20
2024	0.00	0.00	10.27	0.00	0.00	0.00	10.27	16.78	16.96	498.54	98.67	18.35	95.96	285.56
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	16.78	16.74	366.05	96.43	13.62	92.71	163.28
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.78	16.33	347.75	94.21	15.72	94.32	143.50
2027	0.00	0.00	50.21	0.00	0.00	0.00	50.21	17.03	16.35	313.27	92.16	17.22	95.38	108.51
2028	0.00	0.00	70.38	0.00	53.19	0.00	123.57	17.63	16.42	303.01	90.33	20.10	98.10	94.47
2029	0.00	0.00	111.49	0.00	0.00	0.00	111.49	18.19	23.11	297.05	88.58	27.66	100.26	80.54
2030	0.00	0.00	145.58	0.00	0.00	0.00	145.58	18.92	19.18	296.21	87.68	30.20	101.57	76.77
2031	0.00	0.00	64.94	0.00	6.75	0.00	71.70	19.28	19.18	303.64	88.15	25.75	101.07	88.66
2032	0.00	0.00	4.76	0.00	0.00	0.00	4.76	19.30	26.09	312.36	85.72	53.57	99.70	73.37
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	26.10	304.90	84.19	58.13	102.23	60.34
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	26.10	297.73	82.71	63.59	104.64	46.78
2035	0.00	0.00	101.78	0.00	0.00	0.00	101.78	19.81	25.45	226.95	80.72	60.85	102.49	-17.11
2036	0.00	0.00	146.46	0.00	0.00	0.00	146.46	20.54	25.46	205.30	79.24	65.63	103.20	-42.77
2037	0.00	0.00	65.33	0.00	0.00	0.00	65.33	20.87	25.46	207.14	79.62	60.15	102.01	-34.63
2038	0.00	0.00	106.87	0.00	0.00	0.00	106.87	21.40	32.37	208.47	77.26	87.54	102.85	-59.18
2039	0.00	0.00	146.90	0.00	0.00	0.00	146.90	22.14	35.27	202.39	75.88	96.53	112.16	-82.18
2040	0.00	0.00	65.53	0.00	44.75	0.00	110.28	22.69	32.37	197.91	75.23	99.21	112.92	-89.46
2041	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.71	39.30	202.47	73.46	125.92	112.50	-109.41
2042	0.00	0.00	102.50	0.00	0.00	0.00	102.50	23.23	39.30	193.85	71.71	138.85	116.04	-132.75
2043	0.00	0.00	147.49	0.00	0.00	0.00	147.49	23.96	39.30	185.84	70.38	148.02	118.65	-151.21
2044	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.29	41.04	180.37	69.80	151.37	119.35	-160.16
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	24.32	47.96	182.15	67.64	187.42	119.87	-192.78
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	47.96	185.44	67.70	186.35	120.25	-188.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	47.10	172.85	65.87	204.08	124.01	-221.11
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	24.32	49.14	180.15	67.07	192.62	121.38	-200.91
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2052	0.00	0.00	49.96	0.00	24.82	1.05	75.83	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2053	0.00	0.00	67.96	0.00	16.16	3.16	87.29	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2054	0.00	0.00	10.27	0.00	13.19	3.16	26.62	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2055	0.00	0.00	0.00	0.00	0.00	3.28	3.28	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2057	0.00	0.00	50.21	0.00	0.00	0.00	50.21	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2058	0.00	0.00	68.30	0.00	6.75	0.00	75.06	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2059	0.00	0.00	111.49	0.00	0.00	0.00	111.49	24.32	49.14	180.15	67.07	192.62	121.38	-200.91
2060	0.00	0.00	145.58	0.00	0.00	0.00	145.58	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2061	0.00	0.00	64.94	0.00	0.00	0.00	64.94	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2062	0.00	0.00	4.76	0.00	0.00	0.00	4.76	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2063	0.00	0.00	0.00	0.00	39.89	2.80	42.69	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2064	0.00	0.00	0.00	0.00	8.19	3.67	11.86	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2065	0.00	0.00	101.78	0.00	6.80	2.12	110.70	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2066	0.00	0.00	146.46	0.00	7.57	2.14	156.17	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2067	0.00	0.00	65.33	0.00	7.09	3.21	75.64	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2068	0.00	0.00	106.87	0.00	15.17	9.64	131.69	24.32	61.73	180.15	67.07	192.62	121.38	-200.91
2069	0.00	0.00	146.90	0.00	23.93	9.64	180.48	24.32	49.14	180.15	67.07	192.62	121.38	-200.91
2070	0.00	0.00	65.53	0.00	0.01	10.00	75.54	24.32	47.98	180.15	67.07	192.62	121.38	-200.91
2071	0.00	0.00	4.80	0.00	0.00	0.00	4.80	24.32	47.98	180.15	67.07	192.62	121.38	-200.91
2072	0.00	0.00	102.50	0.00	0.00	0.00	102.50	24.32	47.98	180.15	67.07	192.62	121.38	-200.91
2073	0.00	0.00	147.49	0.00	0.00	0.00	147.49	24.32	47.11	180.15	67.07	192.62	121.38	-200.91
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2075	0.00	0.00	4.82	0.00	33.56	0.00	38.38	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2078	0.00	0.00	0.00	0.00	13.30	0.00	13.30	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	49.14	180.15	67.07	192.62	121.38	-200.91
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2082	0.00	0.00	49.96	0.00	0.00	0.00	49.96	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2083	0.00	0.00	67.96	0.00	0.00	0.00	67.96	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2084	0.00	0.00	10.27	0.00	10.44	0.12	20.82	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2087	0.00	0.00	50.21	0.00	24.82	1.05	76.08	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2088	0.00	0.00	68.30	0.00	16.16	3.16	87.63	24.32	46.24	180.15	67.07	192.62	121.38	-200.91
2089	0.00	0.00	10.32	0.00	13.19	3.16	26.67	24.32	49.14	180.15	67.07	192.62	121.38	-200.91
2090	0.00	0.00	0.00	0.00	11.19	3.28	14.47	24.32	49.14	180.15	67.07	192.62	121.38	-200.91
Salvage Value	0.00	0.00	14.46	0.00	4.32	0.96	19.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	726.87	0.00	209.14	49.75	3598.20	343.78	445.49	5771.41	1778.52	1353.35	2032.47	607.06

Net Present Value -3780

K19/C31/250MW

TABLE 173
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	201.82	0.00	0.00	18.63	3.79	253.97	1.28	0.00	235.04	102.84	15.48	80.73	35.99
2015	37.44	447.43	0.00	0.00	16.99	2.35	504.20	3.80	0.00	253.15	101.12	17.24	85.38	49.41
2016	10.52	590.03	0.00	0.00	22.47	2.85	625.87	6.93	0.00	259.84	99.24	17.80	86.94	55.86
2017	10.55	712.98	0.00	0.00	31.91	4.27	759.71	10.73	0.00	270.49	97.30	19.03	88.21	65.95
2018	12.50	501.27	0.00	0.00	31.33	12.81	557.92	13.52	0.00	258.86	94.70	21.46	87.75	54.95
2019	12.54	357.48	0.00	0.00	37.12	12.81	419.95	15.62	13.01	274.12	94.28	21.25	88.65	69.94
2020	12.58	145.55	0.36	0.00	0.01	13.28	171.78	16.48	13.22	408.76	102.59	13.84	86.49	205.84
2021	15.86	50.36	0.00	0.00	0.00	0.00	66.22	16.81	12.98	487.12	103.15	14.20	88.40	281.38
2022	149.25	0.00	71.77	0.00	0.00	0.00	221.02	17.81	13.20	487.91	101.67	14.04	89.21	282.99
2023	229.26	0.00	89.77	0.00	6.75	0.00	325.78	19.33	13.02	490.26	100.52	11.86	92.16	285.72
2024	245.84	0.00	10.27	0.00	0.00	0.00	256.11	20.61	16.96	498.14	98.64	18.46	96.14	284.90
2025	248.58	0.00	0.00	0.00	2.54	0.00	251.12	21.86	16.74	365.37	96.40	13.73	92.90	162.35
2026	669.49	0.00	0.00	0.00	2.54	0.00	672.03	25.22	16.33	347.12	94.20	15.87	94.54	142.52
2027	1059.04	0.00	50.21	0.00	30.99	0.00	1140.24	30.92	16.35	312.21	92.15	17.49	95.56	107.01
2028	948.10	0.00	68.30	0.00	22.97	0.00	1039.37	36.12	16.42	301.47	90.26	20.58	98.49	92.14
2029	675.08	0.00	10.32	0.00	27.35	0.00	712.75	39.68	23.10	295.10	88.55	28.28	100.66	77.62
2030	466.18	0.00	0.00	0.00	47.55	0.00	513.73	42.25	19.16	306.72	89.54	24.86	98.24	94.08
2031	305.31	0.00	0.00	0.00	62.94	0.00	368.25	44.09	33.47	340.43	92.65	20.09	84.98	142.71
2032	112.12	0.00	0.00	0.00	73.72	0.00	185.84	45.02	33.68	438.35	99.45	19.88	83.06	235.95
2033	35.28	0.00	0.00	0.00	0.00	0.00	35.28	45.20	33.55	457.06	99.61	20.56	87.50	249.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	33.76	441.41	97.87	21.08	88.26	234.20
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.93	389.88	96.20	21.34	87.41	184.94
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.88	366.98	94.62	21.80	87.48	163.09
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.71	349.08	92.76	22.67	89.04	144.61
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.35	329.32	90.83	23.59	91.40	123.49
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	35.31	314.98	88.96	25.94	100.48	99.60
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.53	305.08	87.24	29.40	103.34	85.11
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	35.25	294.70	85.61	33.49	106.16	69.44
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	45.20	32.36	291.55	84.75	34.14	107.64	65.02
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.36	284.12	83.42	33.89	112.28	54.53
2044	0.00	0.00	51.07	0.00	0.00	0.00	51.07	45.46	34.10	272.88	81.88	42.08	112.31	36.62
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	46.07	34.10	263.02	80.47	46.54	115.03	20.98
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.12	38.09	256.98	79.11	53.00	119.52	5.35
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	36.57	247.99	77.72	53.69	126.43	-9.84
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	35.70	256.00	79.10	51.08	120.33	5.49
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	46.12	38.59	256.00	79.10	51.08	120.33	5.49
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	46.12	35.70	256.00	79.10	51.08	120.33	5.49
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	46.12	38.60	256.00	79.10	51.08	120.33	5.49
2052	0.00	0.00	49.96	0.00	24.82	1.05	75.83	46.12	35.71	256.00	79.10	51.08	120.33	5.49
2053	0.00	0.00	67.96	0.00	16.16	3.16	87.29	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2054	0.00	0.00	10.27	0.00	13.19	3.16	26.62	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2055	0.00	0.00	0.00	0.00	0.00	3.28	3.28	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2057	0.00	0.00	50.21	0.00	0.00	0.00	50.21	46.12	37.46	256.00	79.10	51.08	120.33	5.49
2058	0.00	0.00	68.30	0.00	6.75	0.00	75.06	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2059	0.00	0.00	10.32	0.00	0.00	0.00	10.32	46.12	40.35	256.00	79.10	51.08	120.33	5.49
2060	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2061	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.12	38.62	256.00	79.10	51.08	120.33	5.49
2062	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2063	0.00	0.00	0.00	0.00	10.52	2.80	13.33	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2064	0.00	0.00	0.00	0.00	14.47	3.67	18.14	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2065	0.00	0.00	0.00	0.00	17.48	2.12	19.59	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2066	0.00	0.00	0.00	0.00	15.89	2.14	18.03	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2067	0.00	0.00	0.00	0.00	25.30	3.21	28.52	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2068	0.00	0.00	0.00	0.00	15.17	9.64	24.81	46.12	66.71	256.00	79.10	51.08	120.33	5.49
2069	0.00	0.00	0.00	0.00	23.93	9.64	33.58	46.12	38.62	256.00	79.10	51.08	120.33	5.49
2070	0.00	0.00	0.00	0.00	0.01	10.00	10.01	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	40.35	256.00	79.10	51.08	120.33	5.49
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	36.59	256.00	79.10	51.08	120.33	5.49
2074	0.00	0.00	51.07	0.00	0.00	0.00	51.07	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2075	0.00	0.00	69.47	0.00	1.91	0.00	71.39	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2076	0.00	0.00	10.50	0.00	1.91	0.00	12.41	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2077	0.00	0.00	0.00	0.00	23.45	0.00	23.45	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2078	0.00	0.00	0.00	0.00	12.45	0.00	12.45	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2079	0.00	0.00	0.00	0.00	21.07	0.00	21.07	46.12	38.62	256.00	79.10	51.08	120.33	5.49
2080	0.00	0.00	0.00	0.00	76.77	0.00	76.77	46.12	51.21	256.00	79.10	51.08	120.33	5.49
2081	0.00	0.00	0.00	0.00	47.87	0.00	47.87	46.12	38.62	256.00	79.10	51.08	120.33	5.49
2082	0.00	0.00	49.96	0.00	55.51	0.00	105.47	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2083	0.00	0.00	67.96	0.00	0.00	0.00	67.96	46.12	37.46	256.00	79.10	51.08	120.33	5.49
2084	0.00	0.00	10.27	0.00	10.44	0.12	20.82	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	46.12	37.46	256.00	79.10	51.08	120.33	5.49
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	46.12	52.95	256.00	79.10	51.08	120.33	5.49
2087	0.00	0.00	50.21	0.00	24.82	1.05	76.08	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2088	0.00	0.00	68.30	0.00	16.16	3.16	87.63	46.12	35.72	256.00	79.10	51.08	120.33	5.49
2089	0.00	0.00	10.32	0.00	13.19	3.16	26.67	46.12	38.62	256.00	79.10	51.08	120.33	5.49
2090	0.00	0.00	0.00	0.00	0.00	3.28	3.28	46.12	38.62	256.00	79.10	51.08	120.33	5.49
Salvage Value	15.21	0.00	7.17	0.00	8.66	0.96	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	2783.06	2612.45	248.80	0.00	305.75	49.75	5999.80	593.18	428.42	6612.56	1885.89	528.43	1970.46	2227.79

Net Present Value -4794

All Gas

TABLE 174
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	261.04	99.23	17.83	86.91	57.07
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	273.83	97.64	18.34	87.61	70.23
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	262.93	94.94	20.48	88.16	59.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	256.72	92.97	18.31	87.82	57.62
2020	0.00	0.00	71.67	0.00	0.00	0.00	71.67	0.76	0.00	262.56	92.87	13.05	89.67	66.97
2021	0.00	0.00	89.68	0.00	6.75	0.00	96.43	1.13	0.00	263.25	91.07	12.33	94.73	65.13
2022	0.00	0.00	10.25	0.00	0.00	0.00	10.25	1.19	3.98	257.48	88.87	21.86	96.22	50.53
2023	0.00	0.00	50.01	0.00	0.00	0.00	50.01	1.44	3.98	254.45	86.66	26.93	101.41	39.45
2024	0.00	0.00	70.11	0.00	53.19	0.00	123.29	2.04	3.98	260.17	85.11	31.52	107.60	35.94
2025	0.00	0.00	10.28	0.00	0.00	0.00	10.28	2.09	7.98	167.99	84.56	26.45	99.59	-42.61
2026	0.00	0.00	50.16	0.00	0.00	0.00	50.16	2.34	7.98	154.02	83.26	26.93	100.25	-56.42
2027	0.00	0.00	68.23	0.00	0.00	0.00	68.23	2.69	7.98	143.65	81.42	27.11	106.61	-71.50
2028	0.00	0.00	111.38	0.00	0.00	0.00	111.38	3.24	11.97	135.86	79.51	41.45	106.20	-91.31
2029	0.00	0.00	145.44	0.00	0.00	0.00	145.44	3.97	11.97	126.01	78.08	47.02	108.16	-107.25
2030	0.00	0.00	64.88	0.00	6.75	0.00	71.63	4.33	11.98	132.76	78.92	43.22	105.81	-95.18
2031	0.00	0.00	4.75	0.00	0.00	0.00	4.75	4.35	18.90	139.83	76.62	71.81	103.07	-111.66
2032	0.00	0.00	50.46	0.00	0.00	0.00	50.46	4.60	18.90	126.09	74.73	79.09	106.48	-134.21
2033	0.00	0.00	68.64	0.00	44.75	0.00	113.39	5.17	18.90	114.04	73.02	87.60	109.44	-156.03
2034	0.00	0.00	112.05	0.00	0.00	0.00	112.05	5.73	22.90	105.72	71.61	99.54	111.52	-176.95
2035	0.00	0.00	146.31	0.00	0.00	0.00	146.31	6.46	22.90	98.07	70.69	105.86	112.41	-190.89
2036	0.00	0.00	65.27	0.00	0.00	0.00	65.27	6.79	22.90	97.09	70.57	103.26	115.74	-192.49
2037	0.00	0.00	106.77	0.00	0.00	0.00	106.77	7.32	29.82	95.05	68.67	130.49	110.01	-214.13
2038	0.00	0.00	146.75	0.00	0.00	0.00	146.75	8.06	29.82	86.35	67.45	140.84	112.97	-234.92
2039	0.00	0.00	65.46	0.00	0.00	0.00	65.46	8.38	29.83	82.96	67.30	143.02	119.44	-246.81
2040	0.00	0.00	4.79	0.00	0.00	0.00	4.79	8.41	36.75	82.24	65.52	166.63	118.48	-268.37
2041	0.00	0.00	102.39	0.00	0.00	0.00	102.39	8.92	36.76	76.56	63.74	186.29	123.24	-296.70
2042	0.00	0.00	147.34	0.00	0.00	0.00	147.34	9.66	36.76	74.18	62.67	202.25	125.81	-316.55
2043	0.00	0.00	65.73	0.00	44.75	0.00	110.47	10.21	36.76	74.56	62.58	206.20	125.86	-320.08
2044	0.00	0.00	4.81	0.00	0.00	0.00	4.81	10.23	43.68	74.72	61.14	230.08	124.53	-341.03
2045	0.00	0.00	22.49	0.00	0.00	0.00	22.49	10.34	43.68	69.62	59.60	252.02	128.00	-370.00
2046	0.00	0.00	30.59	0.00	0.00	0.00	30.59	10.50	43.68	66.37	58.47	269.57	131.24	-392.91
2047	0.00	0.00	4.62	0.00	0.00	0.00	4.62	10.52	45.13	61.95	57.62	283.71	133.33	-412.71
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.13	65.98	58.56	268.43	130.85	-391.87
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	10.52	45.14	65.98	58.56	268.43	130.85	-391.87
2050	0.00	0.00	49.86	0.00	9.87	0.00	59.72	10.52	45.14	65.98	58.56	268.43	130.85	-391.87
2051	0.00	0.00	67.83	0.00	9.87	0.00	77.69	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2052	0.00	0.00	10.25	0.00	9.87	0.00	20.11	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2053	0.00	0.00	50.01	0.00	0.00	0.00	50.01	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2054	0.00	0.00	68.03	0.00	0.00	0.00	68.03	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2055	0.00	0.00	10.28	0.00	0.00	0.00	10.28	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2056	0.00	0.00	50.16	0.00	6.75	0.00	56.91	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2057	0.00	0.00	68.23	0.00	0.00	0.00	68.23	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2058	0.00	0.00	111.38	0.00	0.00	0.00	111.38	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2059	0.00	0.00	145.44	0.00	39.89	0.00	185.33	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2060	0.00	0.00	64.88	0.00	0.00	0.00	64.88	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2061	0.00	0.00	4.75	0.00	0.00	0.00	4.75	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2062	0.00	0.00	50.46	0.00	0.00	0.00	50.46	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2063	0.00	0.00	68.64	0.00	0.00	0.00	68.64	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2064	0.00	0.00	112.05	0.00	0.00	0.00	112.05	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2065	0.00	0.00	146.31	0.00	6.75	0.00	153.06	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2066	0.00	0.00	65.27	0.00	0.00	0.00	65.27	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2067	0.00	0.00	106.77	0.00	0.00	0.00	106.77	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2068	0.00	0.00	146.75	0.00	33.56	0.00	180.31	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2069	0.00	0.00	65.46	0.00	0.00	0.00	65.46	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2070	0.00	0.00	4.79	0.00	0.00	0.00	4.79	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2071	0.00	0.00	102.39	0.00	0.00	0.00	102.39	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2072	0.00	0.00	147.34	0.00	0.00	0.00	147.34	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2073	0.00	0.00	65.73	0.00	0.00	0.00	65.73	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2074	0.00	0.00	4.81	0.00	13.30	0.00	18.11	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2075	0.00	0.00	22.49	0.00	0.00	0.00	22.49	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2076	0.00	0.00	30.59	0.00	0.00	0.00	30.59	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2077	0.00	0.00	4.62	0.00	0.00	0.00	4.62	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2078	0.00	0.00	0.00	0.00	33.56	0.00	33.56	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2080	0.00	0.00	49.86	0.00	0.00	0.00	49.86	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2081	0.00	0.00	67.83	0.00	0.00	0.00	67.83	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2082	0.00	0.00	10.25	0.00	0.00	0.00	10.25	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2083	0.00	0.00	50.01	0.00	11.19	0.00	61.20	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2084	0.00	0.00	68.03	0.00	9.87	0.00	77.89	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2085	0.00	0.00	10.28	0.00	9.87	0.00	20.14	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2086	0.00	0.00	50.16	0.00	9.87	0.00	60.02	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2087	0.00	0.00	68.23	0.00	9.87	0.00	78.10	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2088	0.00	0.00	10.31	0.00	0.00	0.00	10.31	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	65.98	58.56	268.43	130.85	-391.87
Salvage Value	0.00	0.00	32.44	0.00	2.22	0.00	34.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	933.02	0.00	121.40	0.00	1117.38	90.46	343.48	3401.41	1623.89	1941.59	2152.00	-2316.07

Net Present Value -3867

Wind/Gas

TABLE 175
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	261.04	99.23	17.83	86.91	57.07
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	273.84	97.64	18.34	87.61	70.24
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	262.93	94.94	20.48	88.16	59.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	256.72	92.97	18.31	87.82	57.62
2020	0.00	0.00	0.00	7.06	10.56	0.00	17.62	0.60	0.00	260.13	92.44	14.12	89.99	63.57
2021	0.00	0.00	0.36	215.62	17.59	0.00	233.57	1.77	0.00	260.33	90.65	13.66	94.65	61.37
2022	0.00	0.00	0.00	219.66	21.25	0.00	240.91	2.97	6.21	263.62	89.00	13.76	94.73	66.13
2023	0.00	0.00	121.83	212.59	11.12	0.00	345.54	4.59	12.42	267.26	86.53	15.81	98.08	66.84
2024	0.00	0.00	157.91	4.04	18.72	0.00	180.67	5.38	18.63	281.62	84.67	16.18	103.90	76.88
2025	0.00	0.00	20.56	3.53	3.39	0.00	27.48	5.52	26.60	196.59	84.65	18.45	94.97	-1.48
2026	0.00	0.00	50.16	107.81	8.52	0.00	166.49	6.35	26.60	186.01	83.67	17.52	94.83	-10.01
2027	0.00	0.00	70.31	109.83	66.72	0.00	246.86	7.58	29.70	177.18	81.36	21.34	96.69	-22.21
2028	0.00	0.00	10.31	109.83	18.76	0.00	138.89	8.27	36.81	177.17	79.61	27.59	99.06	-29.09
2029	0.00	0.00	50.31	109.83	18.83	0.00	178.96	9.17	39.91	172.51	78.04	29.75	100.82	-36.11
2030	0.00	0.00	68.44	109.83	18.83	0.00	197.09	10.15	43.02	173.73	77.14	31.18	101.31	-35.90
2031	0.00	0.00	60.75	109.83	18.83	0.00	189.41	11.10	50.10	174.03	75.93	36.92	102.07	-40.88
2032	0.00	0.00	68.58	109.83	63.57	0.00	241.98	12.31	53.22	171.59	74.82	37.23	103.92	-44.37
2033	0.00	0.00	10.36	109.83	18.83	0.00	139.02	13.00	60.32	173.87	74.15	39.29	104.87	-44.46
2034	0.00	0.00	50.56	109.83	18.83	0.00	179.22	13.90	63.43	165.92	72.38	45.47	105.88	-57.81
2035	0.00	0.00	68.78	109.83	18.83	0.00	197.44	14.89	66.55	158.12	70.74	49.45	107.77	-69.84
2036	0.00	0.00	61.06	109.83	18.83	0.00	189.71	15.84	73.63	154.59	69.40	57.01	109.09	-80.90
2037	0.00	0.00	68.92	109.83	18.83	0.00	197.57	16.82	76.75	148.79	68.13	60.51	111.19	-91.04
2038	0.00	0.00	61.18	109.83	18.83	0.00	189.83	17.77	83.84	147.40	67.10	66.54	113.47	-99.72
2039	0.00	0.00	69.06	109.83	63.57	0.00	242.46	18.99	86.95	142.18	65.97	65.55	125.01	-114.34
2040	0.00	0.00	10.43	116.89	18.83	0.00	146.15	19.72	94.06	142.74	65.16	69.13	128.01	-119.56
2041	0.00	0.00	50.92	325.45	18.83	0.00	395.19	21.69	97.17	133.42	63.69	81.41	126.13	-137.81
2042	0.00	0.00	69.26	329.48	18.83	0.00	417.57	23.78	100.27	126.25	62.35	87.31	129.31	-152.71
2043	0.00	0.00	61.48	322.42	18.69	0.00	402.59	25.79	107.36	122.74	61.20	96.84	131.47	-166.76
2044	0.00	0.00	69.40	113.86	18.26	0.00	201.53	26.80	110.47	119.21	60.26	100.45	134.21	-175.70
2045	0.00	0.00	32.97	113.36	17.13	0.00	163.47	27.62	117.57	117.08	59.19	106.48	139.32	-187.91
2046	0.00	0.00	30.59	214.11	15.44	0.00	260.13	28.92	120.68	113.94	58.17	106.92	146.97	-198.12
2047	0.00	0.00	4.62	111.85	10.31	0.00	126.78	29.55	125.23	109.39	57.12	110.78	148.43	-206.95
2048	0.00	0.00	0.00	109.83	5.30	0.00	115.12	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2049	0.00	0.00	0.00	109.83	9.94	0.00	119.76	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2050	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2051	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2052	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2053	0.00	0.00	100.02	109.83	0.00	0.00	209.85	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2054	0.00	0.00	136.06	109.83	0.00	0.00	245.89	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2055	0.00	0.00	20.56	109.83	2.64	0.00	133.02	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2056	0.00	0.00	50.16	109.83	4.40	0.00	164.38	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2057	0.00	0.00	68.23	109.83	5.35	0.00	183.41	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2058	0.00	0.00	10.31	109.83	2.99	0.00	123.13	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2059	0.00	0.00	50.31	109.83	15.02	0.00	175.16	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2060	0.00	0.00	68.44	116.89	1.48	0.00	186.81	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2061	0.00	0.00	60.75	325.45	2.38	0.00	388.58	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2062	0.00	0.00	68.58	329.48	43.33	0.00	441.38	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2063	0.00	0.00	10.36	322.42	4.71	0.00	337.49	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2064	0.00	0.00	50.56	113.86	4.71	0.00	169.13	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2065	0.00	0.00	68.78	113.36	4.71	0.00	186.85	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2066	0.00	0.00	61.06	214.11	4.71	0.00	279.87	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2067	0.00	0.00	68.92	111.85	38.27	0.00	219.03	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2068	0.00	0.00	61.18	109.83	4.71	0.00	175.71	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2069	0.00	0.00	69.06	109.83	4.71	0.00	183.59	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2070	0.00	0.00	10.43	109.83	12.62	0.00	132.89	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2071	0.00	0.00	50.92	109.83	17.90	0.00	178.65	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2072	0.00	0.00	69.26	109.83	20.61	0.00	199.70	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2073	0.00	0.00	61.48	109.83	12.84	0.00	184.15	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2074	0.00	0.00	69.40	109.83	41.96	0.00	221.19	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2075	0.00	0.00	32.97	109.83	6.61	0.00	149.41	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2076	0.00	0.00	30.59	109.83	10.85	0.00	151.27	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2077	0.00	0.00	4.62	109.83	28.10	0.00	142.55	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2078	0.00	0.00	0.00	109.83	18.69	0.00	128.51	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2079	0.00	0.00	0.00	109.83	18.47	0.00	128.30	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2080	0.00	0.00	0.00	116.89	18.19	0.00	135.08	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2081	0.00	0.00	0.00	325.45	17.34	0.00	342.79	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2082	0.00	0.00	0.00	329.48	27.64	0.00	357.12	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2083	0.00	0.00	100.02	322.42	15.39	0.00	437.83	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2084	0.00	0.00	136.06	113.86	23.92	0.00	273.84	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2085	0.00	0.00	20.56	113.36	23.77	0.00	157.69	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2086	0.00	0.00	50.16	214.11	22.93	0.00	287.19	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2087	0.00	0.00	68.23	111.85	22.08	0.00	202.16	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2088	0.00	0.00	10.31	109.83	7.98	0.00	128.12	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2089	0.00	0.00	0.00	106.30	15.21	0.00	121.51	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
2090	0.00	0.00	0.00	2.02	0.07	0.00	2.09	29.55	125.23	113.47	58.16	108.06	144.91	-197.66
Salvage Value	0.00	0.00	14.26	38.84	8.17	0.00	61.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	696.56	1903.61	311.61	0.00	2974.73	232.04	974.12	3969.06	1619.55	924.20	2184.29	-758.99

Net Present Value -4940

K22/Gas

TABLE 176
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	99.88	0.00	0.00	9.87	0.00	109.75	0.55	0.00	235.42	102.83	15.46	80.72	36.42
2015	0.00	29.84	0.00	0.00	10.59	0.00	40.42	0.75	0.00	254.26	101.10	17.25	85.37	50.54
2016	0.00	25.92	0.00	0.00	10.65	0.00	36.57	0.93	0.00	260.79	99.23	17.83	86.92	56.81
2017	0.00	192.79	0.00	0.00	23.47	0.00	216.26	2.01	0.00	273.24	97.65	18.34	87.64	69.61
2018	0.00	374.90	0.00	0.00	6.97	0.00	381.87	3.92	0.00	261.68	94.95	20.49	88.21	58.03
2019	0.00	609.71	0.00	0.00	12.14	0.00	621.85	7.03	0.00	255.45	92.98	18.31	87.85	56.30
2020	0.00	677.02	0.00	0.00	22.10	0.00	699.12	10.53	0.00	257.29	92.28	14.54	90.17	60.31
2021	0.00	551.85	0.00	0.00	31.34	0.00	583.20	13.45	0.00	258.77	90.59	13.95	95.34	58.89
2022	0.00	319.56	0.00	0.00	37.12	0.00	356.68	15.23	13.01	262.08	90.57	15.91	90.84	64.76
2023	0.00	148.13	0.00	0.00	0.01	0.00	148.14	15.97	13.22	349.92	96.19	15.83	88.51	149.40
2024	0.00	51.07	0.00	0.00	0.00	0.00	51.07	16.22	12.93	376.96	95.99	18.03	94.19	168.76
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	16.22	13.15	296.21	95.88	12.67	89.19	98.48
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.22	12.97	283.04	94.03	12.82	90.33	85.85
2027	0.00	0.00	72.02	0.00	0.00	0.00	72.02	16.48	12.93	243.77	92.19	12.27	89.67	49.64
2028	0.00	0.00	90.15	0.00	6.75	0.00	96.91	16.85	12.69	231.54	90.64	12.79	91.25	36.86
2029	0.00	0.00	10.32	0.00	0.00	0.00	10.32	16.90	16.24	227.75	89.76	15.82	91.32	30.85
2030	0.00	0.00	50.36	0.00	0.00	0.00	50.36	17.15	16.24	220.66	88.08	19.17	92.95	20.46
2031	0.00	0.00	171.96	0.00	53.19	0.00	225.15	18.27	16.28	212.71	86.45	22.01	95.28	8.97
2032	0.00	0.00	156.22	0.00	0.00	0.00	156.22	19.05	22.98	206.49	84.86	29.92	97.56	-5.85
2033	0.00	0.00	65.07	0.00	6.75	0.00	71.83	19.41	19.04	209.67	84.95	26.18	97.75	0.79
2034	0.00	0.00	4.77	0.00	0.00	0.00	4.77	19.43	25.96	215.84	82.63	53.01	96.16	-15.96
2035	0.00	0.00	101.78	0.00	0.00	0.00	101.78	19.94	25.96	201.47	80.58	58.19	98.71	-36.02
2036	0.00	0.00	146.46	0.00	0.00	0.00	146.46	20.67	25.96	193.16	79.09	64.65	100.83	-51.41
2037	0.00	0.00	65.33	0.00	0.00	0.00	65.33	21.00	25.97	194.79	79.47	58.75	99.70	-43.14
2038	0.00	0.00	106.87	0.00	0.00	0.00	106.87	21.54	32.23	194.78	77.15	84.27	100.58	-67.22
2039	0.00	0.00	146.90	0.00	0.00	0.00	146.90	22.27	32.24	188.57	75.79	93.00	109.81	-90.03
2040	0.00	0.00	65.53	0.00	44.75	0.00	110.28	22.82	32.24	185.66	75.28	95.22	110.14	-94.98
2041	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.85	39.16	188.93	73.40	121.75	109.98	-116.19
2042	0.00	0.00	102.50	0.00	0.00	0.00	102.50	23.36	42.06	180.11	71.62	135.49	113.46	-140.46
2043	0.00	0.00	147.49	0.00	0.00	0.00	147.49	24.10	39.16	172.65	70.28	145.33	116.06	-159.02
2044	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.42	39.16	169.99	69.84	148.64	116.41	-164.89
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	24.45	46.09	173.97	68.32	177.21	115.07	-186.63
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.09	168.49	67.10	188.96	118.42	-206.01
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	47.84	161.09	65.77	202.42	121.32	-228.43
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	47.84	167.85	67.07	189.53	118.27	-207.02
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	47.84	167.85	67.07	189.53	118.27	-207.02
2050	0.00	0.00	0.00	0.00	10.18	0.00	10.18	24.45	46.97	167.85	67.07	189.53	118.27	-207.02
2051	0.00	0.00	0.00	0.00	10.23	0.00	10.23	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2052	0.00	0.00	0.00	0.00	10.24	0.00	10.24	24.45	49.00	167.85	67.07	189.53	118.27	-207.02
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2054	0.00	0.00	0.00	0.00	11.27	0.00	11.27	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2055	0.00	0.00	0.00	0.00	14.95	0.00	14.95	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2056	0.00	0.00	0.00	0.00	16.16	0.00	16.16	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2057	0.00	0.00	50.21	0.00	13.19	0.00	63.39	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2058	0.00	0.00	68.30	0.00	0.00	0.00	68.30	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2059	0.00	0.00	10.32	0.00	0.00	0.00	10.32	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2060	0.00	0.00	50.36	0.00	0.00	0.00	50.36	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2061	0.00	0.00	169.88	0.00	0.00	0.00	169.88	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2062	0.00	0.00	156.22	0.00	0.00	0.00	156.22	24.45	49.00	167.85	67.07	189.53	118.27	-207.02
2063	0.00	0.00	65.07	0.00	6.75	0.00	71.83	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2064	0.00	0.00	4.77	0.00	0.00	0.00	4.77	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2065	0.00	0.00	101.78	0.00	0.40	0.00	102.18	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2066	0.00	0.00	146.46	0.00	40.32	0.00	186.77	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2067	0.00	0.00	65.33	0.00	13.23	0.00	78.56	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2068	0.00	0.00	106.87	0.00	13.38	0.00	120.26	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2069	0.00	0.00	146.90	0.00	0.87	0.00	147.77	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2070	0.00	0.00	65.53	0.00	7.14	0.00	72.67	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2071	0.00	0.00	4.80	0.00	15.18	0.00	19.98	24.45	61.60	167.85	67.07	189.53	118.27	-207.02
2072	0.00	0.00	102.50	0.00	23.93	0.00	126.43	24.45	49.00	167.85	67.07	189.53	118.27	-207.02
2073	0.00	0.00	147.49	0.00	0.01	0.00	147.49	24.45	47.84	167.85	67.07	189.53	118.27	-207.02
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.45	47.84	167.85	67.07	189.53	118.27	-207.02
2075	0.00	0.00	4.82	0.00	33.56	0.00	38.38	24.45	47.84	167.85	67.07	189.53	118.27	-207.02
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.97	167.85	67.07	189.53	118.27	-207.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2081	0.00	0.00	0.00	0.00	13.30	0.00	13.30	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	49.00	167.85	67.07	189.53	118.27	-207.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2087	0.00	0.00	50.21	0.00	9.87	0.00	60.07	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2088	0.00	0.00	68.30	0.00	0.00	0.00	68.30	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2089	0.00	0.00	10.32	0.00	0.00	0.00	10.32	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
2090	0.00	0.00	0.00	0.00	11.19	0.00	11.19	24.45	46.10	167.85	67.07	189.53	118.27	-207.02
Salvage Value	0.00	0.00	12.64	0.00	3.33	0.00	15.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2338.90	668.65	0.00	192.87	0.00	3200.43	304.94	393.87	4714.14	1748.91	1286.08	1989.65	-310.51

Net Present Value: -4210

K22/C29

TABLE 177
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	99.88	0.00	0.00	9.87	0.00	139.48	0.70	0.00	235.42	102.83	15.46	80.72	36.42
2015	37.96	29.84	0.00	0.00	10.59	0.00	78.38	1.09	0.00	254.26	101.10	17.25	85.37	50.54
2016	11.04	25.92	0.00	0.00	10.65	0.00	47.61	1.33	0.00	260.79	99.23	17.83	86.92	56.81
2017	11.73	192.79	0.00	0.00	23.47	0.00	227.98	2.47	0.00	273.24	97.65	18.34	87.64	69.61
2018	11.76	374.90	0.00	0.00	6.97	0.00	393.63	4.44	0.00	261.68	94.95	20.49	88.21	58.03
2019	14.03	609.71	0.00	0.00	12.14	0.00	635.88	7.61	0.00	255.45	92.98	18.31	87.85	56.30
2020	151.48	677.02	0.00	0.00	22.10	0.00	850.59	11.87	0.00	257.29	92.28	14.54	90.17	60.31
2021	231.02	551.85	0.00	0.00	31.34	0.00	814.22	15.94	0.00	258.64	90.59	13.95	95.43	58.67
2022	244.38	319.56	0.00	0.00	37.12	0.00	601.07	18.94	13.01	261.92	90.58	15.89	90.94	64.51
2023	247.11	148.13	0.00	0.00	2.55	0.00	397.78	20.93	13.22	349.42	96.19	15.87	88.56	148.81
2024	665.53	51.07	0.00	0.00	2.54	0.00	719.14	24.53	12.93	375.82	95.98	18.03	94.24	167.57
2025	1052.78	0.00	0.00	0.00	30.99	0.00	1083.77	29.95	13.15	294.81	95.90	12.69	89.29	96.94
2026	942.49	0.00	0.00	0.00	16.22	0.00	958.71	34.74	12.97	281.32	94.03	12.86	90.48	83.96
2027	671.09	0.00	0.00	0.00	27.35	0.00	698.44	38.23	12.93	242.57	92.41	11.76	89.60	48.81
2028	463.42	0.00	0.00	0.00	47.55	0.00	510.97	40.79	12.69	227.38	90.53	12.94	91.59	32.32
2029	303.50	0.00	0.00	0.00	62.94	0.00	366.44	42.62	26.56	291.24	94.31	14.78	82.56	99.60
2030	111.46	0.00	0.00	0.00	73.72	0.00	185.18	43.55	26.78	384.46	101.31	14.48	79.27	189.40
2031	35.07	0.00	0.00	0.00	0.00	0.00	35.07	43.72	26.68	397.12	101.23	14.84	81.48	199.58
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	29.59	384.41	99.57	14.69	82.34	187.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.48	372.21	97.96	14.60	83.93	175.72
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.44	360.15	96.37	14.86	85.02	163.91
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.27	347.52	94.83	14.91	85.68	152.10
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	43.72	24.90	332.95	93.29	14.93	86.48	138.25
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	24.97	317.94	91.77	14.96	87.55	123.66
2038	0.00	0.00	72.57	0.00	0.00	0.00	72.57	43.98	24.43	303.23	90.26	14.93	89.46	108.58
2039	0.00	0.00	90.86	0.00	6.75	0.00	97.62	44.35	27.15	296.63	88.92	14.51	99.37	93.83
2040	0.00	0.00	10.43	0.00	0.00	0.00	10.43	44.41	28.24	288.06	87.21	24.67	99.64	76.54
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	28.24	279.76	85.76	27.64	102.00	64.35
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	44.66	31.13	271.64	84.37	28.57	105.82	52.88
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	45.04	28.24	262.85	82.92	28.85	110.91	40.18
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	45.35	32.22	255.31	81.48	43.87	108.96	21.00
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	45.96	31.56	247.40	80.24	47.00	111.58	8.58
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.02	35.56	252.59	79.84	46.30	114.80	11.65
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.30	234.26	77.68	60.97	116.29	-20.68
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.30	244.75	79.25	51.42	114.22	-0.15
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	40.20	244.75	79.25	51.42	114.22	-0.15
2050	0.00	0.00	0.00	0.00	10.18	0.00	10.18	46.02	36.44	244.75	79.25	51.42	114.22	-0.15
2051	0.00	0.00	0.00	0.00	10.23	0.00	10.23	46.02	35.57	244.75	79.25	51.42	114.22	-0.15
2052	0.00	0.00	0.00	0.00	10.24	0.00	10.24	46.02	38.48	244.75	79.25	51.42	114.22	-0.15
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2054	0.00	0.00	0.00	0.00	11.27	0.00	11.27	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2055	0.00	0.00	0.00	0.00	14.95	0.00	14.95	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2056	0.00	0.00	0.00	0.00	16.16	0.00	16.16	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2057	0.00	0.00	0.00	0.00	13.19	0.00	13.19	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2058	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2059	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.02	53.98	244.75	79.25	51.42	114.22	-0.15
2060	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2061	0.00	0.00	0.00	0.00	3.77	0.00	3.77	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2062	0.00	0.00	0.00	0.00	6.28	0.00	6.28	46.02	38.48	244.75	79.25	51.42	114.22	-0.15
2063	0.00	0.00	0.00	0.00	10.68	0.00	10.68	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2064	0.00	0.00	0.00	0.00	15.07	0.00	15.07	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2065	0.00	0.00	0.00	0.00	18.61	0.00	18.61	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2066	0.00	0.00	0.00	0.00	0.43	0.00	0.43	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2067	0.00	0.00	0.00	0.00	13.23	0.00	13.23	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2068	0.00	0.00	50.76	0.00	6.63	0.00	57.40	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2069	0.00	0.00	69.06	0.00	0.87	0.00	69.93	46.02	53.98	244.75	79.25	51.42	114.22	-0.15
2070	0.00	0.00	10.43	0.00	7.14	0.00	17.58	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2071	0.00	0.00	0.00	0.00	15.18	0.00	15.18	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2072	0.00	0.00	50.97	0.00	23.93	0.00	74.90	46.02	53.98	244.75	79.25	51.42	114.22	-0.15
2073	0.00	0.00	69.33	0.00	1.92	0.00	71.25	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2074	0.00	0.00	61.55	0.00	8.67	0.00	70.21	46.02	52.82	244.75	79.25	51.42	114.22	-0.15
2075	0.00	0.00	69.47	0.00	23.45	0.00	92.92	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2076	0.00	0.00	10.50	0.00	12.45	0.00	22.95	46.02	51.95	244.75	79.25	51.42	114.22	-0.15
2077	0.00	0.00	0.00	0.00	21.07	0.00	21.07	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2078	0.00	0.00	0.00	0.00	43.63	0.00	43.63	46.02	51.08	244.75	79.25	51.42	114.22	-0.15
2079	0.00	0.00	0.00	0.00	47.87	0.00	47.87	46.02	38.48	244.75	79.25	51.42	114.22	-0.15
2080	0.00	0.00	0.00	0.00	95.40	0.00	95.40	46.02	52.82	244.75	79.25	51.42	114.22	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	55.71	244.75	79.25	51.42	114.22	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.32	244.75	79.25	51.42	114.22	-0.15
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	52.82	244.75	79.25	51.42	114.22	-0.15
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	38.48	244.75	79.25	51.42	114.22	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	35.59	244.75	79.25	51.42	114.22	-0.15
Salvage Value	10.71	0.00	4.07	0.00	7.38	0.00	22.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3033.41	2338.90	131.57	0.00	304.30	0.00	5808.18	577.37	364.53	5715.47	1866.34	482.47	1911.78	1454.88

Net Present Value -5295

SCGT/C26

TABLE 178
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	235.42	102.83	15.46	80.72	36.42
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	254.26	101.10	17.25	85.37	50.54
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	261.04	99.23	17.83	86.91	57.07
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	273.84	97.64	18.34	87.61	70.24
2018	195.48	0.00	0.36	0.00	0.00	0.00	195.84	3.11	0.00	262.67	94.94	20.49	88.17	59.07
2019	233.41	0.00	0.00	0.00	0.00	0.00	233.41	4.28	0.00	256.33	92.97	18.31	87.83	57.22
2020	237.17	0.00	71.67	0.00	0.00	0.00	308.84	5.71	0.00	261.86	92.85	13.13	89.68	66.21
2021	651.87	0.00	89.63	0.00	6.75	0.00	748.25	9.35	0.00	262.64	91.05	12.47	94.97	64.15
2022	1043.45	0.00	10.25	0.00	0.48	0.00	1054.18	14.62	3.98	256.76	88.89	22.16	96.47	49.24
2023	934.14	0.00	0.00	0.00	0.96	0.00	935.10	19.29	3.98	252.82	86.52	27.93	101.84	36.52
2024	665.14	0.00	0.00	0.00	1.93	0.00	667.07	22.63	3.98	260.19	85.29	31.24	107.82	35.85
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	24.95	3.98	170.20	85.68	19.09	103.11	-37.67
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	26.46	18.29	209.19	89.63	14.00	87.62	17.94
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	27.01	18.51	294.71	97.20	13.59	81.50	102.42
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	27.19	18.21	318.33	97.45	14.87	86.49	119.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.43	305.69	95.75	15.32	87.62	106.99
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.26	295.92	94.55	15.19	87.73	98.45
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.21	281.68	92.63	16.31	89.48	83.25
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.97	265.07	90.73	17.50	91.16	65.68
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.54	253.91	88.83	20.57	93.94	50.57
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.54	245.58	87.24	23.83	96.07	38.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.58	239.48	85.96	26.55	97.61	29.36
2036	0.00	0.00	50.66	0.00	0.00	0.00	50.66	27.44	20.30	234.36	84.90	26.90	99.88	22.68
2037	0.00	0.00	68.96	0.00	6.75	0.00	75.72	27.82	17.41	225.62	83.40	27.30	105.07	9.85
2038	0.00	0.00	10.41	0.00	0.00	0.00	10.41	27.87	21.39	218.19	81.93	41.64	103.72	-9.11
2039	0.00	0.00	50.82	0.00	0.00	0.00	50.82	28.12	21.39	209.91	80.70	44.33	112.89	-28.01
2040	0.00	0.00	71.20	0.00	53.19	0.00	124.39	28.73	21.39	203.40	79.37	43.93	120.06	-39.96
2041	0.00	0.00	61.36	0.00	0.00	0.00	61.36	29.04	25.39	193.49	77.74	61.18	118.45	-63.88
2042	0.00	0.00	69.26	0.00	0.00	0.00	69.26	29.39	24.73	184.70	76.40	68.76	121.11	-81.57
2043	0.00	0.00	61.48	0.00	0.00	0.00	61.48	29.70	28.71	179.52	75.10	77.21	126.05	-98.84
2044	0.00	0.00	69.40	0.00	44.75	0.00	114.15	30.27	28.71	172.74	73.80	77.83	135.50	-114.38
2045	0.00	0.00	10.49	0.00	0.00	0.00	10.49	30.32	32.72	165.95	72.46	106.93	128.04	-141.48
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	35.62	159.35	71.29	118.08	130.13	-160.15
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.73	153.01	69.99	119.71	141.31	-178.00
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.73	159.44	71.25	114.91	133.16	-159.87
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.74	159.44	71.25	114.91	133.16	-159.87
2050	0.00	0.00	49.86	0.00	9.87	0.00	59.72	30.32	32.75	159.44	71.25	114.91	133.16	-159.87
2051	0.00	0.00	67.83	0.00	9.87	0.00	77.69	30.32	34.49	159.44	71.25	114.91	133.16	-159.87
2052	0.00	0.00	10.25	0.00	9.87	0.00	20.11	30.32	34.50	159.44	71.25	114.91	133.16	-159.87
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	159.44	71.25	114.91	133.16	-159.87
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	159.44	71.25	114.91	133.16	-159.87
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	159.44	71.25	114.91	133.16	-159.87
2056	0.00	0.00	0.00	0.00	6.75	0.00	6.75	30.32	35.65	159.44	71.25	114.91	133.16	-159.87
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2066	0.00	0.00	50.66	0.00	0.00	0.00	50.66	30.32	35.65	159.44	71.25	114.91	133.16	-159.87
2067	0.00	0.00	68.92	0.00	0.00	0.00	68.92	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2068	0.00	0.00	10.41	0.00	0.00	0.00	10.41	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2069	0.00	0.00	50.82	0.00	0.00	0.00	50.82	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2070	0.00	0.00	69.13	0.00	0.00	0.00	69.13	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2071	0.00	0.00	61.36	0.00	0.00	0.00	61.36	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2072	0.00	0.00	69.26	0.00	7.24	0.00	76.50	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2073	0.00	0.00	61.48	0.00	0.96	0.00	62.45	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2074	0.00	0.00	69.40	0.00	1.93	0.00	71.33	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2075	0.00	0.00	10.49	0.00	44.23	0.00	54.72	30.32	48.25	159.44	71.25	114.91	133.16	-159.87
2076	0.00	0.00	0.00	0.00	1.93	0.00	1.93	30.32	35.65	159.44	71.25	114.91	133.16	-159.87
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	49.99	159.44	71.25	114.91	133.16	-159.87
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	159.44	71.25	114.91	133.16	-159.87
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	30.32	49.99	159.44	71.25	114.91	133.16	-159.87
2080	0.00	0.00	49.86	0.00	0.00	0.00	49.86	30.32	34.50	159.44	71.25	114.91	133.16	-159.87
2081	0.00	0.00	67.83	0.00	0.00	0.00	67.83	30.32	49.99	159.44	71.25	114.91	133.16	-159.87
2082	0.00	0.00	10.25	0.00	0.00	0.00	10.25	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	35.65	159.44	71.25	114.91	133.16	-159.87
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
2090	0.00	0.00	0.00	0.00	13.30	0.00	13.30	30.32	32.76	159.44	71.25	114.91	133.16	-159.87
Salvage Value	4.24	0.00	6.98	0.00	2.49	0.00	13.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	319.10	0.00	84.96	0.00	3953.84	387.64	293.52	4721.64	1778.09	844.50	2075.46	23.58

Net Present Value -4611

CCGT/C26

TABLE 179
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	235.42	102.83	15.46	80.72	36.42
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	254.26	101.10	17.25	85.37	50.54
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	261.04	99.23	17.83	86.91	57.07
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	273.84	97.64	18.34	87.61	70.24
2018	195.48	0.00	0.36	0.00	0.00	0.00	195.84	3.11	0.00	262.67	94.94	20.49	88.17	59.07
2019	233.41	0.00	100.17	0.00	0.00	0.00	333.58	4.78	0.00	256.33	92.97	18.31	87.83	57.22
2020	237.17	0.00	165.94	0.00	0.00	0.00	403.11	6.69	0.00	261.86	92.85	13.13	89.68	66.21
2021	651.87	0.00	86.10	0.00	6.75	0.00	744.73	10.30	0.00	266.59	91.75	10.97	93.98	69.90
2022	1043.45	0.00	4.71	0.00	0.48	0.00	1048.64	15.54	6.91	266.59	89.43	31.66	87.31	58.18
2023	934.14	0.00	0.00	0.00	0.96	0.00	935.10	20.22	6.91	267.63	87.36	38.03	91.66	50.57
2024	665.14	0.00	0.00	0.00	1.93	0.00	667.07	23.55	6.91	282.72	86.26	46.08	96.02	54.35
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	25.87	6.91	191.31	85.80	36.85	93.47	-24.81
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	27.39	21.22	222.90	89.52	28.20	83.64	21.54
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	27.94	21.44	303.37	97.16	20.38	79.75	106.08
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	28.11	21.14	328.21	97.53	21.79	84.05	124.84
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.36	316.89	95.86	23.06	85.21	112.75
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.19	300.50	93.77	24.75	86.99	95.00
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.14	301.41	93.68	22.09	85.71	99.93
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.90	279.09	90.92	25.83	88.55	73.80
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.47	269.99	89.20	28.85	90.72	61.23
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.47	259.52	87.23	32.81	93.74	45.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.51	252.58	85.78	35.35	95.71	35.74
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	23.23	243.63	84.17	40.75	97.58	21.13
2037	0.00	0.00	50.71	0.00	0.00	0.00	50.71	28.37	20.34	240.16	83.43	42.12	98.07	16.54
2038	0.00	0.00	69.03	0.00	6.75	0.00	75.79	28.74	20.34	233.85	82.25	42.85	101.92	6.82
2039	0.00	0.00	10.42	0.00	0.00	0.00	10.42	28.80	24.32	224.94	80.52	55.70	109.23	-20.52
2040	0.00	0.00	50.87	0.00	0.00	0.00	50.87	29.05	24.32	217.35	79.11	61.96	111.94	-35.67
2041	0.00	0.00	71.27	0.00	53.19	0.00	124.46	29.66	24.32	208.36	77.81	64.28	115.84	-49.56
2042	0.00	0.00	61.42	0.00	0.00	0.00	61.42	29.97	27.66	202.86	76.48	71.83	120.55	-66.00
2043	0.00	0.00	69.33	0.00	0.00	0.00	69.33	30.32	27.66	193.57	75.10	85.21	118.89	-85.64
2044	0.00	0.00	10.48	0.00	0.00	0.00	10.48	30.37	31.64	187.17	73.79	97.32	121.04	-104.99
2045	0.00	0.00	51.12	0.00	0.00	0.00	51.12	30.62	31.64	180.41	72.49	101.05	128.25	-121.38
2046	0.00	0.00	69.54	0.00	44.75	0.00	114.29	31.20	34.55	177.63	71.59	100.40	135.89	-130.25
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	31.25	35.65	164.89	70.02	126.26	129.24	-160.64
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.66	174.31	71.37	109.24	131.13	-137.42
2049	0.00	0.00	100.17	0.00	9.87	0.00	110.03	31.25	35.66	174.31	71.37	109.24	131.13	-137.42
2050	0.00	0.00	144.13	0.00	9.87	0.00	154.00	31.25	35.66	174.31	71.37	109.24	131.13	-137.42
2051	0.00	0.00	64.30	0.00	9.87	0.00	74.16	31.25	37.41	174.31	71.37	109.24	131.13	-137.42
2052	0.00	0.00	4.71	0.00	9.87	0.00	14.57	31.25	37.41	174.31	71.37	109.24	131.13	-137.42
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.42	174.31	71.37	109.24	131.13	-137.42
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	174.31	71.37	109.24	131.13	-137.42
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	174.31	71.37	109.24	131.13	-137.42
2056	0.00	0.00	0.00	0.00	6.75	0.00	6.75	31.25	38.58	174.31	71.37	109.24	131.13	-137.42
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	38.58	174.31	71.37	109.24	131.13	-137.42
2067	0.00	0.00	50.71	0.00	0.00	0.00	50.71	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2068	0.00	0.00	68.99	0.00	0.00	0.00	68.99	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2069	0.00	0.00	10.42	0.00	0.00	0.00	10.42	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2070	0.00	0.00	50.87	0.00	0.00	0.00	50.87	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2071	0.00	0.00	69.19	0.00	0.00	0.00	69.19	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2072	0.00	0.00	61.42	0.00	0.48	0.00	61.90	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2073	0.00	0.00	69.33	0.00	7.72	0.00	77.05	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2074	0.00	0.00	10.48	0.00	1.93	0.00	12.40	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2075	0.00	0.00	51.12	0.00	4.34	0.00	55.46	31.25	51.18	174.31	71.37	109.24	131.13	-137.42
2076	0.00	0.00	69.54	0.00	41.82	0.00	111.36	31.25	38.58	174.31	71.37	109.24	131.13	-137.42
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	31.25	52.92	174.31	71.37	109.24	131.13	-137.42
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	174.31	71.37	109.24	131.13	-137.42
2079	0.00	0.00	100.17	0.00	0.00	0.00	100.17	31.25	52.92	174.31	71.37	109.24	131.13	-137.42
2080	0.00	0.00	144.13	0.00	0.00	0.00	144.13	31.25	37.43	174.31	71.37	109.24	131.13	-137.42
2081	0.00	0.00	64.30	0.00	33.56	0.00	97.86	31.25	52.92	174.31	71.37	109.24	131.13	-137.42
2082	0.00	0.00	4.71	0.00	0.00	0.00	4.71	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	38.58	174.31	71.37	109.24	131.13	-137.42
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	174.31	71.37	109.24	131.13	-137.42
Salvage Value	4.24	0.00	11.03	0.00	2.27	0.00	17.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	487.12	0.00	82.85	0.00	4119.75	400.97	328.31	4917.89	1780.68	917.37	2017.04	202.79

Net Present Value: -4646

Wind/C26

TABLE 180
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	235.42	102.83	15.46	80.72	36.42
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	254.26	101.10	17.25	85.37	50.54
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	261.04	99.23	17.83	86.91	57.07
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	273.84	97.64	18.34	87.61	70.24
2018	195.48	0.00	0.00	0.00	0.00	0.00	195.48	3.11	0.00	262.67	94.94	20.49	88.17	59.07
2019	233.41	0.00	0.00	0.00	0.00	0.00	233.41	4.28	0.00	256.33	92.97	18.31	87.83	57.22
2020	237.17	0.00	0.00	7.06	10.56	0.00	254.79	5.55	0.00	259.67	92.45	14.09	89.99	63.14
2021	651.87	0.00	0.00	215.62	17.59	0.00	885.08	9.98	0.00	259.93	90.65	13.72	94.90	60.67
2022	1043.45	0.00	0.00	219.66	21.59	0.00	1284.70	16.40	6.21	263.01	89.00	13.75	95.22	65.03
2023	934.14	0.00	0.00	212.59	11.52	0.00	1158.25	22.19	12.42	266.63	86.54	15.77	98.60	65.71
2024	665.14	0.00	0.00	4.04	5.45	0.00	674.63	25.57	18.63	279.91	84.58	16.38	105.10	73.85
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	27.88	18.63	188.60	84.40	10.75	120.96	-27.51
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	29.40	32.93	242.22	88.44	12.78	87.10	53.88
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	29.95	33.15	328.38	95.99	11.53	81.31	139.55
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	30.12	32.86	348.38	96.05	12.65	85.63	154.05
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	33.07	337.72	94.39	12.86	87.53	142.94
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.90	329.65	93.32	12.58	87.51	136.24
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.85	320.66	91.91	12.90	88.64	127.21
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	30.12	32.61	308.08	90.48	12.93	89.60	115.08
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.18	293.11	88.95	12.82	90.75	100.58
2034	0.00	0.00	72.37	0.00	0.00	0.00	72.37	30.38	32.18	278.46	87.50	12.84	91.56	86.56
2035	0.00	0.00	90.59	0.00	6.75	0.00	97.34	30.75	32.22	272.47	86.48	11.72	92.83	81.43
2036	0.00	0.00	61.06	0.00	0.00	0.00	61.06	31.06	38.93	260.94	84.44	21.11	93.94	61.45
2037	0.00	0.00	68.96	0.00	6.75	0.00	75.72	31.44	36.03	251.41	82.99	23.83	96.12	48.46
2038	0.00	0.00	10.41	0.00	0.00	0.00	10.41	31.49	40.02	245.76	81.76	31.05	97.99	34.96
2039	0.00	0.00	50.82	0.00	0.00	0.00	50.82	31.74	40.02	238.61	80.58	30.25	108.58	19.20
2040	0.00	0.00	71.20	7.06	53.19	0.00	131.45	32.39	40.02	227.22	78.93	38.14	109.92	0.23
2041	0.00	0.00	61.36	215.62	0.00	0.00	276.98	33.78	44.02	220.25	77.54	47.05	112.41	-16.75
2042	0.00	0.00	69.26	219.66	0.00	0.00	288.92	35.22	43.36	212.30	76.27	49.16	117.18	-30.31
2043	0.00	0.00	61.48	212.59	0.00	0.00	274.08	36.59	47.34	207.15	74.99	55.01	123.09	-45.93
2044	0.00	0.00	69.40	4.04	44.75	0.00	118.18	37.18	47.34	196.08	73.64	68.16	120.93	-66.65
2045	0.00	0.00	10.49	0.00	0.00	0.00	10.49	37.23	51.35	189.15	72.37	79.65	123.27	-86.14
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	54.25	181.87	71.10	81.06	131.52	-101.81
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.36	175.07	69.87	81.85	141.51	-118.15
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.36	182.03	71.11	80.85	132.10	-102.03
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.37	182.03	71.11	80.85	132.10	-102.03
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.38	182.03	71.11	80.85	132.10	-102.03
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	53.12	182.03	71.11	80.85	132.10	-102.03
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	53.13	182.03	71.11	80.85	132.10	-102.03
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	182.03	71.11	80.85	132.10	-102.03
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	182.03	71.11	80.85	132.10	-102.03
2055	0.00	0.00	0.00	0.00	2.64	0.00	2.64	37.23	53.13	182.03	71.11	80.85	132.10	-102.03
2056	0.00	0.00	0.00	0.00	4.40	0.00	4.40	37.23	54.28	182.03	71.11	80.85	132.10	-102.03
2057	0.00	0.00	0.00	0.00	5.28	0.00	5.28	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2058	0.00	0.00	0.00	0.00	2.64	0.00	2.64	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2059	0.00	0.00	0.00	0.00	0.88	0.00	0.88	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2060	0.00	0.00	0.00	7.06	0.00	0.00	7.06	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2061	0.00	0.00	0.00	215.62	0.00	0.00	215.62	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2062	0.00	0.00	0.00	219.66	0.00	0.00	219.66	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2063	0.00	0.00	0.00	212.59	0.00	0.00	212.59	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2064	0.00	0.00	50.56	4.04	0.00	0.00	54.60	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2065	0.00	0.00	68.78	0.00	0.00	0.00	68.78	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2066	0.00	0.00	61.06	0.00	0.00	0.00	61.06	37.23	54.28	182.03	71.11	80.85	132.10	-102.03
2067	0.00	0.00	68.92	0.00	0.00	0.00	68.92	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2068	0.00	0.00	10.41	0.00	0.00	0.00	10.41	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2069	0.00	0.00	50.82	0.00	0.00	0.00	50.82	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2070	0.00	0.00	69.13	0.00	14.67	0.00	83.80	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2071	0.00	0.00	61.36	0.00	13.19	0.00	74.56	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2072	0.00	0.00	69.26	0.00	23.07	0.00	92.33	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2073	0.00	0.00	61.48	0.00	8.88	0.00	70.37	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2074	0.00	0.00	69.40	0.00	4.57	0.00	73.97	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2075	0.00	0.00	10.49	0.00	44.23	0.00	54.72	37.23	66.88	182.03	71.11	80.85	132.10	-102.03
2076	0.00	0.00	0.00	0.00	1.93	0.00	1.93	37.23	54.28	182.03	71.11	80.85	132.10	-102.03
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	68.62	182.03	71.11	80.85	132.10	-102.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	182.03	71.11	80.85	132.10	-102.03
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	37.23	68.62	182.03	71.11	80.85	132.10	-102.03
2080	0.00	0.00	0.00	7.06	0.00	0.00	7.06	37.23	53.13	182.03	71.11	80.85	132.10	-102.03
2081	0.00	0.00	0.00	215.62	0.00	0.00	215.62	37.23	68.62	182.03	71.11	80.85	132.10	-102.03
2082	0.00	0.00	0.00	219.66	0.00	0.00	219.66	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2083	0.00	0.00	0.00	212.59	0.00	0.00	212.59	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2084	0.00	0.00	0.00	4.04	9.87	0.00	13.90	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	54.28	182.03	71.11	80.85	132.10	-102.03
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
2090	0.00	0.00	0.00	0.00	13.30	0.00	13.30	37.23	51.39	182.03	71.11	80.85	132.10	-102.03
Salvage Value	4.24	0.00	5.27	9.83	3.35	0.00	22.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	244.56	686.48	129.48	0.00	4610.30	447.54	505.89	5067.79	1771.95	631.70	2053.16	610.98

Net Present Value -4953

K19/C25/750MW (WPS Sale &Inv)

TABLE 181
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	3.71	273.08	1.37	0.00	238.00	101.04	15.21	79.47	42.28
2015	85.96	477.40	0.00	0.00	18.59	6.63	588.59	4.31	0.00	255.59	99.38	16.95	83.91	55.35
2016	179.08	632.15	0.00	0.00	25.44	16.86	853.53	8.58	0.00	263.34	97.53	17.51	85.46	62.84
2017	208.35	766.12	0.00	0.00	37.23	24.52	1036.22	13.76	0.00	274.82	95.63	18.70	86.70	73.79
2018	250.44	540.20	0.00	0.00	39.13	101.55	931.32	18.41	0.00	267.87	93.59	19.58	86.56	68.13
2019	256.44	386.37	0.00	0.00	49.83	83.68	776.33	22.30	12.78	283.25	93.51	18.47	85.37	85.90
2020	706.88	157.77	0.00	0.00	3.48	155.11	1023.24	27.41	44.08	441.59	100.52	13.16	92.75	235.16
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	33.57	42.24	516.02	101.06	14.52	97.25	303.19
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	38.77	40.92	517.07	99.86	14.58	98.26	304.37
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	42.60	39.11	507.74	97.57	14.45	100.82	294.90
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	45.43	37.57	507.16	95.36	16.05	106.11	289.64
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	47.52	50.01	451.64	99.78	14.36	89.42	248.09
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	48.63	48.49	590.38	107.64	14.29	88.97	379.47
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	48.82	47.09	619.79	107.86	14.01	93.96	403.96
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	46.10	620.49	106.23	14.51	95.59	404.16
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	47.36	610.02	104.35	14.51	97.34	393.82
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	42.28	603.95	103.02	14.19	98.33	388.40
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	40.98	596.21	101.41	14.53	99.92	380.35
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	39.52	584.84	99.74	14.55	101.52	369.04
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	38.53	571.13	97.98	14.52	103.24	355.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	37.61	557.34	96.29	14.58	104.78	341.70
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	38.86	506.68	94.64	14.42	102.79	294.83
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	35.47	429.41	93.02	14.66	95.94	225.79
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	48.82	34.96	404.23	91.43	14.76	96.63	201.41
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	34.46	388.54	89.82	14.70	99.13	184.88
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	49.21	36.82	373.88	88.24	14.66	108.00	162.98
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	49.78	33.50	353.42	86.99	13.93	112.49	140.01
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	49.86	36.31	335.68	85.03	23.94	112.54	114.16
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	50.25	35.87	325.73	83.53	26.82	115.09	100.29
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	50.83	35.44	317.99	82.20	28.38	118.47	88.95
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	51.30	40.65	315.02	81.00	32.71	122.66	78.64
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	52.20	43.10	297.96	79.21	41.28	122.43	55.05
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	52.28	43.79	290.07	77.80	50.52	124.75	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	42.56	281.92	76.54	52.89	129.08	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	41.34	289.98	77.85	48.23	125.42	38.49
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	52.28	43.83	289.98	77.85	48.23	125.42	38.49
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	52.28	42.36	289.98	77.85	48.23	125.42	38.49
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	52.28	42.03	289.98	77.85	48.23	125.42	38.49
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	52.28	41.72	289.98	77.85	48.23	125.42	38.49
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	52.28	41.42	289.98	77.85	48.23	125.42	38.49
2054	0.00	0.00	0.00	0.00	17.32	18.17	35.50	52.28	41.12	289.98	77.85	48.23	125.42	38.49
2055	0.00	0.00	0.00	0.00	0.86	18.85	19.70	52.28	41.96	289.98	77.85	48.23	125.42	38.49
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	52.28	54.06	289.98	77.85	48.23	125.42	38.49
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	52.28	38.57	289.98	77.85	48.23	125.42	38.49
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	52.28	53.53	289.98	77.85	48.23	125.42	38.49
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	52.28	40.90	289.98	77.85	48.23	125.42	38.49
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	52.28	50.37	289.98	77.85	48.23	125.42	38.49
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	65.59	289.98	77.85	48.23	125.42	38.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	52.28	65.59	289.98	77.85	48.23	125.42	38.49
2065	0.00	0.00	0.00	0.00	8.50	4.10	12.60	52.28	37.99	289.98	77.85	48.23	125.42	38.49
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	52.28	65.59	289.98	77.85	48.23	125.42	38.49
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	52.28	65.59	289.98	77.85	48.23	125.42	38.49
2069	0.00	0.00	76.94	0.00	32.51	55.39	164.84	52.28	37.99	289.98	77.85	48.23	125.42	38.49
2070	0.00	0.00	105.09	0.00	2.62	57.44	165.15	52.28	52.08	289.98	77.85	48.23	125.42	38.49
2071	0.00	0.00	15.94	0.00	31.87	0.00	47.82	52.28	36.85	289.98	77.85	48.23	125.42	38.49
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	52.28	52.08	289.98	77.85	48.23	125.42	38.49
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	52.28	36.00	289.98	77.85	48.23	125.42	38.49
2074	0.00	0.00	95.07	0.00	49.15	0.00	144.22	52.28	50.37	289.98	77.85	48.23	125.42	38.49
2075	0.00	0.00	107.74	0.00	73.92	0.00	181.66	52.28	37.99	289.98	77.85	48.23	125.42	38.49
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	52.28	52.08	289.98	77.85	48.23	125.42	38.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	36.85	289.98	77.85	48.23	125.42	38.49
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	52.28	52.08	289.98	77.85	48.23	125.42	38.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	39.70	289.98	77.85	48.23	125.42	38.49
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	52.28	52.08	289.98	77.85	48.23	125.42	38.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	52.28	37.99	289.98	77.85	48.23	125.42	38.49
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	52.28	35.14	289.98	77.85	48.23	125.42	38.49
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	52.28	37.99	289.98	77.85	48.23	125.42	38.49
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	52.28	37.99	289.98	77.85	48.23	125.42	38.49
Salvage Value	7.48	0.00	21.73	0.00	34.06	15.84	79.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	322.69	0.00	545.81	377.72	8590.62	1165.64	974.39	11022.41	2592.32	742.12	2984.79	4703.18

Net Present Value -6027

K19/C25/750MW

TABLE 182
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	5.19	274.56	1.37	0.00	230.96	101.05	15.21	79.33	35.37
2015	85.96	477.40	0.00	0.00	18.59	8.41	590.37	4.32	0.00	248.76	99.37	16.94	83.90	48.55
2016	179.08	632.15	0.00	0.00	25.44	17.62	854.30	8.60	0.00	255.33	97.52	17.49	85.43	54.89
2017	208.35	766.12	0.00	0.00	37.23	24.52	1036.22	13.78	0.00	265.56	95.62	18.70	86.67	64.56
2018	250.44	540.20	0.00	0.00	39.13	143.53	973.30	18.64	0.00	257.37	93.58	19.55	86.59	57.64
2019	256.44	386.37	0.00	0.00	49.83	98.87	791.51	22.60	12.78	271.47	93.50	18.44	85.39	74.14
2020	706.88	157.77	0.00	0.00	3.48	273.35	1141.47	28.31	47.15	419.78	100.52	13.14	92.65	213.46
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	34.47	45.41	503.54	101.06	14.62	97.32	290.53
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	39.67	44.12	507.07	99.85	14.58	98.28	294.36
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	43.49	42.17	498.40	97.56	14.45	100.85	285.54
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	46.33	40.51	499.09	95.34	16.09	106.16	281.49
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	48.41	52.82	442.73	99.78	14.38	89.41	239.17
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	49.53	51.19	544.80	107.63	14.34	87.15	335.68
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	49.72	49.67	540.95	107.87	13.93	89.45	329.70
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	48.57	538.70	106.23	14.49	90.74	327.25
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	49.73	529.84	104.34	14.50	92.57	318.43
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	44.54	525.18	103.00	14.22	93.73	314.23
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	43.14	519.12	101.39	14.60	95.40	307.73
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	41.59	509.50	99.73	14.61	97.27	297.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	40.50	497.61	97.98	14.50	99.17	285.95
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	39.49	485.70	96.30	14.55	100.99	273.86
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	40.66	419.87	94.67	14.58	94.32	216.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	37.19	395.81	93.03	14.72	94.74	193.32
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	49.72	36.60	381.75	91.41	14.71	96.66	178.96
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	36.04	366.86	89.82	14.68	99.12	163.24
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	50.10	38.33	352.96	88.24	14.69	107.95	142.08
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	50.67	34.95	349.24	86.99	13.94	112.46	135.85
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	50.75	37.70	335.68	85.03	23.94	112.53	114.18
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	51.14	37.20	325.73	83.53	26.82	115.08	100.30
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	51.72	36.72	318.00	82.20	28.38	118.47	88.96
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	52.20	41.87	315.04	81.00	32.71	122.65	78.66
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	53.10	44.26	297.94	79.21	41.28	122.40	55.06
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	53.18	44.90	290.01	77.80	50.52	124.70	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	43.62	281.88	76.54	52.89	129.04	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	42.35	289.95	77.85	48.23	125.38	38.49
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	53.18	44.80	289.95	77.85	48.23	125.38	38.49
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	53.18	43.28	289.95	77.85	48.23	125.38	38.49
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	53.18	42.91	289.95	77.85	48.23	125.38	38.49
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	53.18	42.55	289.95	77.85	48.23	125.38	38.49
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	53.18	42.21	289.95	77.85	48.23	125.38	38.49
2054	0.00	0.00	0.00	0.00	17.32	18.17	35.50	53.18	41.87	289.95	77.85	48.23	125.38	38.49
2055	0.00	0.00	0.00	0.00	0.86	18.85	19.70	53.18	42.68	289.95	77.85	48.23	125.38	38.49
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	53.18	54.74	289.95	77.85	48.23	125.38	38.49
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	53.18	39.21	289.95	77.85	48.23	125.38	38.49
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	53.18	54.14	289.95	77.85	48.23	125.38	38.49
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	53.18	41.48	289.95	77.85	48.23	125.38	38.49
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	53.18	50.37	289.95	77.85	48.23	125.38	38.49
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	65.59	289.95	77.85	48.23	125.38	38.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	53.18	65.59	289.95	77.85	48.23	125.38	38.49
2065	0.00	0.00	0.00	0.00	8.50	4.10	12.60	53.18	37.99	289.95	77.85	48.23	125.38	38.49
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	53.18	65.59	289.95	77.85	48.23	125.38	38.49
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	53.18	65.59	289.95	77.85	48.23	125.38	38.49
2069	0.00	0.00	76.94	0.00	32.51	55.39	164.84	53.18	37.99	289.95	77.85	48.23	125.38	38.49
2070	0.00	0.00	105.09	0.00	2.62	57.44	165.15	53.18	52.08	289.95	77.85	48.23	125.38	38.49
2071	0.00	0.00	15.94	0.00	31.87	0.00	47.82	53.18	36.85	289.95	77.85	48.23	125.38	38.49
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	53.18	52.08	289.95	77.85	48.23	125.38	38.49
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	53.18	36.00	289.95	77.85	48.23	125.38	38.49
2074	0.00	0.00	95.07	0.00	49.15	0.00	144.22	53.18	50.37	289.95	77.85	48.23	125.38	38.49
2075	0.00	0.00	107.74	0.00	73.92	0.00	181.66	53.18	37.99	289.95	77.85	48.23	125.38	38.49
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	53.18	52.08	289.95	77.85	48.23	125.38	38.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	36.85	289.95	77.85	48.23	125.38	38.49
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	53.18	52.08	289.95	77.85	48.23	125.38	38.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	39.70	289.95	77.85	48.23	125.38	38.49
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	53.18	52.08	289.95	77.85	48.23	125.38	38.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	53.18	37.99	289.95	77.85	48.23	125.38	38.49
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	53.18	35.14	289.95	77.85	48.23	125.38	38.49
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	53.18	37.99	289.95	77.85	48.23	125.38	38.49
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	53.18	37.99	289.95	77.85	48.23	125.38	38.49
Salvage Value	7.48	0.00	21.73	0.00	34.06	15.84	79.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	322.69	0.00	545.81	528.33	8741.23	1186.69	1010.79	10436.83	2592.24	742.28	2957.55	4144.76

Net Present Value -6794

K19/Gas25/750MW (WPS Sale & INV)

TABLE 183
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	3.71	241.92	1.21	0.00	238.00	101.04	15.21	79.47	42.28
2015	0.00	477.40	0.00	0.00	18.59	6.63	502.63	3.72	0.00	255.60	99.38	16.95	83.91	55.36
2016	0.00	632.15	0.00	0.00	25.44	16.86	674.45	7.09	0.00	263.37	97.53	17.50	85.46	62.88
2017	0.00	766.12	0.00	0.00	37.23	24.52	827.87	11.23	0.00	275.01	95.62	18.69	86.67	74.02
2018	0.00	540.20	0.00	0.00	39.13	101.55	680.89	14.64	0.00	268.17	93.59	19.54	86.53	68.50
2019	0.00	386.37	0.00	0.00	46.36	83.68	516.41	17.22	12.78	283.75	93.51	18.46	85.36	86.42
2020	0.00	157.77	0.00	0.00	0.01	155.11	312.89	18.79	44.08	442.30	100.52	13.15	92.71	235.92
2021	0.00	54.75	0.35	0.00	0.00	0.00	55.10	19.06	42.24	517.27	101.06	14.51	97.17	304.52
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.06	40.92	518.47	99.85	14.55	98.16	305.90
2023	0.00	0.00	92.47	0.00	0.00	0.00	92.47	19.41	39.11	507.99	97.11	15.42	101.32	294.14
2024	0.00	0.00	189.86	0.00	9.12	0.00	198.97	20.30	37.57	509.45	95.04	16.96	106.44	291.00
2025	0.00	0.00	114.27	0.00	71.81	0.00	186.08	21.22	39.87	400.63	94.71	16.37	98.17	191.38
2026	0.00	0.00	86.91	0.00	0.00	0.00	86.91	21.66	42.07	428.52	93.41	19.40	101.03	214.68
2027	0.00	0.00	98.49	0.00	0.00	0.00	98.49	22.15	40.80	427.79	91.48	19.03	105.39	211.89
2028	0.00	0.00	14.94	0.00	0.00	0.00	14.94	22.22	43.51	420.30	89.20	27.96	107.99	195.16
2029	0.00	0.00	73.20	0.00	0.00	0.00	73.20	22.59	44.95	411.19	87.46	31.30	110.99	181.44
2030	0.00	0.00	99.98	0.00	60.41	0.00	160.39	23.39	39.91	409.54	86.39	34.37	113.44	175.34
2031	0.00	0.00	89.10	0.00	0.00	0.00	89.10	23.84	42.71	413.16	86.00	37.36	114.33	175.47
2032	0.00	0.00	100.98	0.00	0.00	0.00	100.98	24.34	41.62	400.27	83.71	44.56	118.82	153.19
2033	0.00	0.00	15.32	0.00	0.00	0.00	15.32	24.42	44.48	394.32	82.20	53.42	121.83	136.88
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	43.45	390.86	81.44	55.81	123.74	129.88
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	42.03	322.16	79.36	54.02	119.25	69.53
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	41.50	230.87	77.93	55.02	107.60	-9.68
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	40.99	206.44	76.54	60.37	108.14	-38.61
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	40.49	203.32	75.80	59.00	113.48	-44.96
2039	0.00	0.00	158.62	0.00	0.00	0.00	158.62	25.21	42.85	184.27	73.92	70.59	119.98	-80.23
2040	0.00	0.00	229.15	0.00	0.00	0.00	229.15	26.36	39.54	165.30	72.60	78.14	122.89	-108.34
2041	0.00	0.00	102.63	0.00	9.12	0.00	111.75	26.92	39.08	167.69	72.81	76.51	122.62	-104.26
2042	0.00	0.00	7.55	0.00	0.00	0.00	7.55	26.95	45.44	184.13	70.66	109.91	124.27	-120.72
2043	0.00	0.00	78.50	0.00	0.00	0.00	78.50	27.35	45.01	170.85	68.96	120.28	128.15	-146.54
2044	0.00	0.00	107.21	0.00	60.41	0.00	167.62	28.18	46.30	155.44	67.39	128.60	132.03	-172.58
2045	0.00	0.00	51.14	0.00	0.00	0.00	51.14	28.44	49.83	148.49	66.08	143.52	135.06	-196.18
2046	0.00	0.00	47.63	0.00	0.00	0.00	47.63	28.68	49.44	140.48	64.90	155.71	138.06	-218.19
2047	0.00	0.00	7.23	0.00	0.00	0.00	7.23	28.71	49.62	137.21	64.09	160.73	143.63	-231.25
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	48.40	142.06	65.02	153.32	138.92	-215.20
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	28.71	50.90	142.06	65.02	153.32	138.92	-215.20
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	28.71	47.72	142.06	65.02	153.32	138.92	-215.20
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	28.71	47.40	142.06	65.02	153.32	138.92	-215.20
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	28.71	47.08	142.06	65.02	153.32	138.92	-215.20
2053	0.00	0.00	71.04	0.00	20.19	18.17	109.40	28.71	46.77	142.06	65.02	153.32	138.92	-215.20
2054	0.00	0.00	168.43	0.00	16.47	18.17	203.07	28.71	46.47	142.06	65.02	153.32	138.92	-215.20
2055	0.00	0.00	112.23	0.00	0.00	18.85	131.08	28.71	46.18	142.06	65.02	153.32	138.92	-215.20
2056	0.00	0.00	86.91	0.00	0.00	0.00	86.91	28.71	61.13	142.06	65.02	153.32	138.92	-215.20
2057	0.00	0.00	98.49	0.00	0.00	0.00	98.49	28.71	45.63	142.06	65.02	153.32	138.92	-215.20
2058	0.00	0.00	14.94	0.00	0.00	0.00	14.94	28.71	60.60	142.06	65.02	153.32	138.92	-215.20
2059	0.00	0.00	73.20	0.00	9.12	0.00	82.32	28.71	47.96	142.06	65.02	153.32	138.92	-215.20
2060	0.00	0.00	99.98	0.00	53.86	0.00	153.83	28.71	57.43	142.06	65.02	153.32	138.92	-215.20
2061	0.00	0.00	89.10	0.00	0.00	0.00	89.10	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2062	0.00	0.00	100.98	0.00	0.00	0.00	100.98	28.71	57.43	142.06	65.02	153.32	138.92	-215.20
2063	0.00	0.00	15.32	0.00	0.00	0.00	15.32	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	28.71	57.43	142.06	65.02	153.32	138.92	-215.20
2065	0.00	0.00	0.00	0.00	53.80	4.10	57.91	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	28.71	57.43	142.06	65.02	153.32	138.92	-215.20
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	28.71	57.43	142.06	65.02	153.32	138.92	-215.20
2069	0.00	0.00	158.62	0.00	29.89	55.39	243.90	28.71	45.05	142.06	65.02	153.32	138.92	-215.20
2070	0.00	0.00	229.15	0.00	0.01	57.44	286.60	28.71	43.92	142.06	65.02	153.32	138.92	-215.20
2071	0.00	0.00	102.63	0.00	0.00	0.00	102.63	28.71	43.92	142.06	65.02	153.32	138.92	-215.20
2072	0.00	0.00	7.55	0.00	0.00	0.00	7.55	28.71	43.92	142.06	65.02	153.32	138.92	-215.20
2073	0.00	0.00	78.50	0.00	0.00	0.00	78.50	28.71	43.06	142.06	65.02	153.32	138.92	-215.20
2074	0.00	0.00	107.21	0.00	0.00	0.00	107.21	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2075	0.00	0.00	51.14	0.00	17.95	0.00	69.09	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2076	0.00	0.00	47.63	0.00	9.12	0.00	56.75	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2077	0.00	0.00	7.23	0.00	0.00	0.00	7.23	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	28.71	45.05	142.06	65.02	153.32	138.92	-215.20
2080	0.00	0.00	0.00	0.00	15.10	0.00	15.10	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2083	0.00	0.00	71.04	0.00	0.00	0.00	71.04	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2084	0.00	0.00	168.43	0.00	10.41	0.67	179.51	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2085	0.00	0.00	112.23	0.00	10.09	1.35	123.67	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2086	0.00	0.00	86.91	0.00	24.42	4.04	115.36	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2087	0.00	0.00	98.49	0.00	28.37	6.06	132.92	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2088	0.00	0.00	14.94	0.00	20.19	18.17	53.30	28.71	42.21	142.06	65.02	153.32	138.92	-215.20
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	28.71	45.05	142.06	65.02	153.32	138.92	-215.20
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	28.71	45.05	142.06	65.02	153.32	138.92	-215.20
Salvage Value	0.00	0.00	69.00	0.00	18.88	15.84	103.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1282.78	0.00	357.34	377.72	4957.29	621.82	1020.30	7956.88	2331.17	2023.06	3236.90	365.75

Net Present Value -6234

K19/C31/750MW

TABLE 184
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	217.56	0.00	0.00	20.64	5.19	273.93	1.37	0.00	230.96	101.05	15.21	79.33	35.37
2015	38.54	477.40	0.00	0.00	18.59	8.41	542.95	4.08	0.00	248.76	99.37	16.94	83.90	48.55
2016	10.47	632.15	0.00	0.00	25.44	17.62	685.69	7.51	0.00	255.33	97.52	17.49	85.43	54.89
2017	10.54	766.12	0.00	0.00	37.23	24.52	838.40	11.70	0.00	265.80	95.61	18.70	86.67	64.81
2018	12.52	540.20	0.00	0.00	39.13	143.53	735.39	15.38	0.00	257.66	93.57	19.54	86.56	57.98
2019	12.59	386.37	0.00	0.00	46.36	98.87	544.19	18.10	12.78	271.92	93.49	18.48	85.38	74.57
2020	12.67	157.77	0.00	0.00	0.01	273.35	443.79	20.32	47.15	420.55	100.51	13.17	92.64	214.22
2021	16.02	54.75	0.00	0.00	0.00	0.00	70.77	20.68	45.41	504.61	101.05	14.59	97.22	291.75
2022	162.04	0.00	0.00	0.00	0.00	0.00	162.04	21.49	44.12	508.59	99.87	14.56	98.17	295.98
2023	247.17	0.00	0.00	0.00	0.00	0.00	247.17	22.72	42.17	498.25	97.01	15.60	101.60	284.03
2024	268.52	0.00	0.00	0.00	0.00	0.00	268.52	24.06	40.51	500.15	94.87	17.36	107.07	280.85
2025	273.67	0.00	0.00	0.00	3.47	0.00	277.14	25.45	38.77	389.60	94.73	12.59	103.80	178.48
2026	740.31	0.00	0.00	0.00	3.47	0.00	743.78	29.17	36.92	374.43	92.87	12.99	112.40	156.18
2027	1175.50	0.00	0.00	0.00	42.16	0.00	1217.66	35.26	35.54	334.25	90.98	12.20	110.84	120.23
2028	1055.42	0.00	0.00	0.00	21.87	0.00	1077.29	40.64	34.22	321.68	89.41	12.67	120.02	99.57
2029	753.68	0.00	0.00	0.00	36.80	0.00	790.48	44.60	35.55	312.54	87.83	13.05	130.71	80.95
2030	521.97	0.00	0.00	0.00	63.72	0.00	585.69	47.52	30.41	310.10	86.53	13.36	139.20	71.01
2031	342.84	0.00	0.00	0.00	85.37	0.00	428.22	49.67	43.23	355.80	90.47	15.48	91.84	158.01
2032	126.27	0.00	0.00	0.00	100.61	0.00	226.89	50.80	42.25	465.28	97.37	15.22	91.40	261.29
2033	39.85	0.00	0.00	0.00	0.00	0.00	39.85	51.00	40.96	499.42	98.07	14.88	99.17	287.29
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	40.05	485.74	96.31	14.54	100.97	273.92
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	38.37	419.31	94.67	14.50	94.26	215.88
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	37.71	395.72	93.03	14.81	94.67	193.21
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	51.00	36.95	381.91	91.42	14.75	96.63	179.11
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	36.03	366.89	89.82	14.67	99.10	163.30
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	51.38	38.39	353.00	88.24	14.68	107.93	142.16
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	51.95	35.12	349.24	86.99	13.94	112.46	135.85
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	52.03	41.20	335.68	85.03	23.94	112.53	114.18
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	52.43	37.85	325.73	83.53	26.82	115.08	100.30
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	53.00	37.36	318.00	82.20	28.38	118.47	88.96
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	53.48	42.52	315.04	81.00	32.71	122.65	78.66
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	54.38	42.06	297.94	79.21	41.28	122.40	55.06
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	54.46	45.55	290.01	77.80	50.52	124.70	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	43.62	281.88	76.54	52.89	129.04	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	42.35	289.95	77.85	48.23	125.38	38.49
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	54.46	44.80	289.95	77.85	48.23	125.38	38.49
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	54.46	41.57	289.95	77.85	48.23	125.38	38.49
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	54.46	44.05	289.95	77.85	48.23	125.38	38.49
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	54.46	40.84	289.95	77.85	48.23	125.38	38.49
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	54.46	40.50	289.95	77.85	48.23	125.38	38.49
2054	0.00	0.00	0.00	0.00	16.47	18.17	34.64	54.46	40.16	289.95	77.85	48.23	125.38	38.49
2055	0.00	0.00	0.00	0.00	0.00	18.85	18.85	54.46	39.83	289.95	77.85	48.23	125.38	38.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	56.45	289.95	77.85	48.23	125.38	38.49
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	40.92	289.95	77.85	48.23	125.38	38.49
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	55.85	289.95	77.85	48.23	125.38	38.49
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	43.18	289.95	77.85	48.23	125.38	38.49
2060	0.00	0.00	0.00	0.00	0.86	0.00	0.86	54.46	52.08	289.95	77.85	48.23	125.38	38.49
2061	0.00	0.00	0.00	0.00	0.86	0.00	0.86	54.46	37.99	289.95	77.85	48.23	125.38	38.49
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2063	0.00	0.00	0.00	0.00	5.14	0.00	5.14	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2064	0.00	0.00	0.00	0.00	18.81	2.05	20.86	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2065	0.00	0.00	0.00	0.00	23.07	4.10	27.17	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2066	0.00	0.00	0.00	0.00	21.59	12.31	33.90	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2067	0.00	0.00	0.00	0.00	33.71	18.46	52.18	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	54.46	65.59	289.95	77.85	48.23	125.38	38.49
2069	0.00	0.00	76.94	0.00	29.89	55.39	162.23	54.46	37.99	289.95	77.85	48.23	125.38	38.49
2070	0.00	0.00	105.09	0.00	0.01	57.44	162.54	54.46	52.08	289.95	77.85	48.23	125.38	38.49
2071	0.00	0.00	15.94	0.00	0.00	0.00	15.94	54.46	39.70	289.95	77.85	48.23	125.38	38.49
2072	0.00	0.00	78.10	0.00	0.00	0.00	78.10	54.46	52.08	289.95	77.85	48.23	125.38	38.49
2073	0.00	0.00	106.67	0.00	0.00	0.00	106.67	54.46	36.00	289.95	77.85	48.23	125.38	38.49
2074	0.00	0.00	95.07	0.00	0.00	0.00	95.07	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2075	0.00	0.00	107.74	0.00	11.73	0.00	119.47	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2076	0.00	0.00	16.34	0.00	2.61	0.00	18.96	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2077	0.00	0.00	0.00	0.00	31.87	0.00	31.87	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2078	0.00	0.00	0.00	0.00	25.85	0.00	25.85	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2079	0.00	0.00	0.00	0.00	28.23	0.00	28.23	54.46	37.99	289.95	77.85	48.23	125.38	38.49
2080	0.00	0.00	0.00	0.00	103.00	0.00	103.00	54.46	50.37	289.95	77.85	48.23	125.38	38.49
2081	0.00	0.00	0.00	0.00	64.80	0.00	64.80	54.46	37.99	289.95	77.85	48.23	125.38	38.49
2082	0.00	0.00	0.00	0.00	75.76	0.00	75.76	54.46	52.08	289.95	77.85	48.23	125.38	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	36.85	289.95	77.85	48.23	125.38	38.49
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	54.46	52.08	289.95	77.85	48.23	125.38	38.49
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	54.46	36.85	289.95	77.85	48.23	125.38	38.49
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	54.46	52.08	289.95	77.85	48.23	125.38	38.49
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	54.46	35.14	289.95	77.85	48.23	125.38	38.49
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	54.46	37.99	289.95	77.85	48.23	125.38	38.49
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	54.46	37.99	289.95	77.85	48.23	125.38	38.49
Salvage Value	55.10	0.00	21.73	0.00	38.18	15.84	130.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3753.27	2939.45	322.69	0.00	485.48	528.33	8029.23	1083.29	953.49	9641.31	2529.12	739.28	3062.70	3310.20

Net Present Value -6756

K19/Gas31/750MW

TABLE 185
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	5.19	243.40	1.22	0.00	230.96	101.05	15.21	79.33	35.37
2015	0.00	477.40	0.00	0.00	18.59	8.41	504.40	3.74	0.00	248.76	99.37	16.94	83.90	48.55
2016	0.00	632.15	0.00	0.00	25.44	17.62	675.22	7.12	0.00	255.33	97.52	17.49	85.43	54.89
2017	0.00	766.12	0.00	0.00	37.23	24.52	827.87	11.25	0.00	265.80	95.61	18.70	86.67	64.81
2018	0.00	540.20	0.00	0.00	39.13	143.53	722.87	14.87	0.00	257.66	93.57	19.54	86.56	57.98
2019	0.00	386.37	0.00	0.00	46.36	98.87	531.59	17.53	12.78	271.92	93.49	18.48	85.38	74.57
2020	0.00	157.77	0.00	0.00	0.01	273.35	431.12	19.68	47.15	420.55	100.51	13.17	92.64	214.22
2021	0.00	54.75	0.00	0.00	0.00	0.00	54.75	19.96	45.41	504.61	101.05	14.59	97.22	291.75
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	44.12	508.55	99.86	14.58	98.19	295.92
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	42.17	498.52	97.01	15.60	101.58	284.32
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	40.51	500.67	94.87	17.37	107.05	281.38
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	38.77	390.86	94.73	12.60	103.99	179.54
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	36.92	376.77	92.86	13.08	112.80	158.03
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	19.96	35.54	337.25	90.97	12.25	111.18	122.86
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.96	34.22	326.22	89.40	12.68	120.81	103.33
2029	0.00	0.00	167.83	0.00	0.00	0.00	167.83	20.69	35.55	316.41	87.88	12.86	130.70	84.98
2030	0.00	0.00	294.95	0.00	18.24	0.00	313.19	22.15	30.41	317.48	87.29	11.40	136.90	81.90
2031	0.00	0.00	132.85	0.00	71.81	0.00	204.66	23.16	37.01	309.96	85.20	25.42	108.12	91.23
2032	0.00	0.00	89.55	0.00	0.00	0.00	89.55	23.61	39.74	303.27	83.64	32.39	110.34	76.90
2033	0.00	0.00	101.48	0.00	0.00	0.00	101.48	24.12	38.59	294.71	82.23	35.74	112.96	63.79
2034	0.00	0.00	15.39	0.00	0.00	0.00	15.39	24.19	41.38	294.21	81.44	38.65	115.71	58.41
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.19	39.87	221.82	79.38	46.24	105.44	-9.23
2036	0.00	0.00	156.26	0.00	0.00	0.00	156.26	24.97	39.26	200.50	77.98	50.67	105.91	-34.06
2037	0.00	0.00	225.75	0.00	0.00	0.00	225.75	26.10	38.68	191.15	76.68	55.55	108.20	-49.29
2038	0.00	0.00	101.11	0.00	60.41	0.00	161.52	26.91	38.12	194.32	76.53	50.82	113.25	-46.28
2039	0.00	0.00	7.44	0.00	0.00	0.00	7.44	26.95	47.22	207.07	74.36	85.21	117.52	-70.01
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.95	43.85	193.54	72.52	93.73	121.29	-93.99
2041	0.00	0.00	77.72	0.00	0.00	0.00	77.72	27.34	43.33	183.72	71.08	102.21	124.40	-113.97
2042	0.00	0.00	267.15	0.00	0.00	0.00	267.15	28.67	42.83	174.30	69.76	111.46	127.39	-134.31
2043	0.00	0.00	248.71	0.00	0.00	0.00	248.71	29.91	46.26	171.07	68.91	119.12	130.49	-147.45
2044	0.00	0.00	104.18	0.00	60.41	0.00	164.59	30.74	47.51	168.43	68.55	111.40	136.67	-148.19
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.78	53.86	178.73	66.67	150.42	131.97	-170.34
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	53.43	170.03	65.49	159.20	134.89	-189.54
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	52.15	159.46	64.26	168.82	137.89	-211.50
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	50.88	169.41	65.47	159.48	134.92	-190.46
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	30.78	53.33	169.41	65.47	159.48	134.92	-190.46
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	30.78	50.10	169.41	65.47	159.48	134.92	-190.46
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	30.78	49.74	169.41	65.47	159.48	134.92	-190.46
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	30.78	49.38	169.41	65.47	159.48	134.92	-190.46
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	30.78	49.03	169.41	65.47	159.48	134.92	-190.46
2054	0.00	0.00	0.00	0.00	16.47	18.17	34.64	30.78	48.69	169.41	65.47	159.48	134.92	-190.46
2055	0.00	0.00	0.00	0.00	0.00	18.85	18.85	30.78	48.36	169.41	65.47	159.48	134.92	-190.46
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	63.27	169.41	65.47	159.48	134.92	-190.46
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	47.74	169.41	65.47	159.48	134.92	-190.46
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	62.67	169.41	65.47	159.48	134.92	-190.46
2059	0.00	0.00	146.40	0.00	0.00	0.00	146.40	30.78	50.00	169.41	65.47	159.48	134.92	-190.46
2060	0.00	0.00	273.52	0.00	0.00	0.00	273.52	30.78	58.90	169.41	65.47	159.48	134.92	-190.46
2061	0.00	0.00	130.81	0.00	0.00	0.00	130.81	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2062	0.00	0.00	89.55	0.00	0.00	0.00	89.55	30.78	58.90	169.41	65.47	159.48	134.92	-190.46
2063	0.00	0.00	101.48	0.00	0.00	0.00	101.48	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2064	0.00	0.00	15.39	0.00	10.23	2.05	27.68	30.78	58.90	169.41	65.47	159.48	134.92	-190.46
2065	0.00	0.00	0.00	0.00	26.73	4.10	30.84	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2066	0.00	0.00	156.26	0.00	54.88	12.31	223.45	30.78	58.90	169.41	65.47	159.48	134.92	-190.46
2067	0.00	0.00	225.75	0.00	8.86	18.46	253.07	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2068	0.00	0.00	101.11	0.00	18.95	55.39	175.44	30.78	58.90	169.41	65.47	159.48	134.92	-190.46
2069	0.00	0.00	7.44	0.00	29.89	55.39	92.72	30.78	46.52	169.41	65.47	159.48	134.92	-190.46
2070	0.00	0.00	0.00	0.00	0.01	57.44	57.45	30.78	45.38	169.41	65.47	159.48	134.92	-190.46
2071	0.00	0.00	77.72	0.00	0.00	0.00	77.72	30.78	45.38	169.41	65.47	159.48	134.92	-190.46
2072	0.00	0.00	267.15	0.00	0.00	0.00	267.15	30.78	45.38	169.41	65.47	159.48	134.92	-190.46
2073	0.00	0.00	248.71	0.00	45.31	0.00	294.01	30.78	44.53	169.41	65.47	159.48	134.92	-190.46
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2075	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	30.78	46.52	169.41	65.47	159.48	134.92	-190.46
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2081	0.00	0.00	0.00	0.00	17.95	0.00	17.95	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2088	0.00	0.00	0.00	0.00	35.29	18.17	53.46	30.78	43.67	169.41	65.47	159.48	134.92	-190.46
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	30.78	46.52	169.41	65.47	159.48	134.92	-190.46
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	30.78	46.52	169.41	65.47	159.48	134.92	-190.46
Salvage Value	0.00	0.00	41.11	0.00	20.74	15.84	77.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1280.02	0.00	333.95	528.33	5081.75	640.64	1017.33	7561.87	2334.49	2004.76	3230.31	-7.68

Net Present Value -6747

K19/C25/250MW

TABLE 186
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	3.90	273.27	1.38	0.00	230.96	101.05	15.21	79.33	35.37
2015	85.96	477.40	0.00	0.00	18.59	2.67	584.63	4.30	0.00	248.76	99.37	16.94	83.90	48.55
2016	179.08	632.15	0.00	0.00	25.44	3.89	840.56	8.51	0.00	255.33	97.52	17.49	85.43	54.89
2017	208.35	766.12	0.00	0.00	37.23	5.84	1017.53	13.59	0.00	265.56	95.62	18.70	86.67	64.56
2018	250.44	540.20	0.00	0.00	39.13	17.51	847.28	17.83	0.00	254.04	93.05	21.12	86.26	53.61
2019	256.44	386.37	0.00	0.00	49.83	17.51	710.15	21.38	12.78	268.85	92.64	20.88	87.13	68.19
2020	706.88	157.77	0.00	0.00	3.48	18.16	886.28	25.81	12.99	400.91	100.81	13.60	85.00	201.50
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	31.97	12.75	477.47	101.38	13.94	86.91	275.24
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	37.17	12.97	476.15	99.52	14.58	88.35	273.70
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	41.00	12.80	473.40	97.35	14.57	94.13	267.35
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	43.83	12.75	478.24	95.03	16.19	102.80	264.22
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	45.92	26.59	414.27	99.62	14.47	82.46	217.72
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	47.03	26.40	503.03	106.98	14.10	80.15	301.79
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	47.22	26.29	488.66	106.57	13.38	81.71	287.00
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	26.56	483.79	104.88	13.92	82.88	282.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	29.04	475.31	103.11	14.09	84.57	273.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	25.13	469.25	101.88	13.90	84.79	268.69
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.96	460.99	100.31	14.23	85.74	260.71
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.60	450.18	98.71	14.32	86.90	250.26
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.67	438.04	97.05	14.36	88.49	238.14
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.78	425.05	95.45	14.46	89.62	225.51
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	26.81	375.07	93.85	14.51	88.63	178.07
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	47.22	23.97	351.45	92.31	14.79	88.70	155.67
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	23.97	335.93	90.77	14.72	89.62	140.82
2038	0.00	0.00	97.99	0.00	0.00	0.00	97.99	47.60	23.97	319.63	89.24	14.70	91.11	124.57
2039	0.00	0.00	125.99	0.00	9.12	0.00	135.11	48.17	26.81	312.73	88.07	13.77	99.85	111.04
2040	0.00	0.00	15.86	0.00	0.00	0.00	15.86	48.25	27.88	301.47	86.11	23.36	101.24	90.77
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	27.23	292.32	84.64	26.35	103.63	77.69
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	48.64	27.23	284.78	83.34	28.12	106.33	66.99
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	49.22	27.23	276.98	81.98	27.86	111.26	55.89
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	49.70	32.86	268.05	80.45	41.36	110.35	35.90
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	50.59	35.70	258.41	79.07	45.76	113.03	20.55
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	50.68	36.78	252.48	77.73	52.10	117.46	5.19
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.93	243.69	76.37	52.76	124.24	-9.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.08	251.53	77.72	50.20	118.24	5.36
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	50.68	37.92	251.53	77.72	50.20	118.24	5.36
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	50.68	36.79	251.53	77.72	50.20	118.24	5.36
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	50.68	36.80	251.53	77.72	50.20	118.24	5.36
2052	0.00	0.00	0.00	0.00	28.37	1.44	29.81	50.68	36.80	251.53	77.72	50.20	118.24	5.36
2053	0.00	0.00	0.00	0.00	20.19	4.33	24.51	50.68	36.81	251.53	77.72	50.20	118.24	5.36
2054	0.00	0.00	0.00	0.00	17.32	4.33	21.65	50.68	36.81	251.53	77.72	50.20	118.24	5.36
2055	0.00	0.00	0.00	0.00	0.86	4.49	5.34	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	50.68	50.33	251.53	77.72	50.20	118.24	5.36
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	50.68	50.33	251.53	77.72	50.20	118.24	5.36
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	50.68	50.33	251.53	77.72	50.20	118.24	5.36
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	65.55	251.53	77.72	50.20	118.24	5.36
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2064	0.00	0.00	0.00	0.00	10.23	3.74	13.98	50.68	65.55	251.53	77.72	50.20	118.24	5.36
2065	0.00	0.00	0.00	0.00	8.50	2.35	10.85	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2066	0.00	0.00	0.00	0.00	1.02	2.93	3.95	50.68	65.55	251.53	77.72	50.20	118.24	5.36
2067	0.00	0.00	0.00	0.00	8.86	4.39	13.25	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2068	0.00	0.00	76.56	0.00	18.95	13.18	108.69	50.68	65.55	251.53	77.72	50.20	118.24	5.36
2069	0.00	0.00	104.57	0.00	32.51	13.18	150.26	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2070	0.00	0.00	15.86	0.00	2.62	13.67	32.16	50.68	52.03	251.53	77.72	50.20	118.24	5.36
2071	0.00	0.00	0.00	0.00	31.87	0.00	31.87	50.68	36.81	251.53	77.72	50.20	118.24	5.36
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	50.68	52.03	251.53	77.72	50.20	118.24	5.36
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	50.68	35.95	251.53	77.72	50.20	118.24	5.36
2074	0.00	0.00	95.07	0.00	58.27	0.00	153.34	50.68	50.33	251.53	77.72	50.20	118.24	5.36
2075	0.00	0.00	107.74	0.00	64.80	0.00	172.55	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	50.68	52.03	251.53	77.72	50.20	118.24	5.36
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	36.81	251.53	77.72	50.20	118.24	5.36
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	50.68	52.03	251.53	77.72	50.20	118.24	5.36
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	39.65	251.53	77.72	50.20	118.24	5.36
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	50.68	52.03	251.53	77.72	50.20	118.24	5.36
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2084	0.00	0.00	0.00	0.00	10.41	0.16	10.57	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2087	0.00	0.00	0.00	0.00	28.37	1.44	29.81	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2088	0.00	0.00	0.00	0.00	20.19	4.33	24.51	50.68	35.10	251.53	77.72	50.20	118.24	5.36
2089	0.00	0.00	0.00	0.00	16.47	4.33	20.79	50.68	37.95	251.53	77.72	50.20	118.24	5.36
2090	0.00	0.00	0.00	0.00	0.00	4.49	4.49	50.68	37.95	251.53	77.72	50.20	118.24	5.36
Salvage Value	7.48	0.00	21.14	0.00	34.04	4.20	66.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	327.21	0.00	546.00	74.45	8292.06	1127.99	692.55	9500.93	2581.75	769.28	2779.18	3370.72

Net Present Value -6742

K19/Gas24/250MW

TABLE 187
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	3.90	242.11	1.22	0.00	230.96	101.05	15.21	79.33	35.37
2015	0.00	477.40	0.00	0.00	18.59	2.67	498.67	3.72	0.00	248.76	99.37	16.94	83.90	48.55
2016	0.00	632.15	0.00	0.00	25.44	3.89	661.49	7.03	0.00	255.33	97.52	17.49	85.43	54.89
2017	0.00	766.12	0.00	0.00	37.23	5.84	809.18	11.07	0.00	265.80	95.61	18.70	86.67	64.81
2018	0.00	540.20	0.00	0.00	39.13	17.51	596.85	14.06	0.00	254.37	93.05	21.09	86.23	54.00
2019	0.00	386.37	0.00	0.00	46.36	17.51	450.24	16.31	12.78	269.36	92.64	20.88	87.11	68.73
2020	0.00	157.77	0.35	0.00	0.01	18.16	176.29	17.19	12.99	401.67	100.81	13.60	84.99	202.27
2021	0.00	54.75	0.00	0.00	0.00	0.00	54.75	17.46	12.75	478.67	101.36	13.95	86.87	276.49
2022	0.00	0.00	92.12	0.00	0.00	0.00	92.12	17.81	12.97	479.52	99.92	13.78	87.65	278.17
2023	0.00	0.00	117.97	0.00	9.12	0.00	127.09	18.34	12.80	482.05	98.81	11.56	90.44	281.24
2024	0.00	0.00	14.65	0.00	0.00	0.00	14.65	18.41	16.67	489.89	96.96	18.03	94.30	280.61
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.41	16.45	359.70	94.76	13.39	91.10	160.45
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.41	16.05	341.72	92.57	15.45	92.68	141.01
2027	0.00	0.00	72.47	0.00	0.00	0.00	72.47	18.78	16.07	307.83	90.56	16.92	93.73	106.62
2028	0.00	0.00	101.02	0.00	71.81	0.00	172.83	19.63	16.13	297.75	88.77	19.76	96.40	92.83
2029	0.00	0.00	165.92	0.00	0.00	0.00	165.92	20.46	22.71	291.89	87.04	27.18	98.52	79.14
2030	0.00	0.00	218.00	0.00	0.00	0.00	218.00	21.55	18.84	291.08	86.15	29.67	99.81	75.44
2031	0.00	0.00	97.64	0.00	9.12	0.00	106.76	22.08	18.84	298.37	86.62	25.31	99.32	87.12
2032	0.00	0.00	7.18	0.00	0.00	0.00	7.18	22.12	25.64	306.94	84.24	52.64	97.97	72.09
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.12	25.65	299.61	82.73	57.12	100.46	59.30
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.12	25.65	292.57	81.28	62.49	102.83	45.97
2035	0.00	0.00	155.48	0.00	0.00	0.00	155.48	22.90	25.01	223.01	79.32	59.80	100.72	-16.82
2036	0.00	0.00	224.62	0.00	0.00	0.00	224.62	24.02	25.02	201.74	77.87	64.49	101.41	-42.03
2037	0.00	0.00	100.61	0.00	0.00	0.00	100.61	24.52	25.02	203.54	78.24	59.10	100.24	-34.03
2038	0.00	0.00	165.23	0.00	0.00	0.00	165.23	25.35	31.81	204.85	75.92	86.02	101.06	-58.15
2039	0.00	0.00	228.01	0.00	0.00	0.00	228.01	26.49	34.66	198.88	74.56	94.86	110.22	-80.76
2040	0.00	0.00	102.12	0.00	60.41	0.00	162.53	27.30	31.81	194.47	73.93	97.49	110.96	-87.91
2041	0.00	0.00	7.51	0.00	0.00	0.00	7.51	27.34	38.62	198.96	72.18	123.74	110.55	-107.51
2042	0.00	0.00	161.01	0.00	0.00	0.00	161.01	28.15	38.62	190.48	70.47	136.44	114.02	-130.45
2043	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.31	38.62	182.61	69.15	145.45	116.59	-148.58
2044	0.00	0.00	104.18	0.00	0.00	0.00	104.18	29.83	40.33	177.24	68.59	148.75	117.28	-157.38
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	29.87	47.13	178.99	66.47	184.17	117.79	-189.43
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	47.13	182.23	66.52	183.11	118.16	-185.57
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	46.28	169.85	64.73	200.54	121.86	-217.28
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	29.87	48.28	177.02	65.91	189.27	119.27	-197.43
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2052	0.00	0.00	70.69	0.00	28.37	1.44	100.50	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2053	0.00	0.00	96.55	0.00	20.19	4.33	121.06	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2054	0.00	0.00	14.65	0.00	16.47	4.33	35.44	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2055	0.00	0.00	0.00	0.00	0.00	4.49	4.49	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2057	0.00	0.00	72.47	0.00	0.00	0.00	72.47	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2058	0.00	0.00	98.98	0.00	9.12	0.00	108.10	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2059	0.00	0.00	165.92	0.00	0.00	0.00	165.92	29.87	48.28	177.02	65.91	189.27	119.27	-197.43
2060	0.00	0.00	218.00	0.00	0.00	0.00	218.00	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2061	0.00	0.00	97.64	0.00	0.00	0.00	97.64	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2062	0.00	0.00	7.18	0.00	0.00	0.00	7.18	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2063	0.00	0.00	0.00	0.00	53.86	2.76	56.61	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2064	0.00	0.00	0.00	0.00	10.23	3.74	13.98	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2065	0.00	0.00	155.48	0.00	8.50	2.35	166.33	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2066	0.00	0.00	224.62	0.00	10.14	2.93	237.69	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2067	0.00	0.00	100.61	0.00	8.86	4.39	113.86	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2068	0.00	0.00	165.23	0.00	18.95	13.18	197.36	29.87	60.66	177.02	65.91	189.27	119.27	-197.43
2069	0.00	0.00	228.01	0.00	29.89	13.18	271.09	29.87	48.28	177.02	65.91	189.27	119.27	-197.43
2070	0.00	0.00	102.12	0.00	0.01	13.67	115.80	29.87	47.14	177.02	65.91	189.27	119.27	-197.43
2071	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.87	47.14	177.02	65.91	189.27	119.27	-197.43
2072	0.00	0.00	161.01	0.00	0.00	0.00	161.01	29.87	47.14	177.02	65.91	189.27	119.27	-197.43
2073	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.87	46.29	177.02	65.91	189.27	119.27	-197.43
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2075	0.00	0.00	7.66	0.00	45.31	0.00	52.97	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2078	0.00	0.00	0.00	0.00	17.95	0.00	17.95	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	48.28	177.02	65.91	189.27	119.27	-197.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2082	0.00	0.00	70.69	0.00	0.00	0.00	70.69	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2083	0.00	0.00	96.55	0.00	0.00	0.00	96.55	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2084	0.00	0.00	14.65	0.00	10.41	0.16	25.21	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2087	0.00	0.00	72.47	0.00	28.37	1.44	102.28	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2088	0.00	0.00	98.98	0.00	20.19	4.33	123.50	29.87	45.44	177.02	65.91	189.27	119.27	-197.43
2089	0.00	0.00	15.02	0.00	16.47	4.33	35.81	29.87	48.28	177.02	65.91	189.27	119.27	-197.43
2090	0.00	0.00	0.00	0.00	15.10	4.49	19.59	29.87	48.28	177.02	65.91	189.27	119.27	-197.43
Salvage Value	0.00	0.00	73.23	0.00	17.91	4.20	95.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1623.51	0.00	313.82	74.45	4951.23	612.25	744.62	7457.55	2341.63	2406.96	2894.88	-185.92

Net Present Value -6494

K19/C31/250MW

TABLE 188
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	217.56	0.00	0.00	20.64	3.90	272.65	1.38	0.00	230.96	101.05	15.21	79.33	35.37
2015	38.54	477.40	0.00	0.00	18.59	2.67	537.21	4.06	0.00	248.76	99.37	16.94	83.90	48.55
2016	10.47	632.15	0.00	0.00	25.44	3.89	671.96	7.42	0.00	255.33	97.52	17.49	85.43	54.89
2017	10.54	766.12	0.00	0.00	37.23	5.84	819.72	11.52	0.00	265.80	95.61	18.70	86.67	64.81
2018	12.52	540.20	0.00	0.00	39.13	17.51	609.37	14.57	0.00	254.37	93.05	21.09	86.23	54.00
2019	12.59	386.37	0.00	0.00	46.36	17.51	462.83	16.88	12.78	269.36	92.64	20.88	87.11	68.73
2020	12.67	157.77	0.35	0.00	0.01	18.16	188.96	17.83	12.99	401.67	100.81	13.60	84.99	202.27
2021	16.02	54.75	0.00	0.00	0.00	0.00	70.77	18.18	12.75	478.67	101.36	13.95	86.87	276.49
2022	162.04	0.00	92.12	0.00	0.00	0.00	254.16	19.34	12.97	479.45	99.91	13.80	87.66	278.08
2023	247.17	0.00	117.97	0.00	9.12	0.00	374.26	21.11	12.80	481.75	98.78	11.65	90.56	280.76
2024	268.52	0.00	14.65	0.00	0.00	0.00	283.17	22.52	16.67	489.50	96.93	18.14	94.47	279.95
2025	273.67	0.00	0.00	0.00	3.47	0.00	277.14	23.91	16.45	359.04	94.73	13.49	91.29	159.53
2026	740.31	0.00	0.00	0.00	3.47	0.00	743.78	27.63	16.05	341.10	92.56	15.59	92.90	140.04
2027	1175.50	0.00	72.47	0.00	42.16	0.00	1290.14	34.08	16.07	306.79	90.55	17.18	93.90	105.15
2028	1055.42	0.00	98.98	0.00	30.99	0.00	1185.39	40.01	16.13	296.24	88.70	20.22	96.78	90.54
2029	753.68	0.00	15.02	0.00	36.80	0.00	805.50	44.03	22.70	289.98	87.01	27.79	98.91	76.28
2030	521.97	0.00	0.00	0.00	63.72	0.00	585.69	46.96	18.83	301.40	87.99	24.43	96.53	92.45
2031	342.84	0.00	0.00	0.00	85.37	0.00	428.22	49.10	32.89	334.53	91.04	19.75	83.50	140.24
2032	126.27	0.00	0.00	0.00	100.61	0.00	226.89	50.24	33.10	430.74	97.73	19.53	81.62	231.86
2033	39.85	0.00	0.00	0.00	0.00	0.00	39.85	50.44	32.96	449.13	97.88	20.20	85.98	245.06
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	33.18	433.75	96.17	20.71	86.73	230.14
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.36	383.12	94.53	20.97	85.89	181.73
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.31	360.62	92.98	21.42	85.96	160.26
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.15	343.03	91.15	22.28	87.49	142.10
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.79	323.61	89.26	23.18	89.82	121.35
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	34.70	309.51	87.42	25.49	98.74	97.87
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.97	299.79	85.73	28.89	101.54	83.63
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	34.64	289.59	84.12	32.91	104.32	68.24
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	50.44	31.80	286.49	83.28	33.55	105.78	63.89
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.80	279.19	81.97	33.31	110.33	53.58
2044	0.00	0.00	78.89	0.00	0.00	0.00	78.89	50.83	33.50	268.15	80.46	41.35	110.36	35.98
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	51.73	33.50	258.45	79.07	45.74	113.03	20.61
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	51.81	37.43	252.52	77.74	52.08	117.45	5.26
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.93	243.69	76.37	52.76	124.24	-9.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.08	251.55	77.73	50.19	118.24	5.40
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	51.81	37.92	251.55	77.73	50.19	118.24	5.40
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	51.81	35.08	251.55	77.73	50.19	118.24	5.40
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	51.81	37.94	251.55	77.73	50.19	118.24	5.40
2052	0.00	0.00	70.69	0.00	28.37	1.44	100.50	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2053	0.00	0.00	96.55	0.00	20.19	4.33	121.06	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2054	0.00	0.00	14.65	0.00	16.47	4.33	35.44	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2055	0.00	0.00	0.00	0.00	0.00	4.49	4.49	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2057	0.00	0.00	72.47	0.00	0.00	0.00	72.47	51.81	36.81	251.55	77.73	50.19	118.24	5.40
2058	0.00	0.00	98.98	0.00	9.12	0.00	108.10	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2059	0.00	0.00	15.02	0.00	0.00	0.00	15.02	51.81	39.65	251.55	77.73	50.19	118.24	5.40
2060	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2061	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.81	37.95	251.55	77.73	50.19	118.24	5.40
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2063	0.00	0.00	0.00	0.00	14.26	2.76	17.02	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2064	0.00	0.00	0.00	0.00	18.81	3.74	22.55	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2065	0.00	0.00	0.00	0.00	23.07	2.35	25.42	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2066	0.00	0.00	0.00	0.00	21.59	2.93	24.52	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2067	0.00	0.00	0.00	0.00	33.71	4.39	38.11	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2068	0.00	0.00	0.00	0.00	18.95	13.18	32.13	51.81	65.55	251.55	77.73	50.19	118.24	5.40
2069	0.00	0.00	0.00	0.00	29.89	13.18	43.08	51.81	37.95	251.55	77.73	50.19	118.24	5.40
2070	0.00	0.00	0.00	0.00	0.01	13.67	13.68	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	39.65	251.55	77.73	50.19	118.24	5.40
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.95	251.55	77.73	50.19	118.24	5.40
2074	0.00	0.00	78.89	0.00	0.00	0.00	78.89	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2075	0.00	0.00	107.74	0.00	2.61	0.00	110.35	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2076	0.00	0.00	16.34	0.00	2.61	0.00	18.96	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2077	0.00	0.00	0.00	0.00	31.87	0.00	31.87	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2078	0.00	0.00	0.00	0.00	16.73	0.00	16.73	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2079	0.00	0.00	0.00	0.00	28.23	0.00	28.23	51.81	37.95	251.55	77.73	50.19	118.24	5.40
2080	0.00	0.00	0.00	0.00	103.00	0.00	103.00	51.81	50.33	251.55	77.73	50.19	118.24	5.40
2081	0.00	0.00	0.00	0.00	64.80	0.00	64.80	51.81	37.95	251.55	77.73	50.19	118.24	5.40
2082	0.00	0.00	70.69	0.00	75.76	0.00	146.45	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2083	0.00	0.00	96.55	0.00	0.00	0.00	96.55	51.81	36.81	251.55	77.73	50.19	118.24	5.40
2084	0.00	0.00	14.65	0.00	10.41	0.16	25.21	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	51.81	36.81	251.55	77.73	50.19	118.24	5.40
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	51.81	52.03	251.55	77.73	50.19	118.24	5.40
2087	0.00	0.00	72.47	0.00	28.37	1.44	102.28	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2088	0.00	0.00	98.98	0.00	20.19	4.33	123.50	51.81	35.10	251.55	77.73	50.19	118.24	5.40
2089	0.00	0.00	15.02	0.00	16.47	4.33	35.81	51.81	37.95	251.55	77.73	50.19	118.24	5.40
2090	0.00	0.00	0.00	0.00	0.00	4.49	4.49	51.81	37.95	251.55	77.73	50.19	118.24	5.40
Salvage Value	55.10	0.00	35.42	0.00	37.50	4.20	132.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3753.27	2939.45	485.15	0.00	492.94	74.45	7745.25	1039.60	699.58	8863.53	2527.85	829.78	2805.04	2700.86

Net Present Value -6784

All Gas

TABLE 189
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	256.51	97.51	17.52	85.40	56.08
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	269.08	95.95	18.02	86.09	69.01
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	258.37	93.30	20.12	86.63	58.32
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	252.27	91.36	17.99	86.30	56.62
2020	0.00	0.00	91.42	0.00	0.00	0.00	91.42	0.85	0.00	258.00	91.26	12.83	88.11	65.81
2021	0.00	0.00	117.06	0.00	9.12	0.00	126.18	1.38	0.00	258.69	89.49	12.11	93.08	64.00
2022	0.00	0.00	14.50	0.00	0.00	0.00	14.50	1.45	3.92	253.01	87.33	21.48	94.55	49.65
2023	0.00	0.00	71.04	0.00	0.00	0.00	71.04	1.80	3.92	250.03	85.15	26.46	99.65	38.77
2024	0.00	0.00	99.07	0.00	71.81	0.00	170.88	2.65	3.92	255.66	83.63	30.97	105.74	35.32
2025	0.00	0.00	14.72	0.00	0.00	0.00	14.72	2.72	7.84	165.07	83.09	25.99	97.86	-41.87
2026	0.00	0.00	72.11	0.00	0.00	0.00	72.11	3.08	7.84	151.35	81.82	26.46	98.51	-55.44
2027	0.00	0.00	98.49	0.00	0.00	0.00	98.49	3.58	7.84	141.16	80.01	26.64	104.76	-70.26
2028	0.00	0.00	165.09	0.00	0.00	0.00	165.09	4.40	11.76	133.50	78.13	40.74	104.36	-89.73
2029	0.00	0.00	216.92	0.00	0.00	0.00	216.92	5.49	11.76	123.83	76.73	46.20	106.29	-105.39
2030	0.00	0.00	97.15	0.00	9.12	0.00	106.27	6.02	11.77	130.46	77.55	42.47	103.97	-93.53
2031	0.00	0.00	7.14	0.00	0.00	0.00	7.14	6.05	18.57	137.40	75.29	70.56	101.28	-109.73
2032	0.00	0.00	74.30	0.00	0.00	0.00	74.30	6.42	18.58	123.90	73.43	77.72	104.63	-131.88
2033	0.00	0.00	101.48	0.00	60.41	0.00	161.89	7.23	18.58	112.06	71.76	86.08	107.54	-153.32
2034	0.00	0.00	170.10	0.00	0.00	0.00	170.10	8.08	22.50	103.89	70.37	97.82	109.58	-173.88
2035	0.00	0.00	223.51	0.00	0.00	0.00	223.51	9.20	22.50	96.37	69.46	104.02	110.46	-187.57
2036	0.00	0.00	100.10	0.00	0.00	0.00	100.10	9.70	22.50	95.41	69.35	101.47	113.74	-189.15
2037	0.00	0.00	164.40	0.00	0.00	0.00	164.40	10.52	29.30	93.40	67.48	128.23	108.10	-210.41
2038	0.00	0.00	226.88	0.00	0.00	0.00	226.88	11.66	29.31	84.85	66.28	138.40	111.01	-230.84
2039	0.00	0.00	101.61	0.00	0.00	0.00	101.61	12.17	29.31	81.52	66.13	140.54	117.37	-242.52
2040	0.00	0.00	7.47	0.00	0.00	0.00	7.47	12.20	36.11	80.82	64.38	163.74	116.42	-263.72
2041	0.00	0.00	160.21	0.00	0.00	0.00	160.21	13.00	36.12	75.24	62.63	183.05	121.10	-291.56
2042	0.00	0.00	231.45	0.00	0.00	0.00	231.45	14.16	36.12	72.89	61.58	198.74	123.62	-311.06
2043	0.00	0.00	103.66	0.00	60.41	0.00	164.07	14.98	36.12	73.27	61.49	202.63	123.68	-314.52
2044	0.00	0.00	7.62	0.00	0.00	0.00	7.62	15.02	42.93	73.42	60.08	226.08	122.37	-335.12
2045	0.00	0.00	34.87	0.00	0.00	0.00	34.87	15.19	42.93	68.41	58.56	247.65	125.78	-363.58
2046	0.00	0.00	47.63	0.00	0.00	0.00	47.63	15.43	42.93	65.22	57.46	264.89	128.96	-386.10
2047	0.00	0.00	7.23	0.00	0.00	0.00	7.23	15.47	44.34	60.88	56.62	278.79	131.01	-405.55
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.35	64.83	57.55	263.78	128.58	-385.07
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	15.47	44.35	64.83	57.55	263.78	128.58	-385.07
2050	0.00	0.00	69.99	0.00	9.69	0.00	79.68	15.47	44.36	64.83	57.55	263.78	128.58	-385.07
2051	0.00	0.00	95.59	0.00	9.69	0.00	105.28	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2052	0.00	0.00	14.50	0.00	9.69	0.00	24.19	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2053	0.00	0.00	71.04	0.00	0.00	0.00	71.04	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2054	0.00	0.00	97.03	0.00	0.00	0.00	97.03	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2055	0.00	0.00	14.72	0.00	0.00	0.00	14.72	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2056	0.00	0.00	72.11	0.00	9.12	0.00	81.23	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2057	0.00	0.00	98.49	0.00	0.00	0.00	98.49	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2058	0.00	0.00	165.09	0.00	0.00	0.00	165.09	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2059	0.00	0.00	216.92	0.00	53.86	0.00	270.77	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2060	0.00	0.00	97.15	0.00	0.00	0.00	97.15	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2061	0.00	0.00	7.14	0.00	0.00	0.00	7.14	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2062	0.00	0.00	74.30	0.00	0.00	0.00	74.30	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2063	0.00	0.00	101.48	0.00	0.00	0.00	101.48	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2064	0.00	0.00	170.10	0.00	0.00	0.00	170.10	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2065	0.00	0.00	223.51	0.00	9.12	0.00	232.63	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2066	0.00	0.00	100.10	0.00	0.00	0.00	100.10	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2067	0.00	0.00	164.40	0.00	0.00	0.00	164.40	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2068	0.00	0.00	226.88	0.00	45.31	0.00	272.18	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2069	0.00	0.00	101.61	0.00	0.00	0.00	101.61	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2070	0.00	0.00	7.47	0.00	0.00	0.00	7.47	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2071	0.00	0.00	160.21	0.00	0.00	0.00	160.21	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2072	0.00	0.00	231.45	0.00	0.00	0.00	231.45	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2073	0.00	0.00	103.66	0.00	0.00	0.00	103.66	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2074	0.00	0.00	7.62	0.00	17.95	0.00	25.57	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2075	0.00	0.00	34.87	0.00	0.00	0.00	34.87	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2076	0.00	0.00	47.63	0.00	0.00	0.00	47.63	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2077	0.00	0.00	7.23	0.00	0.00	0.00	7.23	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2078	0.00	0.00	0.00	0.00	45.31	0.00	45.31	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2080	0.00	0.00	69.99	0.00	0.00	0.00	69.99	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2081	0.00	0.00	95.59	0.00	0.00	0.00	95.59	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2082	0.00	0.00	14.50	0.00	0.00	0.00	14.50	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2083	0.00	0.00	71.04	0.00	15.10	0.00	86.15	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2084	0.00	0.00	97.03	0.00	9.69	0.00	106.72	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2085	0.00	0.00	14.72	0.00	9.69	0.00	24.41	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2086	0.00	0.00	72.11	0.00	9.69	0.00	81.81	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2087	0.00	0.00	98.49	0.00	9.69	0.00	108.19	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2088	0.00	0.00	14.94	0.00	0.00	0.00	14.94	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	64.83	57.55	263.78	128.58	-385.07
Salvage Value	0.00	0.00	98.73	0.00	9.17	0.00	107.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2039.34	0.00	196.29	0.00	2297.49	226.03	608.54	4109.01	2117.85	3445.52	3079.94	-4534.30

Net Present Value -7666

Wind/Gas

TABLE 190
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	256.51	97.51	17.52	85.40	56.08
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	269.09	95.95	18.02	86.09	69.02
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	258.37	93.30	20.12	86.63	58.32
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	252.27	91.36	17.99	86.30	56.62
2020	0.00	0.00	0.00	9.41	13.30	0.00	22.71	0.62	0.00	255.62	90.84	13.88	88.43	62.47
2021	0.00	0.00	0.35	287.40	22.16	0.00	309.92	2.16	0.00	255.81	89.07	13.42	93.01	60.31
2022	0.00	0.00	0.00	292.78	26.75	0.00	319.53	3.76	6.10	259.04	87.46	13.52	93.08	64.98
2023	0.00	0.00	163.52	283.36	13.93	0.00	460.81	5.96	12.20	262.63	85.03	15.53	96.38	65.68
2024	0.00	0.00	215.53	5.38	24.58	0.00	245.49	7.08	18.31	276.74	83.21	15.90	102.09	75.54
2025	0.00	0.00	29.44	4.71	3.82	0.00	37.97	7.27	26.14	193.18	83.18	18.13	93.32	-1.46
2026	0.00	0.00	72.11	143.70	9.61	0.00	225.42	8.40	26.14	182.78	82.22	17.21	93.18	-9.84
2027	0.00	0.00	100.53	146.39	87.07	0.00	333.99	10.06	29.19	174.10	79.95	20.97	95.01	-21.83
2028	0.00	0.00	14.94	146.39	21.15	0.00	182.49	10.97	36.17	174.09	78.23	27.11	97.34	-28.58
2029	0.00	0.00	73.20	146.39	21.23	0.00	240.83	12.17	39.22	169.51	76.68	29.24	99.07	-35.48
2030	0.00	0.00	99.98	146.39	21.23	0.00	267.60	13.51	42.27	170.72	75.80	30.64	99.55	-35.28
2031	0.00	0.00	89.10	146.39	21.23	0.00	256.73	14.79	49.24	171.01	74.61	36.28	100.30	-40.17
2032	0.00	0.00	100.98	146.39	81.64	0.00	329.01	16.44	52.29	168.61	73.52	36.58	102.11	-43.60
2033	0.00	0.00	15.32	146.39	21.23	0.00	182.94	17.35	59.28	170.85	72.87	38.61	103.05	-43.68
2034	0.00	0.00	75.05	146.39	21.23	0.00	242.67	18.57	62.33	163.04	71.12	44.68	104.04	-56.81
2035	0.00	0.00	102.50	146.39	21.23	0.00	270.12	19.92	65.39	155.38	69.51	48.59	105.90	-68.62
2036	0.00	0.00	91.35	146.39	21.23	0.00	258.98	21.21	72.36	151.91	68.19	56.02	107.20	-79.50
2037	0.00	0.00	103.53	146.39	21.23	0.00	271.15	22.57	75.41	146.21	66.95	59.46	109.26	-89.46
2038	0.00	0.00	92.27	146.39	21.23	0.00	259.89	23.87	82.39	144.84	65.94	65.39	111.50	-97.99
2039	0.00	0.00	104.57	146.39	81.64	0.00	332.60	25.53	85.44	139.72	64.83	64.41	122.84	-112.36
2040	0.00	0.00	15.86	155.80	21.23	0.00	192.90	26.50	92.43	140.27	64.03	67.93	125.79	-117.48
2041	0.00	0.00	77.72	433.79	21.23	0.00	532.74	29.16	95.48	131.10	62.58	80.00	123.94	-135.42
2042	0.00	0.00	106.14	439.17	21.23	0.00	566.54	31.99	98.53	124.06	61.27	85.80	127.06	-150.06
2043	0.00	0.00	94.60	429.75	21.08	0.00	545.43	34.72	105.50	120.61	60.13	95.16	129.19	-163.87
2044	0.00	0.00	107.21	151.77	20.60	0.00	279.57	36.12	108.55	117.14	59.22	98.71	131.88	-172.66
2045	0.00	0.00	51.14	151.10	19.32	0.00	221.56	37.22	115.53	115.05	58.16	104.63	136.90	-184.65
2046	0.00	0.00	47.63	285.38	17.41	0.00	350.42	38.98	118.58	111.96	57.16	105.06	144.42	-194.69
2047	0.00	0.00	7.23	149.08	11.63	0.00	167.93	39.82	123.06	107.49	56.13	108.86	145.86	-203.36
2048	0.00	0.00	0.00	146.39	5.97	0.00	152.36	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2049	0.00	0.00	0.00	146.39	9.77	0.00	156.16	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2050	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2051	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2052	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2053	0.00	0.00	142.09	146.39	0.00	0.00	288.48	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2054	0.00	0.00	194.06	146.39	0.00	0.00	340.45	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2055	0.00	0.00	29.44	146.39	3.32	0.00	179.15	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2056	0.00	0.00	72.11	146.39	5.54	0.00	224.04	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2057	0.00	0.00	98.49	146.39	6.73	0.00	251.61	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2058	0.00	0.00	14.94	146.39	3.72	0.00	165.05	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2059	0.00	0.00	73.20	146.39	20.06	0.00	239.65	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2060	0.00	0.00	99.98	155.80	1.67	0.00	257.45	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2061	0.00	0.00	89.10	433.79	2.68	0.00	525.57	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2062	0.00	0.00	100.98	439.17	57.73	0.00	597.88	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2063	0.00	0.00	15.32	429.75	5.31	0.00	450.38	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2064	0.00	0.00	75.05	151.77	5.31	0.00	232.13	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2065	0.00	0.00	102.50	151.10	5.31	0.00	258.91	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2066	0.00	0.00	91.35	285.38	5.31	0.00	382.04	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2067	0.00	0.00	103.53	149.08	50.62	0.00	303.22	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2068	0.00	0.00	92.27	146.39	5.31	0.00	243.97	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2069	0.00	0.00	104.57	146.39	5.31	0.00	256.26	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2070	0.00	0.00	15.86	146.39	15.28	0.00	177.53	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2071	0.00	0.00	77.72	146.39	21.93	0.00	246.04	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2072	0.00	0.00	106.14	146.39	25.33	0.00	277.87	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2073	0.00	0.00	94.60	146.39	15.52	0.00	256.51	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2074	0.00	0.00	107.21	146.39	55.14	0.00	308.73	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2075	0.00	0.00	51.14	146.39	7.46	0.00	204.99	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2076	0.00	0.00	47.63	146.39	12.24	0.00	206.26	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2077	0.00	0.00	7.23	146.39	34.65	0.00	188.26	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2078	0.00	0.00	0.00	146.39	21.08	0.00	167.46	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2079	0.00	0.00	0.00	146.39	20.84	0.00	167.23	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2080	0.00	0.00	0.00	155.80	20.52	0.00	176.32	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2081	0.00	0.00	0.00	433.79	19.56	0.00	453.35	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2082	0.00	0.00	0.00	439.17	33.66	0.00	472.82	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2083	0.00	0.00	142.09	429.75	17.36	0.00	589.20	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2084	0.00	0.00	194.06	151.77	25.54	0.00	371.37	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2085	0.00	0.00	29.44	151.10	25.38	0.00	205.92	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2086	0.00	0.00	72.11	285.38	24.43	0.00	381.92	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2087	0.00	0.00	98.49	149.08	23.47	0.00	271.04	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2088	0.00	0.00	14.94	146.39	9.00	0.00	170.33	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2089	0.00	0.00	0.00	141.68	19.64	0.00	161.32	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
2090	0.00	0.00	0.00	2.69	0.08	0.00	2.77	39.82	123.06	111.50	57.15	106.19	142.39	-194.23
Salvage Value	0.00	0.00	70.93	177.50	32.63	0.00	281.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1486.10	3886.04	504.24	0.00	5938.24	552.63	1713.36	5021.21	2110.75	1554.98	3171.75	-1816.27

Net Present Value -10020

K22/Gas

TABLE 191
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	103.08	0.00	0.00	9.69	0.00	112.78	0.56	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	31.29	0.00	0.00	10.60	0.00	41.88	0.77	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	27.76	0.00	0.00	10.68	0.00	38.43	0.97	0.00	256.27	97.51	17.52	85.41	55.83
2017	0.00	207.16	0.00	0.00	26.68	0.00	233.84	2.13	0.00	268.50	95.96	18.02	86.12	68.40
2018	0.00	404.01	0.00	0.00	8.71	0.00	412.72	4.20	0.00	257.14	93.31	20.13	86.67	57.02
2019	0.00	658.97	0.00	0.00	15.17	0.00	674.13	7.57	0.00	251.01	91.37	17.99	86.33	55.33
2020	0.00	733.85	0.00	0.00	27.60	0.00	761.45	11.38	0.00	252.83	90.67	14.29	88.60	59.27
2021	0.00	599.92	0.00	0.00	39.15	0.00	639.07	14.57	0.00	254.28	89.02	13.70	93.68	57.87
2022	0.00	348.41	0.00	0.00	46.36	0.00	394.77	16.55	12.78	257.53	89.00	15.63	89.27	63.63
2023	0.00	161.97	0.00	0.00	0.01	0.00	161.98	17.36	12.99	343.85	94.52	15.55	86.97	146.81
2024	0.00	56.00	0.00	0.00	0.00	0.00	56.00	17.64	12.71	370.42	94.33	17.71	92.55	165.83
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.64	12.92	291.08	94.22	12.45	87.64	96.77
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.64	12.75	278.13	92.40	12.60	88.77	84.36
2027	0.00	0.00	93.90	0.00	0.00	0.00	93.90	18.00	12.70	239.54	90.59	12.06	88.11	48.78
2028	0.00	0.00	120.46	0.00	9.12	0.00	129.58	18.54	12.47	227.52	89.06	12.57	89.66	36.22
2029	0.00	0.00	15.02	0.00	0.00	0.00	15.02	18.61	15.96	223.80	88.21	15.54	89.74	30.32
2030	0.00	0.00	73.57	0.00	0.00	0.00	73.57	18.98	15.96	216.83	86.55	18.84	91.34	20.10
2031	0.00	0.00	254.93	0.00	71.81	0.00	326.74	20.60	16.00	209.02	84.95	21.63	93.62	8.82
2032	0.00	0.00	235.43	0.00	0.00	0.00	235.43	21.78	22.58	202.91	83.39	29.40	95.87	-5.74
2033	0.00	0.00	98.62	0.00	9.12	0.00	107.74	22.32	18.71	206.03	83.48	25.72	96.05	0.78
2034	0.00	0.00	7.25	0.00	0.00	0.00	7.25	22.36	25.51	212.09	81.20	52.09	94.49	-15.68
2035	0.00	0.00	155.48	0.00	0.00	0.00	155.48	23.13	25.51	197.97	79.18	57.18	97.00	-35.40
2036	0.00	0.00	224.62	0.00	0.00	0.00	224.62	24.26	25.51	189.81	77.72	63.53	99.08	-50.52
2037	0.00	0.00	100.61	0.00	0.00	0.00	100.61	24.76	25.52	191.41	78.09	57.74	97.97	-42.39
2038	0.00	0.00	165.23	0.00	0.00	0.00	165.23	25.59	31.67	191.40	75.81	82.81	98.84	-66.05
2039	0.00	0.00	228.01	0.00	0.00	0.00	228.01	26.73	31.68	185.30	74.47	91.39	107.91	-88.47
2040	0.00	0.00	102.12	0.00	60.41	0.00	162.53	27.54	31.68	182.44	73.97	93.57	108.23	-93.33
2041	0.00	0.00	7.51	0.00	0.00	0.00	7.51	27.58	38.49	185.66	72.12	119.63	108.07	-114.18
2042	0.00	0.00	161.01	0.00	0.00	0.00	161.01	28.38	41.33	176.98	70.38	133.13	111.49	-138.02
2043	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.54	38.49	169.66	69.06	142.81	114.04	-156.26
2044	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.07	38.49	167.04	68.62	146.06	114.39	-162.03
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.10	45.29	170.95	67.13	174.14	113.07	-183.39
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.29	165.56	65.94	185.69	116.37	-202.43
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	47.01	158.30	64.63	198.91	119.22	-224.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	47.01	164.94	65.90	186.24	116.22	-203.43
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	47.01	164.94	65.90	186.24	116.22	-203.43
2050	0.00	0.00	0.00	0.00	10.09	0.00	10.09	30.10	46.16	164.94	65.90	186.24	116.22	-203.43
2051	0.00	0.00	0.00	0.00	10.15	0.00	10.15	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2052	0.00	0.00	0.00	0.00	10.16	0.00	10.16	30.10	48.15	164.94	65.90	186.24	116.22	-203.43
2053	0.00	0.00	0.00	0.00	0.43	0.00	0.43	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2054	0.00	0.00	0.00	0.00	14.08	0.00	14.08	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2055	0.00	0.00	0.00	0.00	18.67	0.00	18.67	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2056	0.00	0.00	0.00	0.00	20.19	0.00	20.19	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2057	0.00	0.00	72.47	0.00	16.47	0.00	88.94	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2058	0.00	0.00	98.98	0.00	0.00	0.00	98.98	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2059	0.00	0.00	15.02	0.00	0.00	0.00	15.02	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2060	0.00	0.00	73.57	0.00	0.00	0.00	73.57	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2061	0.00	0.00	252.89	0.00	0.00	0.00	252.89	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2062	0.00	0.00	235.43	0.00	0.00	0.00	235.43	30.10	48.15	164.94	65.90	186.24	116.22	-203.43
2063	0.00	0.00	98.62	0.00	9.12	0.00	107.74	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2064	0.00	0.00	7.25	0.00	0.00	0.00	7.25	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2065	0.00	0.00	155.48	0.00	0.50	0.00	155.99	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2066	0.00	0.00	224.62	0.00	54.39	0.00	279.01	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2067	0.00	0.00	100.61	0.00	16.52	0.00	117.13	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2068	0.00	0.00	165.23	0.00	17.40	0.00	182.63	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2069	0.00	0.00	228.01	0.00	1.09	0.00	229.10	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2070	0.00	0.00	102.12	0.00	8.92	0.00	111.04	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2071	0.00	0.00	7.51	0.00	18.96	0.00	26.47	30.10	60.53	164.94	65.90	186.24	116.22	-203.43
2072	0.00	0.00	161.01	0.00	29.89	0.00	190.90	30.10	48.15	164.94	65.90	186.24	116.22	-203.43
2073	0.00	0.00	232.61	0.00	0.01	0.00	232.61	30.10	47.01	164.94	65.90	186.24	116.22	-203.43
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.10	47.01	164.94	65.90	186.24	116.22	-203.43
2075	0.00	0.00	7.66	0.00	45.31	0.00	52.98	30.10	47.01	164.94	65.90	186.24	116.22	-203.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	46.16	164.94	65.90	186.24	116.22	-203.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2081	0.00	0.00	0.00	0.00	17.95	0.00	17.95	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	48.15	164.94	65.90	186.24	116.22	-203.43
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2087	0.00	0.00	72.47	0.00	9.69	0.00	82.17	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2088	0.00	0.00	98.98	0.00	0.00	0.00	98.98	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2089	0.00	0.00	15.02	0.00	0.00	0.00	15.02	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
2090	0.00	0.00	0.00	0.00	15.10	0.00	15.10	30.10	45.30	164.94	65.90	186.24	116.22	-203.43
Salvage Value	0.00	0.00	64.67	0.00	13.77	0.00	78.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2766.90	1549.56	0.00	296.69	0.00	4613.15	566.94	684.05	6159.28	2308.68	2308.29	2827.68	-1285.36

Net Present Value: -7150

K22/C29

TABLE 192
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	Low
Capital Cost	Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	103.08	0.00	0.00	9.69	0.00	143.31	0.72	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.06	31.29	0.00	0.00	10.60	0.00	80.94	1.12	0.00	249.85	99.35	16.95	83.89	49.66
2016	10.99	27.76	0.00	0.00	10.68	0.00	49.42	1.37	0.00	256.27	97.51	17.52	85.41	55.83
2017	11.71	207.16	0.00	0.00	26.68	0.00	245.55	2.60	0.00	268.50	95.96	18.02	86.12	68.40
2018	11.78	404.01	0.00	0.00	8.71	0.00	424.50	4.72	0.00	257.14	93.31	20.13	86.67	57.02
2019	14.08	658.97	0.00	0.00	15.17	0.00	688.22	8.16	0.00	251.01	91.37	17.99	86.33	55.33
2020	163.28	733.85	0.00	0.00	27.60	0.00	924.72	12.78	0.00	252.83	90.67	14.29	88.60	59.27
2021	247.43	599.92	0.00	0.00	39.15	0.00	886.50	17.22	0.00	254.16	89.02	13.70	93.78	57.65
2022	265.39	348.41	0.00	0.00	46.36	0.00	660.16	20.52	12.78	257.37	89.01	15.61	89.36	63.39
2023	270.48	161.97	0.00	0.00	3.48	0.00	435.92	22.70	12.99	343.36	94.52	15.59	87.02	146.23
2024	731.67	56.00	0.00	0.00	3.47	0.00	791.14	26.65	12.71	369.30	94.32	17.71	92.60	164.67
2025	1161.78	0.00	0.00	0.00	42.16	0.00	1203.94	32.67	12.92	289.70	94.24	12.47	87.74	95.26
2026	1043.10	0.00	0.00	0.00	21.87	0.00	1064.97	38.00	12.75	276.44	92.40	12.63	88.91	82.50
2027	744.89	0.00	0.00	0.00	36.80	0.00	781.69	41.90	12.70	238.36	90.81	11.55	88.04	47.96
2028	515.88	0.00	0.00	0.00	63.72	0.00	579.60	44.80	12.47	223.43	88.96	12.71	90.00	31.76
2029	338.84	0.00	0.00	0.00	85.37	0.00	424.21	46.92	26.10	286.19	92.67	14.52	81.12	97.87
2030	124.80	0.00	0.00	0.00	100.61	0.00	225.41	48.05	26.31	377.79	99.55	14.22	77.90	186.11
2031	39.38	0.00	0.00	0.00	0.00	0.00	39.38	48.25	26.22	390.23	99.47	14.58	80.06	196.12
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	29.08	377.74	97.84	14.44	80.91	184.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	25.04	365.75	96.26	14.35	82.47	172.68
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	25.00	353.90	94.70	14.60	83.54	161.06
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	24.83	341.49	93.18	14.65	84.20	149.46
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	48.25	24.47	327.18	91.67	14.67	84.98	135.85
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	24.54	312.42	90.17	14.70	86.03	121.51
2038	0.00	0.00	97.99	0.00	0.00	0.00	97.99	48.63	24.00	297.97	88.70	14.67	87.91	106.70
2039	0.00	0.00	125.99	0.00	9.12	0.00	135.11	49.20	26.68	291.48	87.38	14.26	97.64	92.21
2040	0.00	0.00	15.86	0.00	0.00	0.00	15.86	49.28	27.75	283.07	85.70	24.25	97.91	75.22
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	27.75	274.90	84.28	27.16	100.23	63.24
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	49.67	30.59	266.92	82.91	28.07	103.98	51.96
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	50.25	27.75	258.29	81.48	28.35	108.98	39.48
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	50.72	31.66	250.88	80.06	43.11	107.07	20.63
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	51.62	31.02	243.11	78.85	46.18	109.64	8.43
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	51.70	34.94	248.21	78.45	45.50	112.81	11.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.65	230.20	76.33	59.91	114.28	-20.32
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.65	240.50	77.88	50.53	112.24	-0.15
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	39.50	240.50	77.88	50.53	112.24	-0.15
2050	0.00	0.00	0.00	0.00	10.09	0.00	10.09	51.70	35.80	240.50	77.88	50.53	112.24	-0.15
2051	0.00	0.00	0.00	0.00	10.15	0.00	10.15	51.70	34.96	240.50	77.88	50.53	112.24	-0.15
2052	0.00	0.00	0.00	0.00	10.16	0.00	10.16	51.70	37.81	240.50	77.88	50.53	112.24	-0.15
2053	0.00	0.00	0.00	0.00	0.43	0.00	0.43	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2054	0.00	0.00	0.00	0.00	14.08	0.00	14.08	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2055	0.00	0.00	0.00	0.00	18.67	0.00	18.67	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2056	0.00	0.00	0.00	0.00	20.19	0.00	20.19	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2057	0.00	0.00	0.00	0.00	16.47	0.00	16.47	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2058	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2059	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.70	53.04	240.50	77.88	50.53	112.24	-0.15
2060	0.00	0.00	0.00	0.00	10.28	0.00	10.28	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2061	0.00	0.00	0.00	0.00	5.14	0.00	5.14	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2062	0.00	0.00	0.00	0.00	8.57	0.00	8.57	51.70	37.81	240.50	77.88	50.53	112.24	-0.15
2063	0.00	0.00	0.00	0.00	14.57	0.00	14.57	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2064	0.00	0.00	0.00	0.00	20.57	0.00	20.57	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2065	0.00	0.00	0.00	0.00	25.36	0.00	25.36	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2066	0.00	0.00	0.00	0.00	0.53	0.00	0.53	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2067	0.00	0.00	0.00	0.00	16.52	0.00	16.52	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2068	0.00	0.00	76.56	0.00	8.28	0.00	84.84	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2069	0.00	0.00	104.57	0.00	1.09	0.00	105.65	51.70	53.04	240.50	77.88	50.53	112.24	-0.15
2070	0.00	0.00	15.86	0.00	8.92	0.00	24.79	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2071	0.00	0.00	0.00	0.00	18.96	0.00	18.96	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2072	0.00	0.00	78.10	0.00	29.89	0.00	108.00	51.70	53.04	240.50	77.88	50.53	112.24	-0.15
2073	0.00	0.00	106.67	0.00	2.62	0.00	109.29	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2074	0.00	0.00	95.07	0.00	11.73	0.00	106.80	51.70	51.90	240.50	77.88	50.53	112.24	-0.15
2075	0.00	0.00	107.74	0.00	31.87	0.00	139.62	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2076	0.00	0.00	16.34	0.00	16.73	0.00	33.07	51.70	51.05	240.50	77.88	50.53	112.24	-0.15
2077	0.00	0.00	0.00	0.00	28.23	0.00	28.23	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2078	0.00	0.00	0.00	0.00	58.27	0.00	58.27	51.70	50.19	240.50	77.88	50.53	112.24	-0.15
2079	0.00	0.00	0.00	0.00	64.80	0.00	64.80	51.70	37.81	240.50	77.88	50.53	112.24	-0.15
2080	0.00	0.00	0.00	0.00	129.62	0.00	129.62	51.70	51.90	240.50	77.88	50.53	112.24	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	54.75	240.50	77.88	50.53	112.24	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.68	240.50	77.88	50.53	112.24	-0.15
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	51.90	240.50	77.88	50.53	112.24	-0.15
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	37.81	240.50	77.88	50.53	112.24	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	34.97	240.50	77.88	50.53	112.24	-0.15
Salvage Value	38.68	0.00	21.14	0.00	32.03	0.00	91.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3958.91	2766.90	327.21	0.00	495.32	0.00	7548.33	1019.32	620.27	7769.83	2507.97	769.33	2708.09	1784.43

Net Present Value: -7403

SCGT/C26

TABLE 193
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	249.85	99.35	16.95	83.89	49.66
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	256.51	97.51	17.52	85.40	56.08
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	269.09	95.95	18.02	86.09	69.02
2018	209.58	0.00	0.35	0.00	0.00	0.00	209.93	3.23	0.00	258.12	93.30	20.13	86.64	58.04
2019	251.91	0.00	0.00	0.00	0.00	0.00	251.91	4.49	0.00	251.88	91.36	17.99	86.31	56.23
2020	257.96	0.00	91.42	0.00	0.00	0.00	349.37	6.13	0.00	257.32	91.24	12.90	88.12	65.06
2021	711.05	0.00	117.02	0.00	9.12	0.00	837.18	10.21	0.00	258.09	89.47	12.26	93.32	63.04
2022	1141.50	0.00	14.50	0.00	0.53	0.00	1156.53	15.99	3.92	252.31	87.35	21.78	94.80	48.39
2023	1024.89	0.00	0.00	0.00	1.05	0.00	1025.94	21.12	3.92	248.43	85.02	27.45	100.07	35.89
2024	731.88	0.00	0.00	0.00	2.11	0.00	733.99	24.79	3.92	255.68	83.81	30.69	105.95	35.22
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	27.35	3.92	167.25	84.20	18.76	101.32	-37.02
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	29.02	17.97	205.56	88.07	13.76	86.10	17.63
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	29.64	18.18	289.60	95.51	13.36	80.08	100.64
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	29.83	17.90	312.81	95.76	14.61	84.99	117.45
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	18.11	300.38	94.09	15.05	86.10	105.13
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.94	290.79	92.91	14.93	86.21	96.75
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.89	276.79	91.02	16.03	87.93	81.81
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.66	260.47	89.15	17.19	89.58	64.54
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.23	249.50	87.29	20.21	92.31	49.69
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.23	241.32	85.73	23.42	94.40	37.78
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.27	235.33	84.47	26.09	95.92	28.85
2036	0.00	0.00	75.80	0.00	0.00	0.00	75.80	30.21	19.95	230.29	83.43	26.43	98.14	22.29
2037	0.00	0.00	103.57	0.00	9.12	0.00	112.69	30.77	17.10	221.71	81.95	26.83	103.25	9.68
2038	0.00	0.00	15.71	0.00	0.00	0.00	15.71	30.85	21.02	214.40	80.51	40.92	101.92	-8.95
2039	0.00	0.00	76.94	0.00	0.00	0.00	76.94	31.24	21.02	206.27	79.30	43.56	110.93	-27.52
2040	0.00	0.00	107.13	0.00	71.81	0.00	178.94	32.12	21.02	199.87	77.99	43.16	117.98	-39.27
2041	0.00	0.00	93.66	0.00	0.00	0.00	93.66	32.59	24.95	190.14	76.39	60.12	116.40	-62.78
2042	0.00	0.00	106.14	0.00	0.00	0.00	106.14	33.12	24.30	181.49	75.07	67.56	119.01	-80.15
2043	0.00	0.00	94.60	0.00	0.00	0.00	94.60	33.59	28.21	176.40	73.80	75.87	123.86	-97.12
2044	0.00	0.00	107.21	0.00	60.41	0.00	167.62	34.43	28.21	169.75	72.52	76.48	133.14	-112.40
2045	0.00	0.00	16.26	0.00	0.00	0.00	16.26	34.51	32.15	163.07	71.21	105.07	125.82	-139.02
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	35.00	156.58	70.05	116.03	127.87	-157.37
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.16	150.36	68.78	117.63	138.86	-174.91
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.17	156.67	70.01	112.91	130.85	-157.10
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.17	156.67	70.01	112.91	130.85	-157.10
2050	0.00	0.00	69.99	0.00	9.69	0.00	79.68	34.51	32.18	156.67	70.01	112.91	130.85	-157.10
2051	0.00	0.00	95.59	0.00	9.69	0.00	105.28	34.51	33.89	156.67	70.01	112.91	130.85	-157.10
2052	0.00	0.00	14.50	0.00	9.69	0.00	24.19	34.51	33.90	156.67	70.01	112.91	130.85	-157.10
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	156.67	70.01	112.91	130.85	-157.10
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	156.67	70.01	112.91	130.85	-157.10
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	156.67	70.01	112.91	130.85	-157.10
2056	0.00	0.00	0.00	0.00	9.12	0.00	9.12	34.51	35.04	156.67	70.01	112.91	130.85	-157.10
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2066	0.00	0.00	75.80	0.00	0.00	0.00	75.80	34.51	35.04	156.67	70.01	112.91	130.85	-157.10
2067	0.00	0.00	103.53	0.00	0.00	0.00	103.53	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2068	0.00	0.00	15.71	0.00	0.00	0.00	15.71	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2069	0.00	0.00	76.94	0.00	0.00	0.00	76.94	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2070	0.00	0.00	105.09	0.00	0.00	0.00	105.09	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2071	0.00	0.00	93.66	0.00	0.00	0.00	93.66	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2072	0.00	0.00	106.14	0.00	9.64	0.00	115.79	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2073	0.00	0.00	94.60	0.00	1.05	0.00	95.65	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2074	0.00	0.00	107.21	0.00	2.11	0.00	109.31	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2075	0.00	0.00	16.26	0.00	58.59	0.00	74.86	34.51	47.41	156.67	70.01	112.91	130.85	-157.10
2076	0.00	0.00	0.00	0.00	2.11	0.00	2.11	34.51	35.04	156.67	70.01	112.91	130.85	-157.10
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	49.12	156.67	70.01	112.91	130.85	-157.10
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	156.67	70.01	112.91	130.85	-157.10
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	34.51	49.12	156.67	70.01	112.91	130.85	-157.10
2080	0.00	0.00	69.99	0.00	0.00	0.00	69.99	34.51	33.90	156.67	70.01	112.91	130.85	-157.10
2081	0.00	0.00	95.59	0.00	0.00	0.00	95.59	34.51	49.12	156.67	70.01	112.91	130.85	-157.10
2082	0.00	0.00	14.50	0.00	0.00	0.00	14.50	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	35.04	156.67	70.01	112.91	130.85	-157.10
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
2090	0.00	0.00	0.00	0.00	17.95	0.00	17.95	34.51	32.19	156.67	70.01	112.91	130.85	-157.10
Salvage Value	15.19	0.00	35.15	0.00	10.26	0.00	60.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	676.53	0.00	132.97	0.00	5188.63	684.15	509.81	6176.56	2365.17	1458.80	2988.30	-635.70

Net Present Value -7018

CCGT/C26

TABLE 194
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	249.85	99.35	16.95	83.89	49.66
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	256.51	97.51	17.52	85.40	56.08
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	269.09	95.95	18.02	86.09	69.02
2018	209.58	0.00	0.35	0.00	0.00	0.00	209.93	3.23	0.00	258.12	93.30	20.13	86.64	58.04
2019	251.91	0.00	143.56	0.00	0.00	0.00	395.47	5.21	0.00	251.88	91.36	17.99	86.31	56.23
2020	257.96	0.00	228.83	0.00	0.00	0.00	486.78	7.54	0.00	257.32	91.24	12.90	88.12	65.06
2021	711.05	0.00	114.32	0.00	9.12	0.00	834.49	11.60	0.00	261.96	90.15	10.78	92.35	68.68
2022	1141.50	0.00	6.83	0.00	0.53	0.00	1148.86	17.35	6.79	261.96	87.88	31.11	85.80	57.17
2023	1024.89	0.00	0.00	0.00	1.05	0.00	1025.94	22.47	6.79	262.98	85.85	37.37	90.07	49.69
2024	731.88	0.00	0.00	0.00	2.11	0.00	733.99	26.14	6.79	277.81	84.77	45.28	94.36	53.41
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	28.70	6.79	187.99	84.31	36.21	91.85	-24.38
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	30.38	20.85	219.03	87.97	27.71	82.18	21.16
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	30.99	21.06	298.11	95.47	20.03	78.37	104.24
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	31.18	20.78	322.51	95.84	21.41	82.59	122.68
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.99	311.39	94.20	22.66	83.74	110.80
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.82	295.29	92.14	24.32	85.48	93.35
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.77	296.18	92.05	21.70	84.23	98.20
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.54	274.25	89.34	25.38	87.01	72.52
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.11	265.31	87.65	28.35	89.14	60.16
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.11	255.01	85.72	32.25	92.11	44.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.15	248.20	84.29	34.74	94.05	35.12
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	22.83	239.40	82.71	40.04	95.89	20.77
2037	0.00	0.00	76.18	0.00	0.00	0.00	76.18	31.57	19.98	235.99	81.98	41.39	96.37	16.26
2038	0.00	0.00	104.09	0.00	9.12	0.00	113.21	32.13	19.98	229.79	80.83	42.10	100.15	6.70
2039	0.00	0.00	15.78	0.00	0.00	0.00	15.78	32.21	23.90	221.03	79.12	54.74	107.34	-20.16
2040	0.00	0.00	77.33	0.00	0.00	0.00	77.33	32.60	23.90	213.57	77.74	60.89	110.00	-35.05
2041	0.00	0.00	107.66	0.00	71.81	0.00	179.46	33.48	23.90	204.75	76.46	63.16	113.83	-48.70
2042	0.00	0.00	94.13	0.00	0.00	0.00	94.13	33.95	27.18	199.34	75.15	70.58	118.46	-64.86
2043	0.00	0.00	106.67	0.00	0.00	0.00	106.67	34.49	27.18	190.21	73.80	83.74	116.83	-84.15
2044	0.00	0.00	16.18	0.00	0.00	0.00	16.18	34.57	31.09	183.92	72.51	95.63	118.94	-103.16
2045	0.00	0.00	79.28	0.00	0.00	0.00	79.28	34.97	31.09	177.28	71.24	99.30	126.02	-119.28
2046	0.00	0.00	108.28	0.00	60.41	0.00	168.69	35.81	33.95	174.54	70.35	98.65	133.53	-127.99
2047	0.00	0.00	16.43	0.00	0.00	0.00	16.43	35.89	35.03	162.03	68.81	124.07	127.00	-157.85
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.04	171.28	70.13	107.34	128.85	-135.04
2049	0.00	0.00	143.56	0.00	9.69	0.00	153.25	35.89	35.05	171.28	70.13	107.34	128.85	-135.04
2050	0.00	0.00	207.40	0.00	9.69	0.00	217.09	35.89	35.05	171.28	70.13	107.34	128.85	-135.04
2051	0.00	0.00	92.89	0.00	9.69	0.00	102.58	35.89	36.76	171.28	70.13	107.34	128.85	-135.04
2052	0.00	0.00	6.83	0.00	9.69	0.00	16.52	35.89	36.77	171.28	70.13	107.34	128.85	-135.04
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.77	171.28	70.13	107.34	128.85	-135.04
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	171.28	70.13	107.34	128.85	-135.04
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	171.28	70.13	107.34	128.85	-135.04
2056	0.00	0.00	0.00	0.00	9.12	0.00	9.12	35.89	37.92	171.28	70.13	107.34	128.85	-135.04
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	37.92	171.28	70.13	107.34	128.85	-135.04
2067	0.00	0.00	76.18	0.00	0.00	0.00	76.18	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2068	0.00	0.00	104.05	0.00	0.00	0.00	104.05	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2069	0.00	0.00	15.78	0.00	0.00	0.00	15.78	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2070	0.00	0.00	77.33	0.00	0.00	0.00	77.33	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2071	0.00	0.00	105.61	0.00	0.00	0.00	105.61	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2072	0.00	0.00	94.13	0.00	0.53	0.00	94.65	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2073	0.00	0.00	106.67	0.00	10.17	0.00	116.84	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2074	0.00	0.00	16.18	0.00	2.11	0.00	18.29	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2075	0.00	0.00	79.28	0.00	4.74	0.00	84.02	35.89	50.29	171.28	70.13	107.34	128.85	-135.04
2076	0.00	0.00	108.28	0.00	55.96	0.00	164.24	35.89	37.92	171.28	70.13	107.34	128.85	-135.04
2077	0.00	0.00	16.43	0.00	0.00	0.00	16.43	35.89	52.00	171.28	70.13	107.34	128.85	-135.04
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	171.28	70.13	107.34	128.85	-135.04
2079	0.00	0.00	143.56	0.00	0.00	0.00	143.56	35.89	52.00	171.28	70.13	107.34	128.85	-135.04
2080	0.00	0.00	207.40	0.00	0.00	0.00	207.40	35.89	36.78	171.28	70.13	107.34	128.85	-135.04
2081	0.00	0.00	92.89	0.00	45.31	0.00	138.20	35.89	52.00	171.28	70.13	107.34	128.85	-135.04
2082	0.00	0.00	6.83	0.00	0.00	0.00	6.83	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	37.92	171.28	70.13	107.34	128.85	-135.04
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	171.28	70.13	107.34	128.85	-135.04
Salvage Value	15.19	0.00	55.03	0.00	9.23	0.00	79.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	983.31	0.00	129.36	0.00	5491.80	713.60	563.34	6479.76	2368.57	1534.58	2907.25	-330.65

Net Present Value: -7099

Wind/C26

TABLE 195
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	249.85	99.35	16.95	83.89	49.66
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	256.51	97.51	17.52	85.40	56.08
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	269.09	95.95	18.02	86.09	69.02
2018	209.58	0.00	0.00	0.00	0.00	0.00	209.58	3.23	0.00	258.12	93.30	20.13	86.64	58.04
2019	251.91	0.00	0.00	0.00	0.00	0.00	251.91	4.49	0.00	251.88	91.36	17.99	86.31	56.23
2020	257.96	0.00	0.00	9.41	13.30	0.00	280.67	5.89	0.00	255.17	90.85	13.85	88.43	62.04
2021	711.05	0.00	0.00	287.40	22.16	0.00	1020.61	11.00	0.00	255.42	89.07	13.48	93.26	59.61
2022	1141.50	0.00	0.00	292.78	27.12	0.00	1461.40	18.30	6.10	258.44	87.46	13.51	93.57	63.90
2023	1024.89	0.00	0.00	283.36	14.35	0.00	1322.60	24.92	12.20	262.00	85.04	15.50	96.89	64.57
2024	731.88	0.00	0.00	5.38	6.54	0.00	743.80	28.64	18.31	275.05	83.11	16.09	103.28	72.57
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	31.19	18.31	185.33	82.94	10.56	118.86	-27.03
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	32.87	32.36	238.01	86.91	12.56	85.59	52.95
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	33.48	32.58	322.68	94.33	11.33	79.90	137.12
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	33.68	32.29	342.33	94.38	12.43	84.14	151.38
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.50	331.86	92.76	12.63	86.01	140.46
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.33	323.93	91.71	12.36	85.99	133.88
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.28	315.10	90.32	12.67	87.10	125.00
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	33.68	32.05	302.74	88.91	12.70	88.04	113.08
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	31.62	288.02	87.41	12.60	89.17	98.84
2034	0.00	0.00	96.48	0.00	0.00	0.00	96.48	34.05	31.62	273.63	85.98	12.61	89.97	85.06
2035	0.00	0.00	123.93	0.00	9.12	0.00	133.05	34.61	31.66	267.74	84.98	11.52	91.22	80.02
2036	0.00	0.00	91.35	0.00	0.00	0.00	91.35	35.07	38.26	256.41	82.97	20.75	92.31	60.39
2037	0.00	0.00	103.57	0.00	9.12	0.00	112.69	35.63	35.41	247.04	81.55	23.42	94.45	47.62
2038	0.00	0.00	15.71	0.00	0.00	0.00	15.71	35.71	39.32	241.49	80.34	30.51	96.29	34.36
2039	0.00	0.00	76.94	0.00	0.00	0.00	76.94	36.09	39.32	234.47	79.18	29.72	106.70	18.87
2040	0.00	0.00	107.13	9.41	71.81	0.00	188.35	37.02	39.32	223.28	77.56	37.48	108.01	0.22
2041	0.00	0.00	93.66	287.40	0.00	0.00	381.06	38.93	43.25	216.43	76.19	46.24	110.46	-16.46
2042	0.00	0.00	106.14	292.78	0.00	0.00	398.92	40.92	42.61	208.62	74.95	48.31	115.14	-29.79
2043	0.00	0.00	94.60	283.36	0.00	0.00	377.96	42.81	46.52	203.55	73.68	54.05	120.95	-45.13
2044	0.00	0.00	107.21	5.38	60.41	0.00	173.00	43.68	46.52	192.68	72.36	66.98	118.83	-65.49
2045	0.00	0.00	16.26	0.00	0.00	0.00	16.26	43.76	50.45	185.87	71.11	78.27	121.13	-84.64
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	53.31	178.72	69.87	79.65	129.24	-100.04
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.47	172.03	68.65	80.43	139.05	-116.10
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.47	178.87	69.88	79.45	129.81	-100.26
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.48	178.87	69.88	79.45	129.81	-100.26
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.48	178.87	69.88	79.45	129.81	-100.26
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2055	0.00	0.00	0.00	0.00	3.32	0.00	3.32	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2056	0.00	0.00	0.00	0.00	5.54	0.00	5.54	43.76	53.34	178.87	69.88	79.45	129.81	-100.26
2057	0.00	0.00	0.00	0.00	6.65	0.00	6.65	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2058	0.00	0.00	0.00	0.00	3.32	0.00	3.32	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2059	0.00	0.00	0.00	0.00	1.11	0.00	1.11	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2060	0.00	0.00	0.00	9.41	0.00	0.00	9.41	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2061	0.00	0.00	0.00	287.40	0.00	0.00	287.40	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2062	0.00	0.00	0.00	292.78	0.00	0.00	292.78	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2063	0.00	0.00	0.00	283.36	0.00	0.00	283.36	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2064	0.00	0.00	75.05	5.38	0.00	0.00	80.43	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2065	0.00	0.00	102.50	0.00	0.00	0.00	102.50	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2066	0.00	0.00	91.35	0.00	0.00	0.00	91.35	43.76	53.34	178.87	69.88	79.45	129.81	-100.26
2067	0.00	0.00	103.53	0.00	0.00	0.00	103.53	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2068	0.00	0.00	15.71	0.00	0.00	0.00	15.71	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2069	0.00	0.00	76.94	0.00	0.00	0.00	76.94	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2070	0.00	0.00	105.09	0.00	19.09	0.00	124.18	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2071	0.00	0.00	93.66	0.00	16.62	0.00	110.28	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2072	0.00	0.00	106.14	0.00	29.59	0.00	135.73	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2073	0.00	0.00	94.60	0.00	11.03	0.00	105.62	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2074	0.00	0.00	107.21	0.00	5.43	0.00	112.64	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2075	0.00	0.00	16.26	0.00	58.59	0.00	74.86	43.76	65.72	178.87	69.88	79.45	129.81	-100.26
2076	0.00	0.00	0.00	0.00	2.11	0.00	2.11	43.76	53.34	178.87	69.88	79.45	129.81	-100.26
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	67.43	178.87	69.88	79.45	129.81	-100.26
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	43.76	67.43	178.87	69.88	79.45	129.81	-100.26
2080	0.00	0.00	0.00	9.41	0.00	0.00	9.41	43.76	52.20	178.87	69.88	79.45	129.81	-100.26
2081	0.00	0.00	0.00	287.40	0.00	0.00	287.40	43.76	67.43	178.87	69.88	79.45	129.81	-100.26
2082	0.00	0.00	0.00	292.78	0.00	0.00	292.78	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2083	0.00	0.00	0.00	283.36	0.00	0.00	283.36	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2084	0.00	0.00	0.00	5.38	9.69	0.00	15.07	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	53.34	178.87	69.88	79.45	129.81	-100.26
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
2090	0.00	0.00	0.00	0.00	17.95	0.00	17.95	43.76	50.50	178.87	69.88	79.45	129.81	-100.26
Salvage Value	15.19	0.00	27.13	44.54	13.92	0.00	100.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	587.41	1254.53	201.65	0.00	6422.72	821.60	850.83	6705.70	2357.13	1068.48	2951.56	328.54

Net Present Value -7767

K19/C25/750MW (WPS Sale &Inv)

TABLE 196
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	4.77	308.38	1.54	0.00	238.00	101.04	15.21	79.47	42.28
2015	86.56	537.27	0.00	0.00	21.36	8.59	653.78	4.81	0.00	255.59	99.38	16.95	83.91	55.35
2016	195.77	714.27	0.00	0.00	30.34	22.12	962.50	9.62	0.00	263.34	97.53	17.51	85.46	62.84
2017	231.66	866.06	0.00	0.00	45.80	32.26	1175.77	15.50	0.00	274.82	95.63	18.70	86.70	73.79
2018	278.90	617.26	0.00	0.00	51.31	130.38	1077.85	20.89	0.00	267.87	93.59	19.58	86.56	68.13
2019	286.07	433.17	0.00	0.00	64.96	108.94	893.13	25.36	12.78	283.25	93.51	18.47	85.37	85.90
2020	789.91	179.32	0.00	0.00	4.17	194.97	1168.37	31.20	44.08	441.59	100.52	13.16	92.75	235.16
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	38.12	42.24	516.02	101.06	14.52	97.25	303.19
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	43.96	40.92	517.07	99.86	14.58	98.26	304.37
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	48.27	39.11	507.74	97.57	14.45	100.82	294.90
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	51.50	37.57	507.16	95.36	16.05	106.11	289.64
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	53.88	50.01	451.64	99.78	14.36	89.42	248.09
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	55.17	48.49	590.38	107.64	14.29	88.97	379.47
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	55.39	47.09	619.79	107.86	14.01	93.96	403.96
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	46.10	620.49	106.23	14.51	95.59	404.16
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	47.36	610.02	104.35	14.51	97.34	393.82
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	42.28	603.95	103.02	14.19	98.33	388.40
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	40.98	596.21	101.41	14.53	99.92	380.35
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	39.52	584.84	99.74	14.55	101.52	369.04
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	38.53	571.13	97.98	14.52	103.24	355.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	37.61	557.34	96.29	14.58	104.78	341.70
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	38.86	506.68	94.64	14.42	102.79	294.83
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	35.47	429.41	93.02	14.66	95.94	225.79
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	55.39	34.96	404.23	91.43	14.76	96.63	201.41
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	34.46	388.54	89.82	14.70	99.13	184.88
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	55.94	36.82	373.88	88.24	14.66	108.00	162.98
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	56.75	33.50	353.42	86.99	13.93	112.49	140.01
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	56.87	36.31	335.68	85.03	23.94	112.54	114.16
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	57.43	35.87	325.73	83.53	26.82	115.09	100.29
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	58.26	35.44	317.99	82.20	28.38	118.47	88.95
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	58.94	40.65	315.02	81.00	32.71	122.66	78.64
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	60.19	43.10	297.96	79.21	41.28	122.43	55.05
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	60.31	43.79	290.07	77.80	50.52	124.75	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	42.56	281.92	76.54	52.89	129.08	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	41.34	289.98	77.85	48.23	125.42	38.49
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	60.31	43.83	289.98	77.85	48.23	125.42	38.49
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	60.31	42.36	289.98	77.85	48.23	125.42	38.49
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	60.31	42.03	289.98	77.85	48.23	125.42	38.49
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	60.31	41.72	289.98	77.85	48.23	125.42	38.49
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	60.31	41.42	289.98	77.85	48.23	125.42	38.49
2054	0.00	0.00	0.00	0.00	22.62	23.91	46.53	60.31	41.12	289.98	77.85	48.23	125.42	38.49
2055	0.00	0.00	0.00	0.00	1.03	24.80	25.82	60.31	41.96	289.98	77.85	48.23	125.42	38.49
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	60.31	54.06	289.98	77.85	48.23	125.42	38.49
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	60.31	38.57	289.98	77.85	48.23	125.42	38.49
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	60.31	53.53	289.98	77.85	48.23	125.42	38.49
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	60.31	40.90	289.98	77.85	48.23	125.42	38.49
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	60.31	50.37	289.98	77.85	48.23	125.42	38.49
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	65.59	289.98	77.85	48.23	125.42	38.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	60.31	65.59	289.98	77.85	48.23	125.42	38.49
2065	0.00	0.00	0.00	0.00	11.14	5.40	16.54	60.31	37.99	289.98	77.85	48.23	125.42	38.49
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	60.31	65.59	289.98	77.85	48.23	125.42	38.49
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	60.31	65.59	289.98	77.85	48.23	125.42	38.49
2069	0.00	0.00	110.19	0.00	42.33	72.88	225.41	60.31	37.99	289.98	77.85	48.23	125.42	38.49
2070	0.00	0.00	150.79	0.00	3.15	75.58	229.52	60.31	52.08	289.98	77.85	48.23	125.42	38.49
2071	0.00	0.00	22.92	0.00	38.41	0.00	61.33	60.31	36.85	289.98	77.85	48.23	125.42	38.49
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	60.31	52.08	289.98	77.85	48.23	125.42	38.49
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	60.31	36.00	289.98	77.85	48.23	125.42	38.49
2074	0.00	0.00	137.51	0.00	60.40	0.00	197.91	60.31	50.37	289.98	77.85	48.23	125.42	38.49
2075	0.00	0.00	156.15	0.00	90.26	0.00	246.41	60.31	37.99	289.98	77.85	48.23	125.42	38.49
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	60.31	52.08	289.98	77.85	48.23	125.42	38.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	36.85	289.98	77.85	48.23	125.42	38.49
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	60.31	52.08	289.98	77.85	48.23	125.42	38.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	39.70	289.98	77.85	48.23	125.42	38.49
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	60.31	52.08	289.98	77.85	48.23	125.42	38.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	60.31	37.99	289.98	77.85	48.23	125.42	38.49
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	60.31	35.14	289.98	77.85	48.23	125.42	38.49
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	60.31	37.99	289.98	77.85	48.23	125.42	38.49
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	60.31	37.99	289.98	77.85	48.23	125.42	38.49
Salvage Value	8.35	0.00	31.34	0.00	41.94	20.84	102.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	456.50	0.00	669.64	485.37	9855.57	1331.82	974.39	11022.41	2592.32	742.12	2984.79	4703.18

Net Present Value -7459

K19/C25/750MW

TABLE 197
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	6.54	310.15	1.55	0.00	230.96	101.05	15.21	79.33	35.37
2015	86.56	537.27	0.00	0.00	21.36	10.72	655.91	4.83	0.00	248.76	99.37	16.94	83.90	48.55
2016	195.77	714.27	0.00	0.00	30.34	23.04	963.42	9.65	0.00	255.33	97.52	17.49	85.43	54.89
2017	231.66	866.06	0.00	0.00	45.80	32.26	1175.77	15.53	0.00	265.56	95.62	18.70	86.67	64.56
2018	278.90	617.26	0.00	0.00	51.31	180.76	1128.23	21.17	0.00	257.37	93.58	19.55	86.59	57.64
2019	286.07	433.17	0.00	0.00	64.96	127.16	911.35	25.72	12.78	271.47	93.50	18.44	85.39	74.14
2020	789.91	179.32	0.00	0.00	4.17	336.85	1310.26	32.28	47.15	419.78	100.52	13.14	92.65	213.46
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	39.19	45.41	503.54	101.06	14.62	97.32	290.53
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	45.04	44.12	507.07	99.85	14.58	98.28	294.36
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	49.35	42.17	498.40	97.56	14.45	100.85	285.54
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	52.57	40.51	499.09	95.34	16.09	106.16	281.49
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	54.95	52.82	442.73	99.78	14.38	89.41	239.17
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	56.25	51.19	544.80	107.63	14.34	87.15	335.68
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	56.46	49.67	540.95	107.87	13.93	89.45	329.70
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	48.57	538.70	106.23	14.49	90.74	327.25
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	49.73	529.84	104.34	14.50	92.57	318.43
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	44.54	525.18	103.00	14.22	93.73	314.23
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	43.14	519.12	101.39	14.60	95.40	307.73
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	41.59	509.50	99.73	14.61	97.27	297.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	40.50	497.61	97.98	14.50	99.17	285.95
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	39.49	485.70	96.30	14.55	100.99	273.86
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	40.66	419.87	94.67	14.58	94.32	216.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	37.19	395.81	93.03	14.72	94.74	193.32
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	56.46	36.60	381.75	91.41	14.71	96.66	178.96
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	36.04	366.86	89.82	14.68	99.12	163.24
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	57.01	38.33	352.96	88.24	14.69	107.95	142.08
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	57.83	34.95	349.24	86.99	13.94	112.46	135.85
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	57.94	37.70	335.68	85.03	23.94	112.53	114.18
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	58.50	37.20	325.73	83.53	26.82	115.08	100.30
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	59.33	36.72	318.00	82.20	28.38	118.47	88.96
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	60.02	41.87	315.04	81.00	32.71	122.65	78.66
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	61.27	44.26	297.94	79.21	41.28	122.40	55.06
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	61.39	44.90	290.01	77.80	50.52	124.70	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	43.62	281.88	76.54	52.89	129.04	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	42.35	289.95	77.85	48.23	125.38	38.49
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	61.39	44.80	289.95	77.85	48.23	125.38	38.49
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	61.39	43.28	289.95	77.85	48.23	125.38	38.49
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	61.39	42.91	289.95	77.85	48.23	125.38	38.49
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	61.39	42.55	289.95	77.85	48.23	125.38	38.49
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	61.39	42.21	289.95	77.85	48.23	125.38	38.49
2054	0.00	0.00	0.00	0.00	22.62	23.91	46.53	61.39	41.87	289.95	77.85	48.23	125.38	38.49
2055	0.00	0.00	0.00	0.00	1.03	24.80	25.82	61.39	42.68	289.95	77.85	48.23	125.38	38.49
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	61.39	54.74	289.95	77.85	48.23	125.38	38.49
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	61.39	39.21	289.95	77.85	48.23	125.38	38.49
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	61.39	54.14	289.95	77.85	48.23	125.38	38.49
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	61.39	41.48	289.95	77.85	48.23	125.38	38.49
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	61.39	50.37	289.95	77.85	48.23	125.38	38.49
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	65.59	289.95	77.85	48.23	125.38	38.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	61.39	65.59	289.95	77.85	48.23	125.38	38.49
2065	0.00	0.00	0.00	0.00	11.14	5.40	16.54	61.39	37.99	289.95	77.85	48.23	125.38	38.49
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	61.39	65.59	289.95	77.85	48.23	125.38	38.49
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	61.39	65.59	289.95	77.85	48.23	125.38	38.49
2069	0.00	0.00	110.19	0.00	42.33	72.88	225.41	61.39	37.99	289.95	77.85	48.23	125.38	38.49
2070	0.00	0.00	150.79	0.00	3.15	75.58	229.52	61.39	52.08	289.95	77.85	48.23	125.38	38.49
2071	0.00	0.00	22.92	0.00	38.41	0.00	61.33	61.39	36.85	289.95	77.85	48.23	125.38	38.49
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	61.39	52.08	289.95	77.85	48.23	125.38	38.49
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	61.39	36.00	289.95	77.85	48.23	125.38	38.49
2074	0.00	0.00	137.51	0.00	60.40	0.00	197.91	61.39	50.37	289.95	77.85	48.23	125.38	38.49
2075	0.00	0.00	156.15	0.00	90.26	0.00	246.41	61.39	37.99	289.95	77.85	48.23	125.38	38.49
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	61.39	52.08	289.95	77.85	48.23	125.38	38.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	36.85	289.95	77.85	48.23	125.38	38.49
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	61.39	52.08	289.95	77.85	48.23	125.38	38.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	39.70	289.95	77.85	48.23	125.38	38.49
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	61.39	52.08	289.95	77.85	48.23	125.38	38.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	61.39	37.99	289.95	77.85	48.23	125.38	38.49
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	61.39	35.14	289.95	77.85	48.23	125.38	38.49
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	61.39	37.99	289.95	77.85	48.23	125.38	38.49
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	61.39	37.99	289.95	77.85	48.23	125.38	38.49
Salvage Value	8.35	0.00	31.34	0.00	41.94	20.84	102.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	456.50	0.00	669.64	666.11	10036.31	1357.07	1010.79	10436.83	2592.24	742.28	2957.55	4144.76

Net Present Value -8259

K19/Gas25/750MW (WPS Sale & INV)

TABLE 198
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	4.77	277.01	1.39	0.00	238.00	101.04	15.21	79.47	42.28
2015	0.00	537.27	0.00	0.00	21.36	8.59	567.22	4.22	0.00	255.60	99.38	16.95	83.91	55.36
2016	0.00	714.27	0.00	0.00	30.34	22.12	766.73	8.05	0.00	263.37	97.53	17.50	85.46	62.88
2017	0.00	866.06	0.00	0.00	45.80	32.26	944.12	12.78	0.00	275.01	95.62	18.69	86.67	74.02
2018	0.00	617.26	0.00	0.00	51.31	130.38	798.95	16.77	0.00	268.17	93.59	19.54	86.53	68.50
2019	0.00	433.17	0.00	0.00	60.79	108.94	602.90	19.78	12.78	283.75	93.51	18.46	85.36	86.42
2020	0.00	179.32	0.00	0.00	0.01	194.97	374.30	21.66	44.08	442.30	100.52	13.15	92.71	235.92
2021	0.00	62.33	0.35	0.00	0.00	0.00	62.68	21.97	42.24	517.27	101.06	14.51	97.17	304.52
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.97	40.92	518.47	99.85	14.55	98.16	305.90
2023	0.00	0.00	119.98	0.00	0.00	0.00	119.98	22.46	39.11	507.99	97.11	15.42	101.32	294.14
2024	0.00	0.00	255.54	0.00	11.87	0.00	267.41	23.69	37.57	509.45	95.04	16.96	106.44	291.00
2025	0.00	0.00	158.35	0.00	93.47	0.00	251.83	24.94	39.87	400.63	94.71	16.37	98.17	191.38
2026	0.00	0.00	121.28	0.00	0.00	0.00	121.28	25.55	42.07	428.52	93.41	19.40	101.03	214.68
2027	0.00	0.00	137.72	0.00	0.00	0.00	137.72	26.23	40.80	427.79	91.48	19.03	105.39	211.89
2028	0.00	0.00	20.93	0.00	0.00	0.00	20.93	26.34	43.51	420.30	89.20	27.96	107.99	195.16
2029	0.00	0.00	102.77	0.00	0.00	0.00	102.77	26.85	44.95	411.19	87.46	31.30	110.99	181.44
2030	0.00	0.00	140.63	0.00	78.64	0.00	219.27	27.95	39.91	409.54	86.39	34.37	113.44	175.34
2031	0.00	0.00	125.59	0.00	0.00	0.00	125.59	28.58	42.71	413.16	86.00	37.36	114.33	175.47
2032	0.00	0.00	142.61	0.00	0.00	0.00	142.61	29.29	41.62	400.27	83.71	44.56	118.82	153.19
2033	0.00	0.00	21.68	0.00	0.00	0.00	21.68	29.40	44.48	394.32	82.20	53.42	121.83	136.88
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	43.45	390.86	81.44	55.81	123.74	129.88
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	42.03	322.16	79.36	54.02	119.25	69.53
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	41.50	230.87	77.93	55.02	107.60	-9.68
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	40.99	206.44	76.54	60.37	108.14	-38.61
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	40.49	203.32	75.80	59.00	113.48	-44.96
2039	0.00	0.00	230.85	0.00	0.00	0.00	230.85	30.55	42.85	184.27	73.92	70.59	119.98	-80.23
2040	0.00	0.00	334.17	0.00	0.00	0.00	334.17	32.22	39.54	165.30	72.60	78.14	122.89	-108.34
2041	0.00	0.00	149.96	0.00	11.87	0.00	161.83	33.03	39.08	167.69	72.81	76.51	122.62	-104.26
2042	0.00	0.00	11.05	0.00	0.00	0.00	11.05	33.09	45.44	184.13	70.66	109.91	124.27	-120.72
2043	0.00	0.00	113.31	0.00	0.00	0.00	113.31	33.65	45.01	170.85	68.96	120.28	128.15	-146.54
2044	0.00	0.00	155.06	0.00	78.64	0.00	233.70	34.82	46.30	155.44	67.39	128.60	132.03	-172.58
2045	0.00	0.00	74.11	0.00	0.00	0.00	74.11	35.19	49.83	148.49	66.08	143.52	135.06	-196.18
2046	0.00	0.00	69.17	0.00	0.00	0.00	69.17	35.54	49.44	140.48	64.90	155.71	138.06	-218.19
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	35.59	49.62	137.21	64.09	160.73	143.63	-231.25
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	48.40	142.06	65.02	153.32	138.92	-215.20
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	35.59	50.90	142.06	65.02	153.32	138.92	-215.20
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	35.59	47.72	142.06	65.02	153.32	138.92	-215.20
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	35.59	47.40	142.06	65.02	153.32	138.92	-215.20
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	35.59	47.08	142.06	65.02	153.32	138.92	-215.20
2053	0.00	0.00	98.55	0.00	26.47	23.91	148.93	35.59	46.77	142.06	65.02	153.32	138.92	-215.20
2054	0.00	0.00	234.11	0.00	21.59	23.91	279.62	35.59	46.47	142.06	65.02	153.32	138.92	-215.20
2055	0.00	0.00	156.31	0.00	0.00	24.80	181.11	35.59	46.18	142.06	65.02	153.32	138.92	-215.20
2056	0.00	0.00	121.28	0.00	0.00	0.00	121.28	35.59	61.13	142.06	65.02	153.32	138.92	-215.20
2057	0.00	0.00	137.72	0.00	0.00	0.00	137.72	35.59	45.63	142.06	65.02	153.32	138.92	-215.20
2058	0.00	0.00	20.93	0.00	0.00	0.00	20.93	35.59	60.60	142.06	65.02	153.32	138.92	-215.20
2059	0.00	0.00	102.77	0.00	11.87	0.00	114.64	35.59	47.96	142.06	65.02	153.32	138.92	-215.20
2060	0.00	0.00	140.63	0.00	70.10	0.00	210.74	35.59	57.43	142.06	65.02	153.32	138.92	-215.20
2061	0.00	0.00	125.59	0.00	0.00	0.00	125.59	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2062	0.00	0.00	142.61	0.00	0.00	0.00	142.61	35.59	57.43	142.06	65.02	153.32	138.92	-215.20
2063	0.00	0.00	21.68	0.00	0.00	0.00	21.68	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	35.59	57.43	142.06	65.02	153.32	138.92	-215.20
2065	0.00	0.00	0.00	0.00	70.12	5.40	75.51	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	35.59	57.43	142.06	65.02	153.32	138.92	-215.20
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	35.59	57.43	142.06	65.02	153.32	138.92	-215.20
2069	0.00	0.00	230.85	0.00	39.20	72.88	342.93	35.59	45.05	142.06	65.02	153.32	138.92	-215.20
2070	0.00	0.00	334.17	0.00	0.01	75.58	409.76	35.59	43.92	142.06	65.02	153.32	138.92	-215.20
2071	0.00	0.00	149.96	0.00	0.00	0.00	149.96	35.59	43.92	142.06	65.02	153.32	138.92	-215.20
2072	0.00	0.00	11.05	0.00	0.00	0.00	11.05	35.59	43.92	142.06	65.02	153.32	138.92	-215.20
2073	0.00	0.00	113.31	0.00	0.00	0.00	113.31	35.59	43.06	142.06	65.02	153.32	138.92	-215.20
2074	0.00	0.00	155.06	0.00	0.00	0.00	155.06	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2075	0.00	0.00	74.11	0.00	23.37	0.00	97.48	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2076	0.00	0.00	69.17	0.00	11.87	0.00	81.04	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	35.59	45.05	142.06	65.02	153.32	138.92	-215.20
2080	0.00	0.00	0.00	0.00	19.66	0.00	19.66	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2083	0.00	0.00	98.55	0.00	0.00	0.00	98.55	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2084	0.00	0.00	234.11	0.00	10.63	0.89	245.63	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2085	0.00	0.00	156.31	0.00	10.22	1.77	168.30	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2086	0.00	0.00	121.28	0.00	29.00	5.31	155.60	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2087	0.00	0.00	137.72	0.00	34.18	7.97	179.87	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2088	0.00	0.00	20.93	0.00	26.47	23.91	71.31	35.59	42.21	142.06	65.02	153.32	138.92	-215.20
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	35.59	45.05	142.06	65.02	153.32	138.92	-215.20
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	35.59	45.05	142.06	65.02	153.32	138.92	-215.20
Salvage Value	0.00	0.00	97.84	0.00	23.77	20.84	142.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	1803.55	0.00	451.84	485.37	6067.10	750.60	1020.30	7956.88	2331.17	2023.06	3236.90	365.75

Net Present Value -7472

K19/C31/750MW

TABLE 199
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	248.19	0.00	0.00	24.05	6.54	309.50	1.55	0.00	230.96	101.05	15.21	79.33	35.37
2015	38.79	537.27	0.00	0.00	21.36	10.72	608.15	4.59	0.00	248.76	99.37	16.94	83.90	48.55
2016	10.56	714.27	0.00	0.00	30.34	23.04	778.21	8.48	0.00	255.33	97.52	17.49	85.43	54.89
2017	10.64	866.06	0.00	0.00	45.80	32.26	954.76	13.25	0.00	265.80	95.61	18.70	86.67	64.81
2018	12.67	617.26	0.00	0.00	51.31	180.76	862.00	17.56	0.00	257.66	93.57	19.54	86.56	57.98
2019	12.77	433.17	0.00	0.00	60.79	127.16	633.89	20.73	12.78	271.92	93.49	18.48	85.38	74.57
2020	12.87	179.32	0.00	0.00	0.01	336.85	529.05	23.38	47.15	420.55	100.51	13.17	92.64	214.22
2021	16.31	62.33	0.00	0.00	0.00	0.00	78.63	23.77	45.41	504.61	101.05	14.59	97.22	291.75
2022	181.28	0.00	0.00	0.00	0.00	0.00	181.28	24.68	44.12	508.59	99.87	14.56	98.17	295.98
2023	274.96	0.00	0.00	0.00	0.00	0.00	274.96	26.05	42.17	498.25	97.01	15.60	101.60	284.03
2024	301.80	0.00	0.00	0.00	0.00	0.00	301.80	27.56	40.51	500.15	94.87	17.36	107.07	280.85
2025	308.20	0.00	0.00	0.00	4.16	0.00	312.36	29.12	38.77	389.60	94.73	12.59	103.80	178.48
2026	836.68	0.00	0.00	0.00	4.16	0.00	840.85	33.33	36.92	374.43	92.87	12.99	112.40	156.18
2027	1332.35	0.00	0.00	0.00	50.75	0.00	1383.10	40.24	35.54	334.25	90.98	12.20	110.84	120.23
2028	1198.48	0.00	0.00	0.00	26.56	0.00	1225.03	46.37	34.22	321.68	89.41	12.67	120.02	99.57
2029	857.44	0.00	0.00	0.00	44.79	0.00	902.23	50.88	35.55	312.54	87.83	13.05	130.71	80.95
2030	594.94	0.00	0.00	0.00	77.88	0.00	672.82	54.24	30.41	310.10	86.53	13.36	139.20	71.01
2031	391.50	0.00	0.00	0.00	103.08	0.00	494.58	56.72	43.23	355.80	90.47	15.48	91.84	158.01
2032	144.46	0.00	0.00	0.00	120.74	0.00	265.20	58.04	42.25	465.28	97.37	15.22	91.40	261.29
2033	45.67	0.00	0.00	0.00	0.00	0.00	45.67	58.27	40.96	499.42	98.07	14.88	99.17	287.29
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	40.05	485.74	96.31	14.54	100.97	273.92
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	38.37	419.31	94.67	14.50	94.26	215.88
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	37.71	395.72	93.03	14.81	94.67	193.21
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	58.27	36.95	381.91	91.42	14.75	96.63	179.11
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	36.03	366.89	89.82	14.67	99.10	163.30
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	58.82	38.39	353.00	88.24	14.68	107.93	142.16
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	59.63	35.12	349.24	86.99	13.94	112.46	135.85
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	59.75	41.20	335.68	85.03	23.94	112.53	114.18
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	60.31	37.85	325.73	83.53	26.82	115.08	100.30
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	61.14	37.36	318.00	82.20	28.38	118.47	88.96
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	61.83	42.52	315.04	81.00	32.71	122.65	78.66
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	63.08	42.06	297.94	79.21	41.28	122.40	55.06
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	63.20	45.55	290.01	77.80	50.52	124.70	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	43.62	281.88	76.54	52.89	129.04	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	42.35	289.95	77.85	48.23	125.38	38.49
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	63.20	44.80	289.95	77.85	48.23	125.38	38.49
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	63.20	41.57	289.95	77.85	48.23	125.38	38.49
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	63.20	44.05	289.95	77.85	48.23	125.38	38.49
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	63.20	40.84	289.95	77.85	48.23	125.38	38.49
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	63.20	40.50	289.95	77.85	48.23	125.38	38.49
2054	0.00	0.00	0.00	0.00	21.59	23.91	45.50	63.20	40.16	289.95	77.85	48.23	125.38	38.49
2055	0.00	0.00	0.00	0.00	0.00	24.80	24.80	63.20	39.83	289.95	77.85	48.23	125.38	38.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	56.45	289.95	77.85	48.23	125.38	38.49
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	40.92	289.95	77.85	48.23	125.38	38.49
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	55.85	289.95	77.85	48.23	125.38	38.49
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	43.18	289.95	77.85	48.23	125.38	38.49
2060	0.00	0.00	0.00	0.00	1.03	0.00	1.03	63.20	52.08	289.95	77.85	48.23	125.38	38.49
2061	0.00	0.00	0.00	0.00	1.03	0.00	1.03	63.20	37.99	289.95	77.85	48.23	125.38	38.49
2062	0.00	0.00	0.00	0.00	12.34	0.00	12.34	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2063	0.00	0.00	0.00	0.00	6.17	0.00	6.17	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2064	0.00	0.00	0.00	0.00	23.70	2.70	26.40	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2065	0.00	0.00	0.00	0.00	28.62	5.40	34.02	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2066	0.00	0.00	0.00	0.00	26.02	16.20	42.22	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2067	0.00	0.00	0.00	0.00	41.44	24.29	65.73	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	63.20	65.59	289.95	77.85	48.23	125.38	38.49
2069	0.00	0.00	110.19	0.00	39.20	72.88	222.27	63.20	37.99	289.95	77.85	48.23	125.38	38.49
2070	0.00	0.00	150.79	0.00	0.01	75.58	226.39	63.20	52.08	289.95	77.85	48.23	125.38	38.49
2071	0.00	0.00	22.92	0.00	0.00	0.00	22.92	63.20	39.70	289.95	77.85	48.23	125.38	38.49
2072	0.00	0.00	112.52	0.00	0.00	0.00	112.52	63.20	52.08	289.95	77.85	48.23	125.38	38.49
2073	0.00	0.00	153.98	0.00	0.00	0.00	153.98	63.20	36.00	289.95	77.85	48.23	125.38	38.49
2074	0.00	0.00	137.51	0.00	0.00	0.00	137.51	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2075	0.00	0.00	156.15	0.00	15.00	0.00	171.15	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2076	0.00	0.00	23.73	0.00	3.13	0.00	26.87	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2077	0.00	0.00	0.00	0.00	38.41	0.00	38.41	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2078	0.00	0.00	0.00	0.00	32.26	0.00	32.26	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2079	0.00	0.00	0.00	0.00	34.51	0.00	34.51	63.20	37.99	289.95	77.85	48.23	125.38	38.49
2080	0.00	0.00	0.00	0.00	130.50	0.00	130.50	63.20	50.37	289.95	77.85	48.23	125.38	38.49
2081	0.00	0.00	0.00	0.00	78.40	0.00	78.40	63.20	37.99	289.95	77.85	48.23	125.38	38.49
2082	0.00	0.00	0.00	0.00	90.91	0.00	90.91	63.20	52.08	289.95	77.85	48.23	125.38	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	36.85	289.95	77.85	48.23	125.38	38.49
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	63.20	52.08	289.95	77.85	48.23	125.38	38.49
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	63.20	36.85	289.95	77.85	48.23	125.38	38.49
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	63.20	52.08	289.95	77.85	48.23	125.38	38.49
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	63.20	35.14	289.95	77.85	48.23	125.38	38.49
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	63.20	37.99	289.95	77.85	48.23	125.38	38.49
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	63.20	37.99	289.95	77.85	48.23	125.38	38.49
Salvage Value	62.18	0.00	31.34	0.00	46.91	20.84	161.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4235.48	3326.34	456.50	0.00	596.73	666.11	9281.15	1247.15	953.49	9641.31	2529.12	739.28	3062.70	3310.20

Net Present Value -8172

K19/Gas31/750MW

TABLE 200
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	6.54	278.78	1.39	0.00	230.96	101.05	15.21	79.33	35.37
2015	0.00	537.27	0.00	0.00	21.36	10.72	569.35	4.24	0.00	248.76	99.37	16.94	83.90	48.55
2016	0.00	714.27	0.00	0.00	30.34	23.04	767.65	8.08	0.00	255.33	97.52	17.49	85.43	54.89
2017	0.00	866.06	0.00	0.00	45.80	32.26	944.12	12.80	0.00	265.80	95.61	18.70	86.67	64.81
2018	0.00	617.26	0.00	0.00	51.31	180.76	849.33	17.05	0.00	257.66	93.57	19.54	86.56	57.98
2019	0.00	433.17	0.00	0.00	60.79	127.16	621.12	20.15	12.78	271.92	93.49	18.48	85.38	74.57
2020	0.00	179.32	0.00	0.00	0.01	336.85	516.18	22.73	47.15	420.55	100.51	13.17	92.64	214.22
2021	0.00	62.33	0.00	0.00	0.00	0.00	62.33	23.04	45.41	504.61	101.05	14.59	97.22	291.75
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	44.12	508.55	99.86	14.58	98.19	295.92
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	42.17	498.52	97.01	15.60	101.58	284.32
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	40.51	500.67	94.87	17.37	107.05	281.38
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	38.77	390.86	94.73	12.60	103.99	179.54
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	36.92	376.77	92.86	13.08	112.80	158.03
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	23.04	35.54	337.25	90.97	12.25	111.18	122.86
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	23.04	34.22	326.22	89.40	12.68	120.81	103.33
2029	0.00	0.00	226.96	0.00	0.00	0.00	226.96	24.07	35.55	316.41	87.88	12.86	130.70	84.98
2030	0.00	0.00	406.18	0.00	23.74	0.00	429.92	26.11	30.41	317.48	87.29	11.40	136.90	81.90
2031	0.00	0.00	186.41	0.00	93.47	0.00	279.88	27.50	37.01	309.96	85.20	25.42	108.12	91.23
2032	0.00	0.00	126.47	0.00	0.00	0.00	126.47	28.14	39.74	303.27	83.64	32.39	110.34	76.90
2033	0.00	0.00	143.61	0.00	0.00	0.00	143.61	28.85	38.59	294.71	82.23	35.74	112.96	63.79
2034	0.00	0.00	21.83	0.00	0.00	0.00	21.83	28.96	41.38	294.21	81.44	38.65	115.71	58.41
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.96	39.87	221.82	79.38	46.24	105.44	-9.23
2036	0.00	0.00	226.07	0.00	0.00	0.00	226.07	30.09	39.26	200.50	77.98	50.67	105.91	-34.06
2037	0.00	0.00	327.25	0.00	0.00	0.00	327.25	31.73	38.68	191.15	76.68	55.55	108.20	-49.29
2038	0.00	0.00	146.86	0.00	78.64	0.00	225.49	32.86	38.12	194.32	76.53	50.82	113.25	-46.28
2039	0.00	0.00	10.82	0.00	0.00	0.00	10.82	32.91	47.22	207.07	74.36	85.21	117.52	-70.01
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.91	43.85	193.54	72.52	93.73	121.29	-93.99
2041	0.00	0.00	111.74	0.00	0.00	0.00	111.74	33.47	43.33	183.72	71.08	102.21	124.40	-113.97
2042	0.00	0.00	388.64	0.00	0.00	0.00	388.64	35.41	42.83	174.30	69.76	111.46	127.39	-134.31
2043	0.00	0.00	364.48	0.00	0.00	0.00	364.48	37.24	46.26	171.07	68.91	119.12	130.49	-147.45
2044	0.00	0.00	153.14	0.00	78.64	0.00	231.77	38.39	47.51	168.43	68.55	111.40	136.67	-148.19
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.45	53.86	178.73	66.67	150.42	131.97	-170.34
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	53.43	170.03	65.49	159.20	134.89	-189.54
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	52.15	159.46	64.26	168.82	137.89	-211.50
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	50.88	169.41	65.47	159.48	134.92	-190.46
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	38.45	53.33	169.41	65.47	159.48	134.92	-190.46
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	38.45	50.10	169.41	65.47	159.48	134.92	-190.46
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	38.45	49.74	169.41	65.47	159.48	134.92	-190.46
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	38.45	49.38	169.41	65.47	159.48	134.92	-190.46
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	38.45	49.03	169.41	65.47	159.48	134.92	-190.46
2054	0.00	0.00	0.00	0.00	21.59	23.91	45.50	38.45	48.69	169.41	65.47	159.48	134.92	-190.46
2055	0.00	0.00	0.00	0.00	0.00	24.80	24.80	38.45	48.36	169.41	65.47	159.48	134.92	-190.46
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	63.27	169.41	65.47	159.48	134.92	-190.46
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	47.74	169.41	65.47	159.48	134.92	-190.46
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	62.67	169.41	65.47	159.48	134.92	-190.46
2059	0.00	0.00	205.53	0.00	0.00	0.00	205.53	38.45	50.00	169.41	65.47	159.48	134.92	-190.46
2060	0.00	0.00	384.75	0.00	0.00	0.00	384.75	38.45	58.90	169.41	65.47	159.48	134.92	-190.46
2061	0.00	0.00	184.37	0.00	0.00	0.00	184.37	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2062	0.00	0.00	126.47	0.00	0.00	0.00	126.47	38.45	58.90	169.41	65.47	159.48	134.92	-190.46
2063	0.00	0.00	143.61	0.00	0.00	0.00	143.61	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2064	0.00	0.00	21.83	0.00	13.42	2.70	37.95	38.45	58.90	169.41	65.47	159.48	134.92	-190.46
2065	0.00	0.00	0.00	0.00	34.88	5.40	40.28	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2066	0.00	0.00	226.07	0.00	71.44	16.20	313.71	38.45	58.90	169.41	65.47	159.48	134.92	-190.46
2067	0.00	0.00	327.25	0.00	11.62	24.29	363.15	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2068	0.00	0.00	146.86	0.00	24.84	72.88	244.58	38.45	58.90	169.41	65.47	159.48	134.92	-190.46
2069	0.00	0.00	10.82	0.00	39.20	72.88	122.90	38.45	46.52	169.41	65.47	159.48	134.92	-190.46
2070	0.00	0.00	0.00	0.00	0.01	75.58	75.59	38.45	45.38	169.41	65.47	159.48	134.92	-190.46
2071	0.00	0.00	111.74	0.00	0.00	0.00	111.74	38.45	45.38	169.41	65.47	159.48	134.92	-190.46
2072	0.00	0.00	388.64	0.00	0.00	0.00	388.64	38.45	45.38	169.41	65.47	159.48	134.92	-190.46
2073	0.00	0.00	364.48	0.00	58.98	0.00	423.45	38.45	44.53	169.41	65.47	159.48	134.92	-190.46
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2075	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	38.45	46.52	169.41	65.47	159.48	134.92	-190.46
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2081	0.00	0.00	0.00	0.00	23.37	0.00	23.37	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2088	0.00	0.00	0.00	0.00	46.13	23.91	70.04	38.45	43.67	169.41	65.47	159.48	134.92	-190.46
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	38.45	46.52	169.41	65.47	159.48	134.92	-190.46
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	38.45	46.52	169.41	65.47	159.48	134.92	-190.46
Salvage Value	0.00	0.00	59.79	0.00	26.20	20.84	106.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	1821.83	0.00	421.38	666.11	6235.66	774.91	1017.33	7561.87	2334.49	2004.76	3230.31	-7.68

Net Present Value -8036

K19/C25/250MW

TABLE 201
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	4.11	307.71	1.55	0.00	230.96	101.05	15.21	79.33	35.37
2015	86.56	537.27	0.00	0.00	21.36	3.08	648.27	4.79	0.00	248.76	99.37	16.94	83.90	48.55
2016	195.77	714.27	0.00	0.00	30.34	5.11	945.49	9.52	0.00	255.33	97.52	17.49	85.43	54.89
2017	231.66	866.06	0.00	0.00	45.80	7.66	1151.17	15.28	0.00	265.56	95.62	18.70	86.67	64.56
2018	278.90	617.26	0.00	0.00	51.31	22.98	970.46	20.13	0.00	254.04	93.05	21.12	86.26	53.61
2019	286.07	433.17	0.00	0.00	64.96	22.98	807.18	24.17	12.78	268.85	92.64	20.88	87.13	68.19
2020	789.91	179.32	0.00	0.00	4.17	23.83	997.24	29.15	12.99	400.91	100.81	13.60	85.00	201.50
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	36.07	12.75	477.47	101.38	13.94	86.91	275.24
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	41.91	12.97	476.15	99.52	14.58	88.35	273.70
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	46.22	12.80	473.40	97.35	14.57	94.13	267.35
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	49.45	12.75	478.24	95.03	16.19	102.80	264.22
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	51.83	26.59	414.27	99.62	14.47	82.46	217.72
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	53.12	26.40	503.03	106.98	14.10	80.15	301.79
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	53.34	26.29	488.66	106.57	13.38	81.71	287.00
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	26.56	483.79	104.88	13.92	82.88	282.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	29.04	475.31	103.11	14.09	84.57	273.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	25.13	469.25	101.88	13.90	84.79	268.69
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.96	460.99	100.31	14.23	85.74	260.71
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.60	450.18	98.71	14.32	86.90	250.26
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.67	438.04	97.05	14.36	88.49	238.14
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.78	425.05	95.45	14.46	89.62	225.51
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	26.81	375.07	93.85	14.51	88.63	178.07
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	53.34	23.97	351.45	92.31	14.79	88.70	155.67
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	23.97	335.93	90.77	14.72	89.62	140.82
2038	0.00	0.00	130.85	0.00	0.00	0.00	130.85	53.89	23.97	319.63	89.24	14.70	91.11	124.57
2039	0.00	0.00	171.17	0.00	11.87	0.00	183.04	54.69	26.81	312.73	88.07	13.77	99.85	111.04
2040	0.00	0.00	22.76	0.00	0.00	0.00	22.76	54.81	27.88	301.47	86.11	23.36	101.24	90.77
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.81	27.23	292.32	84.64	26.35	103.63	77.69
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	55.37	27.23	284.78	83.34	28.12	106.33	66.99
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	56.20	27.23	276.98	81.98	27.86	111.26	55.89
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	56.89	32.86	268.05	80.45	41.36	110.35	35.90
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	58.14	35.70	258.41	79.07	45.76	113.03	20.55
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	58.25	36.78	252.48	77.73	52.10	117.46	5.19
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.93	243.69	76.37	52.76	124.24	-9.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.08	251.53	77.72	50.20	118.24	5.36
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	58.25	37.92	251.53	77.72	50.20	118.24	5.36
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	58.25	36.79	251.53	77.72	50.20	118.24	5.36
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	58.25	36.80	251.53	77.72	50.20	118.24	5.36
2052	0.00	0.00	0.00	0.00	34.18	1.89	36.07	58.25	36.80	251.53	77.72	50.20	118.24	5.36
2053	0.00	0.00	0.00	0.00	26.47	5.68	32.15	58.25	36.81	251.53	77.72	50.20	118.24	5.36
2054	0.00	0.00	0.00	0.00	22.62	5.68	28.30	58.25	36.81	251.53	77.72	50.20	118.24	5.36
2055	0.00	0.00	0.00	0.00	1.03	5.89	6.92	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	58.25	50.33	251.53	77.72	50.20	118.24	5.36
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	58.25	50.33	251.53	77.72	50.20	118.24	5.36
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	58.25	50.33	251.53	77.72	50.20	118.24	5.36
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	65.55	251.53	77.72	50.20	118.24	5.36
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2064	0.00	0.00	0.00	0.00	13.42	3.90	17.32	58.25	65.55	251.53	77.72	50.20	118.24	5.36
2065	0.00	0.00	0.00	0.00	11.14	2.66	13.80	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2066	0.00	0.00	0.00	0.00	1.34	3.85	5.19	58.25	65.55	251.53	77.72	50.20	118.24	5.36
2067	0.00	0.00	0.00	0.00	11.62	5.77	17.38	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2068	0.00	0.00	109.42	0.00	24.84	17.30	151.57	58.25	65.55	251.53	77.72	50.20	118.24	5.36
2069	0.00	0.00	149.75	0.00	42.33	17.30	209.39	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2070	0.00	0.00	22.76	0.00	3.15	17.95	43.85	58.25	52.03	251.53	77.72	50.20	118.24	5.36
2071	0.00	0.00	0.00	0.00	38.41	0.00	38.41	58.25	36.81	251.53	77.72	50.20	118.24	5.36
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	58.25	52.03	251.53	77.72	50.20	118.24	5.36
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	58.25	35.95	251.53	77.72	50.20	118.24	5.36
2074	0.00	0.00	137.51	0.00	72.27	0.00	209.78	58.25	50.33	251.53	77.72	50.20	118.24	5.36
2075	0.00	0.00	156.15	0.00	78.40	0.00	234.54	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	58.25	52.03	251.53	77.72	50.20	118.24	5.36
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	36.81	251.53	77.72	50.20	118.24	5.36
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	58.25	52.03	251.53	77.72	50.20	118.24	5.36
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	39.65	251.53	77.72	50.20	118.24	5.36
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	58.25	52.03	251.53	77.72	50.20	118.24	5.36
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2084	0.00	0.00	0.00	0.00	10.63	0.21	10.84	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2087	0.00	0.00	0.00	0.00	34.18	1.89	36.07	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2088	0.00	0.00	0.00	0.00	26.47	5.68	32.15	58.25	35.10	251.53	77.72	50.20	118.24	5.36
2089	0.00	0.00	0.00	0.00	21.59	5.68	27.27	58.25	37.95	251.53	77.72	50.20	118.24	5.36
2090	0.00	0.00	0.00	0.00	0.00	5.89	5.89	58.25	37.95	251.53	77.72	50.20	118.24	5.36
Salvage Value	8.35	0.00	30.49	0.00	41.91	5.38	86.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	462.38	0.00	669.89	95.07	9471.40	1283.55	692.55	9500.93	2581.75	769.28	2779.18	3370.72

Net Present Value -8077

K19/Gas24/250MW

TABLE 202
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	4.11	276.34	1.40	0.00	230.96	101.05	15.21	79.33	35.37
2015	0.00	537.27	0.00	0.00	21.36	3.08	561.71	4.20	0.00	248.76	99.37	16.94	83.90	48.55
2016	0.00	714.27	0.00	0.00	30.34	5.11	749.72	7.95	0.00	255.33	97.52	17.49	85.43	54.89
2017	0.00	866.06	0.00	0.00	45.80	7.66	919.51	12.55	0.00	265.80	95.61	18.70	86.67	64.81
2018	0.00	617.26	0.00	0.00	51.31	22.98	691.55	16.01	0.00	254.37	93.05	21.09	86.23	54.00
2019	0.00	433.17	0.00	0.00	60.79	22.98	516.94	18.59	12.78	269.36	92.64	20.88	87.11	68.73
2020	0.00	179.32	0.35	0.00	0.01	23.83	203.52	19.61	12.99	401.67	100.81	13.60	84.99	202.27
2021	0.00	62.33	0.00	0.00	0.00	0.00	62.33	19.92	12.75	478.67	101.36	13.95	86.87	276.49
2022	0.00	0.00	119.30	0.00	0.00	0.00	119.30	20.41	12.97	479.52	99.92	13.78	87.65	278.17
2023	0.00	0.00	155.36	0.00	11.87	0.00	167.23	21.14	12.80	482.05	98.81	11.56	90.44	281.24
2024	0.00	0.00	20.36	0.00	0.00	0.00	20.36	21.24	16.67	489.89	96.96	18.03	94.30	280.61
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.24	16.45	359.70	94.76	13.39	91.10	160.45
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.24	16.05	341.72	92.57	15.45	92.68	141.01
2027	0.00	0.00	101.34	0.00	0.00	0.00	101.34	21.75	16.07	307.83	90.56	16.92	93.73	106.62
2028	0.00	0.00	140.73	0.00	93.47	0.00	234.20	22.91	16.13	297.75	88.77	19.76	96.40	92.83
2029	0.00	0.00	236.37	0.00	0.00	0.00	236.37	24.09	22.71	291.89	87.04	27.18	98.52	79.14
2030	0.00	0.00	311.65	0.00	0.00	0.00	311.65	25.65	18.84	291.08	86.15	29.67	99.81	75.44
2031	0.00	0.00	139.86	0.00	11.87	0.00	151.73	26.41	18.84	298.37	86.62	25.31	99.32	87.12
2032	0.00	0.00	10.31	0.00	0.00	0.00	10.31	26.46	25.64	306.94	84.24	52.64	97.97	72.09
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.46	25.65	299.61	82.73	57.12	100.46	59.30
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.46	25.65	292.57	81.28	62.49	102.83	45.97
2035	0.00	0.00	224.49	0.00	0.00	0.00	224.49	27.58	25.01	223.01	79.32	59.80	100.72	-16.82
2036	0.00	0.00	324.97	0.00	0.00	0.00	324.97	29.21	25.02	201.74	77.87	64.49	101.41	-42.03
2037	0.00	0.00	145.84	0.00	0.00	0.00	145.84	29.93	25.02	203.54	78.24	59.10	100.24	-34.03
2038	0.00	0.00	239.99	0.00	0.00	0.00	239.99	31.13	31.81	204.85	75.92	86.02	101.06	-58.15
2039	0.00	0.00	331.84	0.00	0.00	0.00	331.84	32.79	34.66	198.88	74.56	94.86	110.22	-80.76
2040	0.00	0.00	148.92	0.00	78.64	0.00	227.56	33.93	31.81	194.47	73.93	97.49	110.96	-87.91
2041	0.00	0.00	10.97	0.00	0.00	0.00	10.97	33.99	38.62	198.96	72.18	123.74	110.55	-107.51
2042	0.00	0.00	235.73	0.00	0.00	0.00	235.73	35.17	38.62	190.48	70.47	136.44	114.02	-130.45
2043	0.00	0.00	341.23	0.00	0.00	0.00	341.23	36.87	38.62	182.61	69.15	145.45	116.59	-148.58
2044	0.00	0.00	153.14	0.00	0.00	0.00	153.14	37.64	40.33	177.24	68.59	148.75	117.28	-157.38
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	37.69	47.13	178.99	66.47	184.17	117.79	-189.43
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	47.13	182.23	66.52	183.11	118.16	-185.57
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	46.28	169.85	64.73	200.54	121.86	-217.28
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	37.69	48.28	177.02	65.91	189.27	119.27	-197.43
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2052	0.00	0.00	97.87	0.00	34.18	1.89	133.94	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2053	0.00	0.00	133.93	0.00	26.47	5.68	166.08	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2054	0.00	0.00	20.36	0.00	21.59	5.68	47.63	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2055	0.00	0.00	0.00	0.00	0.00	5.89	5.89	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2057	0.00	0.00	101.34	0.00	0.00	0.00	101.34	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2058	0.00	0.00	138.69	0.00	11.87	0.00	150.56	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2059	0.00	0.00	236.37	0.00	0.00	0.00	236.37	37.69	48.28	177.02	65.91	189.27	119.27	-197.43
2060	0.00	0.00	311.65	0.00	0.00	0.00	311.65	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2061	0.00	0.00	139.86	0.00	0.00	0.00	139.86	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2062	0.00	0.00	10.31	0.00	0.00	0.00	10.31	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2063	0.00	0.00	0.00	0.00	70.10	2.76	72.86	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2064	0.00	0.00	0.00	0.00	13.42	3.90	17.32	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2065	0.00	0.00	224.49	0.00	11.14	2.66	238.29	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2066	0.00	0.00	324.97	0.00	13.21	3.85	342.03	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2067	0.00	0.00	145.84	0.00	11.62	5.77	163.22	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2068	0.00	0.00	239.99	0.00	24.84	17.30	282.14	37.69	60.66	177.02	65.91	189.27	119.27	-197.43
2069	0.00	0.00	331.84	0.00	39.20	17.30	388.35	37.69	48.28	177.02	65.91	189.27	119.27	-197.43
2070	0.00	0.00	148.92	0.00	0.01	17.95	166.88	37.69	47.14	177.02	65.91	189.27	119.27	-197.43
2071	0.00	0.00	10.97	0.00	0.00	0.00	10.97	37.69	47.14	177.02	65.91	189.27	119.27	-197.43
2072	0.00	0.00	235.73	0.00	0.00	0.00	235.73	37.69	47.14	177.02	65.91	189.27	119.27	-197.43
2073	0.00	0.00	341.23	0.00	0.00	0.00	341.23	37.69	46.29	177.02	65.91	189.27	119.27	-197.43
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2075	0.00	0.00	11.28	0.00	58.98	0.00	70.26	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2078	0.00	0.00	0.00	0.00	23.37	0.00	23.37	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	48.28	177.02	65.91	189.27	119.27	-197.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2082	0.00	0.00	97.87	0.00	0.00	0.00	97.87	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2083	0.00	0.00	133.93	0.00	0.00	0.00	133.93	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2084	0.00	0.00	20.36	0.00	10.63	0.21	31.20	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2087	0.00	0.00	101.34	0.00	34.18	1.89	137.41	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2088	0.00	0.00	138.69	0.00	26.47	5.68	170.83	37.69	45.44	177.02	65.91	189.27	119.27	-197.43
2089	0.00	0.00	21.08	0.00	21.59	5.68	48.35	37.69	48.28	177.02	65.91	189.27	119.27	-197.43
2090	0.00	0.00	0.00	0.00	19.66	5.89	25.55	37.69	48.28	177.02	65.91	189.27	119.27	-197.43
Salvage Value	0.00	0.00	105.04	0.00	22.51	5.38	132.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	2314.73	0.00	395.19	95.07	6131.33	745.49	744.62	7457.55	2341.63	2406.96	2894.88	-185.92

Net Present Value -7807

K19/C31/250MW

TABLE 203
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	248.19	0.00	0.00	24.05	4.11	307.07	1.55	0.00	230.96	101.05	15.21	79.33	35.37
2015	38.79	537.27	0.00	0.00	21.36	3.08	600.50	4.55	0.00	248.76	99.37	16.94	83.90	48.55
2016	10.56	714.27	0.00	0.00	30.34	5.11	760.28	8.35	0.00	255.33	97.52	17.49	85.43	54.89
2017	10.64	866.06	0.00	0.00	45.80	7.66	930.16	13.00	0.00	265.80	95.61	18.70	86.67	64.81
2018	12.67	617.26	0.00	0.00	51.31	22.98	704.22	16.52	0.00	254.37	93.05	21.09	86.23	54.00
2019	12.77	433.17	0.00	0.00	60.79	22.98	529.71	19.17	12.78	269.36	92.64	20.88	87.11	68.73
2020	12.87	179.32	0.35	0.00	0.01	23.83	216.39	20.25	12.99	401.67	100.81	13.60	84.99	202.27
2021	16.31	62.33	0.00	0.00	0.00	0.00	78.63	20.65	12.75	478.67	101.36	13.95	86.87	276.49
2022	181.28	0.00	119.30	0.00	0.00	0.00	300.57	22.04	12.97	479.45	99.91	13.80	87.66	278.08
2023	274.96	0.00	155.36	0.00	11.87	0.00	442.19	24.15	12.80	481.75	98.78	11.65	90.56	280.76
2024	301.80	0.00	20.36	0.00	0.00	0.00	322.16	25.76	16.67	489.50	96.93	18.14	94.47	279.95
2025	308.20	0.00	0.00	0.00	4.16	0.00	312.36	27.32	16.45	359.04	94.73	13.49	91.29	159.53
2026	836.68	0.00	0.00	0.00	4.16	0.00	840.85	31.52	16.05	341.10	92.56	15.59	92.90	140.04
2027	1332.35	0.00	101.34	0.00	50.75	0.00	1484.44	38.95	16.07	306.79	90.55	17.18	93.90	105.15
2028	1198.48	0.00	138.69	0.00	38.43	0.00	1375.59	45.82	16.13	296.24	88.70	20.22	96.78	90.54
2029	857.44	0.00	21.08	0.00	44.79	0.00	923.31	50.44	22.70	289.98	87.01	27.79	98.91	76.28
2030	594.94	0.00	0.00	0.00	77.88	0.00	672.82	53.80	18.83	301.40	87.99	24.43	96.53	92.45
2031	391.50	0.00	0.00	0.00	103.08	0.00	494.58	56.28	32.89	334.53	91.04	19.75	83.50	140.24
2032	144.46	0.00	0.00	0.00	120.74	0.00	265.20	57.60	33.10	430.74	97.73	19.53	81.62	231.86
2033	45.67	0.00	0.00	0.00	0.00	0.00	45.67	57.83	32.96	449.13	97.88	20.20	85.98	245.06
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	33.18	433.75	96.17	20.71	86.73	230.14
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.36	383.12	94.53	20.97	85.89	181.73
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.31	360.62	92.98	21.42	85.96	160.26
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.15	343.03	91.15	22.28	87.49	142.10
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.79	323.61	89.26	23.18	89.82	121.35
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	34.70	309.51	87.42	25.49	98.74	97.87
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.97	299.79	85.73	28.89	101.54	83.63
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	34.64	289.59	84.12	32.91	104.32	68.24
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	57.83	31.80	286.49	83.28	33.55	105.78	63.89
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.80	279.19	81.97	33.31	110.33	53.58
2044	0.00	0.00	114.10	0.00	0.00	0.00	114.10	58.40	33.50	268.15	80.46	41.35	110.36	35.98
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	59.65	33.50	258.45	79.07	45.74	113.03	20.61
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	59.77	37.43	252.52	77.74	52.08	117.45	5.26
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.93	243.69	76.37	52.76	124.24	-9.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.08	251.55	77.73	50.19	118.24	5.40
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	59.77	37.92	251.55	77.73	50.19	118.24	5.40
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	59.77	35.08	251.55	77.73	50.19	118.24	5.40
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	59.77	37.94	251.55	77.73	50.19	118.24	5.40
2052	0.00	0.00	97.87	0.00	34.18	1.89	133.94	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2053	0.00	0.00	133.93	0.00	26.47	5.68	166.08	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2054	0.00	0.00	20.36	0.00	21.59	5.68	47.63	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2055	0.00	0.00	0.00	0.00	0.00	5.89	5.89	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2057	0.00	0.00	101.34	0.00	0.00	0.00	101.34	59.77	36.81	251.55	77.73	50.19	118.24	5.40
2058	0.00	0.00	138.69	0.00	11.87	0.00	150.56	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2059	0.00	0.00	21.08	0.00	0.00	0.00	21.08	59.77	39.65	251.55	77.73	50.19	118.24	5.40
2060	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2061	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	37.95	251.55	77.73	50.19	118.24	5.40
2062	0.00	0.00	0.00	0.00	12.34	0.00	12.34	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2063	0.00	0.00	0.00	0.00	18.04	2.76	20.80	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2064	0.00	0.00	0.00	0.00	23.70	3.90	27.60	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2065	0.00	0.00	0.00	0.00	28.62	2.66	31.28	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2066	0.00	0.00	0.00	0.00	26.02	3.85	29.87	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2067	0.00	0.00	0.00	0.00	41.44	5.77	47.21	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2068	0.00	0.00	0.00	0.00	24.84	17.30	42.15	59.77	65.55	251.55	77.73	50.19	118.24	5.40
2069	0.00	0.00	0.00	0.00	39.20	17.30	56.50	59.77	37.95	251.55	77.73	50.19	118.24	5.40
2070	0.00	0.00	0.00	0.00	0.01	17.95	17.96	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	39.65	251.55	77.73	50.19	118.24	5.40
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.95	251.55	77.73	50.19	118.24	5.40
2074	0.00	0.00	114.10	0.00	0.00	0.00	114.10	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2075	0.00	0.00	156.15	0.00	3.13	0.00	159.28	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2076	0.00	0.00	23.73	0.00	3.13	0.00	26.87	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2077	0.00	0.00	0.00	0.00	38.41	0.00	38.41	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2078	0.00	0.00	0.00	0.00	20.39	0.00	20.39	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2079	0.00	0.00	0.00	0.00	34.51	0.00	34.51	59.77	37.95	251.55	77.73	50.19	118.24	5.40
2080	0.00	0.00	0.00	0.00	130.50	0.00	130.50	59.77	50.33	251.55	77.73	50.19	118.24	5.40
2081	0.00	0.00	0.00	0.00	78.40	0.00	78.40	59.77	37.95	251.55	77.73	50.19	118.24	5.40
2082	0.00	0.00	97.87	0.00	90.91	0.00	188.78	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2083	0.00	0.00	133.93	0.00	0.00	0.00	133.93	59.77	36.81	251.55	77.73	50.19	118.24	5.40
2084	0.00	0.00	20.36	0.00	10.63	0.21	31.20	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	59.77	36.81	251.55	77.73	50.19	118.24	5.40
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	59.77	52.03	251.55	77.73	50.19	118.24	5.40
2087	0.00	0.00	101.34	0.00	34.18	1.89	137.41	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2088	0.00	0.00	138.69	0.00	26.47	5.68	170.83	59.77	35.10	251.55	77.73	50.19	118.24	5.40
2089	0.00	0.00	21.08	0.00	21.59	5.68	48.35	59.77	37.95	251.55	77.73	50.19	118.24	5.40
2090	0.00	0.00	0.00	0.00	0.00	5.89	5.89	59.77	37.95	251.55	77.73	50.19	118.24	5.40
Salvage Value	62.18	0.00	49.85	0.00	46.02	5.38	163.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4235.48	3326.34	667.69	0.00	606.43	95.07	8931.01	1193.56	699.58	8863.53	2527.85	829.78	2805.04	2700.86

Net Present Value -8123

All Gas

TABLE 204
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	256.51	97.51	17.52	85.40	56.08
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	269.08	95.95	18.02	86.09	69.01
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	258.37	93.30	20.12	86.63	58.32
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	252.27	91.36	17.99	86.30	56.62
2020	0.00	0.00	117.94	0.00	0.00	0.00	117.94	0.99	0.00	258.00	91.26	12.83	88.11	65.81
2021	0.00	0.00	153.55	0.00	11.87	0.00	165.42	1.71	0.00	258.69	89.49	12.11	93.08	64.00
2022	0.00	0.00	20.08	0.00	0.00	0.00	20.08	1.81	3.92	253.01	87.33	21.48	94.55	49.65
2023	0.00	0.00	98.55	0.00	0.00	0.00	98.55	2.30	3.92	250.03	85.15	26.46	99.65	38.77
2024	0.00	0.00	136.91	0.00	93.47	0.00	230.38	3.44	3.92	255.66	83.63	30.97	105.74	35.32
2025	0.00	0.00	20.50	0.00	0.00	0.00	20.50	3.54	7.84	165.07	83.09	25.99	97.86	-41.87
2026	0.00	0.00	100.64	0.00	0.00	0.00	100.64	4.05	7.84	151.35	81.82	26.46	98.51	-55.44
2027	0.00	0.00	137.72	0.00	0.00	0.00	137.72	4.73	7.84	141.16	80.01	26.64	104.76	-70.26
2028	0.00	0.00	234.73	0.00	0.00	0.00	234.73	5.91	11.76	133.50	78.13	40.74	104.36	-89.73
2029	0.00	0.00	309.48	0.00	0.00	0.00	309.48	7.46	11.76	123.83	76.73	46.20	106.29	-105.39
2030	0.00	0.00	138.89	0.00	11.87	0.00	150.76	8.21	11.77	130.46	77.55	42.47	103.97	-93.53
2031	0.00	0.00	10.23	0.00	0.00	0.00	10.23	8.26	18.57	137.40	75.29	70.56	101.28	-109.73
2032	0.00	0.00	104.94	0.00	0.00	0.00	104.94	8.79	18.58	123.90	73.43	77.72	104.63	-131.88
2033	0.00	0.00	143.61	0.00	78.64	0.00	222.24	9.90	18.58	112.06	71.76	86.08	107.54	-153.32
2034	0.00	0.00	244.76	0.00	0.00	0.00	244.76	11.12	22.50	103.89	70.37	97.82	109.58	-173.88
2035	0.00	0.00	322.71	0.00	0.00	0.00	322.71	12.73	22.50	96.37	69.46	104.02	110.46	-187.57
2036	0.00	0.00	144.82	0.00	0.00	0.00	144.82	13.46	22.50	95.41	69.35	101.47	113.74	-189.15
2037	0.00	0.00	238.32	0.00	0.00	0.00	238.32	14.65	29.30	93.40	67.48	128.23	108.10	-210.41
2038	0.00	0.00	329.54	0.00	0.00	0.00	329.54	16.30	29.31	84.85	66.28	138.40	111.01	-230.84
2039	0.00	0.00	147.89	0.00	0.00	0.00	147.89	17.04	29.31	81.52	66.13	140.54	117.37	-242.52
2040	0.00	0.00	10.90	0.00	0.00	0.00	10.90	17.09	36.11	80.82	64.38	163.74	116.42	-263.72
2041	0.00	0.00	234.09	0.00	0.00	0.00	234.09	18.26	36.12	75.24	62.63	183.05	121.10	-291.56
2042	0.00	0.00	338.86	0.00	0.00	0.00	338.86	19.96	36.12	72.89	61.58	198.74	123.62	-311.06
2043	0.00	0.00	152.07	0.00	78.64	0.00	230.71	21.11	36.12	73.27	61.49	202.63	123.68	-314.52
2044	0.00	0.00	11.21	0.00	0.00	0.00	11.21	21.17	42.93	73.42	60.08	226.08	122.37	-335.12
2045	0.00	0.00	50.54	0.00	0.00	0.00	50.54	21.42	42.93	68.41	58.56	247.65	125.78	-363.58
2046	0.00	0.00	69.17	0.00	0.00	0.00	69.17	21.76	42.93	65.22	57.46	264.89	128.96	-386.10
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	21.82	44.34	60.88	56.62	278.79	131.01	-405.55
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.35	64.83	57.55	263.78	128.58	-385.07
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	21.82	44.35	64.83	57.55	263.78	128.58	-385.07
2050	0.00	0.00	96.51	0.00	9.69	0.00	106.21	21.82	44.36	64.83	57.55	263.78	128.58	-385.07
2051	0.00	0.00	132.08	0.00	9.69	0.00	141.77	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2052	0.00	0.00	20.08	0.00	9.69	0.00	29.77	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2053	0.00	0.00	98.55	0.00	0.00	0.00	98.55	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2054	0.00	0.00	134.87	0.00	0.00	0.00	134.87	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2055	0.00	0.00	20.50	0.00	0.00	0.00	20.50	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2056	0.00	0.00	100.64	0.00	11.87	0.00	112.51	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2057	0.00	0.00	137.72	0.00	0.00	0.00	137.72	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2058	0.00	0.00	234.73	0.00	0.00	0.00	234.73	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2059	0.00	0.00	309.48	0.00	70.10	0.00	379.59	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2060	0.00	0.00	138.89	0.00	0.00	0.00	138.89	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2061	0.00	0.00	10.23	0.00	0.00	0.00	10.23	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2062	0.00	0.00	104.94	0.00	0.00	0.00	104.94	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2063	0.00	0.00	143.61	0.00	0.00	0.00	143.61	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2064	0.00	0.00	244.76	0.00	0.00	0.00	244.76	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2065	0.00	0.00	322.71	0.00	11.87	0.00	334.58	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2066	0.00	0.00	144.82	0.00	0.00	0.00	144.82	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2067	0.00	0.00	238.32	0.00	0.00	0.00	238.32	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2068	0.00	0.00	329.54	0.00	58.98	0.00	388.51	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2069	0.00	0.00	147.89	0.00	0.00	0.00	147.89	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2070	0.00	0.00	10.90	0.00	0.00	0.00	10.90	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2071	0.00	0.00	234.09	0.00	0.00	0.00	234.09	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2072	0.00	0.00	338.86	0.00	0.00	0.00	338.86	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2073	0.00	0.00	152.07	0.00	0.00	0.00	152.07	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2074	0.00	0.00	11.21	0.00	23.37	0.00	34.57	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2075	0.00	0.00	50.54	0.00	0.00	0.00	50.54	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2076	0.00	0.00	69.17	0.00	0.00	0.00	69.17	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2078	0.00	0.00	0.00	0.00	58.98	0.00	58.98	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2080	0.00	0.00	96.51	0.00	0.00	0.00	96.51	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2081	0.00	0.00	132.08	0.00	0.00	0.00	132.08	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2082	0.00	0.00	20.08	0.00	0.00	0.00	20.08	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2083	0.00	0.00	98.55	0.00	19.66	0.00	118.21	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2084	0.00	0.00	134.87	0.00	9.69	0.00	144.56	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2085	0.00	0.00	20.50	0.00	9.69	0.00	30.19	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2086	0.00	0.00	100.64	0.00	9.69	0.00	110.33	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2087	0.00	0.00	137.72	0.00	9.69	0.00	147.42	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2088	0.00	0.00	20.93	0.00	0.00	0.00	20.93	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	64.83	57.55	263.78	128.58	-385.07
Salvage Value	0.00	0.00	134.34	0.00	11.05	0.00	145.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2900.43	0.00	240.64	0.00	3202.93	314.51	608.54	4109.01	2117.85	3445.52	3079.94	-4534.30

Net Present Value: -8660

Wind/Gas

TABLE 205
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	256.51	97.51	17.52	85.40	56.08
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	269.09	95.95	18.02	86.09	69.02
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	258.37	93.30	20.12	86.63	58.32
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	252.27	91.36	17.99	86.30	56.62
2020	0.00	0.00	0.00	12.59	20.40	0.00	32.99	0.67	0.00	255.62	90.84	13.88	88.43	62.47
2021	0.00	0.00	0.35	384.42	34.00	0.00	418.77	2.76	0.00	255.81	89.07	13.42	93.01	60.31
2022	0.00	0.00	0.00	391.62	41.07	0.00	432.69	4.92	6.10	259.04	87.46	13.52	93.08	64.98
2023	0.00	0.00	218.54	379.03	21.49	0.00	619.05	7.91	12.20	262.63	85.03	15.53	96.38	65.68
2024	0.00	0.00	291.21	7.20	33.81	0.00	332.22	9.47	18.31	276.74	83.21	15.90	102.09	75.54
2025	0.00	0.00	41.00	6.30	6.55	0.00	53.85	9.73	26.14	193.18	83.18	18.13	93.32	-1.46
2026	0.00	0.00	100.64	192.21	16.46	0.00	309.31	11.28	26.14	182.78	82.22	17.21	93.18	-9.84
2027	0.00	0.00	139.76	195.81	119.62	0.00	455.20	13.55	29.19	174.10	79.95	20.97	95.01	-21.83
2028	0.00	0.00	20.93	195.81	36.25	0.00	252.99	14.81	36.17	174.09	78.23	27.11	97.34	-28.58
2029	0.00	0.00	102.77	195.81	36.38	0.00	334.96	16.49	39.22	169.51	76.68	29.24	99.07	-35.48
2030	0.00	0.00	140.63	195.81	36.38	0.00	372.83	18.35	42.27	170.72	75.80	30.64	99.55	-35.28
2031	0.00	0.00	125.59	195.81	36.38	0.00	357.78	20.14	49.24	171.01	74.61	36.28	100.30	-40.17
2032	0.00	0.00	142.61	195.81	115.02	0.00	453.44	22.41	52.29	168.61	73.52	36.58	102.11	-43.60
2033	0.00	0.00	21.68	195.81	36.38	0.00	253.87	23.68	59.28	170.85	72.87	38.61	103.05	-43.68
2034	0.00	0.00	106.41	195.81	36.38	0.00	338.61	25.37	62.33	163.04	71.12	44.68	104.04	-56.81
2035	0.00	0.00	145.63	195.81	36.38	0.00	377.82	27.26	65.39	155.38	69.51	48.59	105.90	-68.62
2036	0.00	0.00	130.04	195.81	36.38	0.00	362.24	29.07	72.36	151.91	68.19	56.02	107.20	-79.50
2037	0.00	0.00	147.67	195.81	36.38	0.00	379.87	30.97	75.41	146.21	66.95	59.46	109.26	-89.46
2038	0.00	0.00	131.87	195.81	36.38	0.00	364.06	32.79	82.39	144.84	65.94	65.39	111.50	-97.99
2039	0.00	0.00	149.75	195.81	115.02	0.00	460.58	35.09	85.44	139.72	64.83	64.41	122.84	-112.36
2040	0.00	0.00	22.76	208.40	36.38	0.00	267.55	36.43	92.43	140.27	64.03	67.93	125.79	-117.48
2041	0.00	0.00	111.74	580.23	36.38	0.00	728.36	40.07	95.48	131.10	62.58	80.00	123.94	-135.42
2042	0.00	0.00	152.91	587.43	36.38	0.00	776.72	43.96	98.53	124.06	61.27	85.80	127.06	-150.06
2043	0.00	0.00	136.55	574.84	36.11	0.00	747.50	47.69	105.50	120.61	60.13	95.16	129.19	-163.87
2044	0.00	0.00	155.06	203.00	35.29	0.00	393.36	49.66	108.55	117.14	59.22	98.71	131.88	-172.66
2045	0.00	0.00	74.11	202.11	33.11	0.00	309.33	51.21	115.53	115.05	58.16	104.63	136.90	-184.65
2046	0.00	0.00	69.17	381.72	29.84	0.00	480.73	53.61	118.58	111.96	57.16	105.06	144.42	-194.69
2047	0.00	0.00	10.51	199.41	19.92	0.00	229.84	54.76	123.06	107.49	56.13	108.86	145.86	-203.36
2048	0.00	0.00	0.00	195.81	10.23	0.00	206.04	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2049	0.00	0.00	0.00	195.81	9.83	0.00	205.64	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2050	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2051	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2052	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2053	0.00	0.00	197.11	195.81	0.00	0.00	392.92	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2054	0.00	0.00	269.74	195.81	0.00	0.00	465.55	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2055	0.00	0.00	41.00	195.81	5.10	0.00	241.91	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2056	0.00	0.00	100.64	195.81	8.50	0.00	304.95	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2057	0.00	0.00	137.72	195.81	10.34	0.00	343.87	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2058	0.00	0.00	20.93	195.81	5.78	0.00	222.52	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2059	0.00	0.00	102.77	195.81	26.67	0.00	325.24	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2060	0.00	0.00	140.63	208.40	2.87	0.00	351.90	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2061	0.00	0.00	125.59	580.23	4.59	0.00	710.41	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2062	0.00	0.00	142.61	587.43	76.74	0.00	806.78	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2063	0.00	0.00	21.68	574.84	9.10	0.00	605.61	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2064	0.00	0.00	106.41	203.00	9.10	0.00	318.51	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2065	0.00	0.00	145.63	202.11	9.10	0.00	356.83	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2066	0.00	0.00	130.04	381.72	9.10	0.00	520.86	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2067	0.00	0.00	147.67	199.41	68.07	0.00	415.15	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2068	0.00	0.00	131.87	195.81	9.10	0.00	336.78	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2069	0.00	0.00	149.75	195.81	9.10	0.00	354.65	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2070	0.00	0.00	22.76	195.81	24.40	0.00	242.97	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2071	0.00	0.00	111.74	195.81	34.59	0.00	342.14	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2072	0.00	0.00	152.91	195.81	39.83	0.00	388.55	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2073	0.00	0.00	136.55	195.81	24.80	0.00	357.16	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2074	0.00	0.00	155.06	195.81	75.22	0.00	426.09	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2075	0.00	0.00	74.11	195.81	12.78	0.00	282.70	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2076	0.00	0.00	69.17	195.81	20.97	0.00	285.94	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2077	0.00	0.00	10.51	195.81	51.98	0.00	258.30	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2078	0.00	0.00	0.00	195.81	36.11	0.00	231.92	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2079	0.00	0.00	0.00	195.81	35.70	0.00	231.51	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2080	0.00	0.00	0.00	208.40	35.16	0.00	243.56	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2081	0.00	0.00	0.00	580.23	33.52	0.00	613.75	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2082	0.00	0.00	0.00	587.43	51.45	0.00	638.88	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2083	0.00	0.00	197.11	574.84	29.74	0.00	801.69	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2084	0.00	0.00	269.74	203.00	36.85	0.00	509.59	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2085	0.00	0.00	41.00	202.11	36.57	0.00	279.68	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2086	0.00	0.00	100.64	381.72	34.94	0.00	517.30	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2087	0.00	0.00	137.72	199.41	33.30	0.00	370.43	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2088	0.00	0.00	20.93	195.81	15.42	0.00	232.16	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2089	0.00	0.00	0.00	189.51	27.44	0.00	216.95	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
2090	0.00	0.00	0.00	3.60	0.14	0.00	3.73	54.76	123.06	111.50	57.15	106.19	142.39	-194.23
Salvage Value	0.00	0.00	100.16	237.43	50.24	0.00	387.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2085.14	5197.93	755.22	0.00	8100.16	756.52	1713.36	5021.21	2110.75	1554.98	3171.75	-1816.27

Net Present Value -12386

K22/Gas

TABLE 206
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	103.56	0.00	0.00	9.69	0.00	113.25	0.57	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	34.13	0.00	0.00	10.88	0.00	45.01	0.79	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	36.65	0.00	0.00	10.98	0.00	47.64	1.03	0.00	256.27	97.51	17.52	85.41	55.83
2017	0.00	239.36	0.00	0.00	31.97	0.00	271.33	2.39	0.00	268.50	95.96	18.02	86.12	68.40
2018	0.00	467.46	0.00	0.00	11.42	0.00	478.88	4.78	0.00	257.14	93.31	20.13	86.67	57.02
2019	0.00	747.62	0.00	0.00	19.89	0.00	767.50	8.62	0.00	251.01	91.37	17.99	86.33	55.33
2020	0.00	840.88	0.00	0.00	36.19	0.00	877.07	13.00	0.00	252.83	90.67	14.29	88.60	59.27
2021	0.00	683.97	0.00	0.00	51.33	0.00	735.30	16.68	0.00	254.28	89.02	13.70	93.68	57.87
2022	0.00	398.08	0.00	0.00	60.79	0.00	458.87	18.97	12.78	257.53	89.00	15.63	89.27	63.63
2023	0.00	185.31	0.00	0.00	0.01	0.00	185.32	19.90	12.99	343.85	94.52	15.55	86.97	146.81
2024	0.00	64.22	0.00	0.00	0.00	0.00	64.22	20.22	12.71	370.42	94.33	17.71	92.55	165.83
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	20.22	12.92	291.08	94.22	12.45	87.64	96.77
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.22	12.75	278.13	92.40	12.60	88.77	84.36
2027	0.00	0.00	122.77	0.00	0.00	0.00	122.77	20.73	12.70	239.54	90.59	12.06	88.11	48.78
2028	0.00	0.00	160.16	0.00	11.87	0.00	172.03	21.48	12.47	227.52	89.06	12.57	89.66	36.22
2029	0.00	0.00	21.08	0.00	0.00	0.00	21.08	21.59	15.96	223.80	88.21	15.54	89.74	30.32
2030	0.00	0.00	103.49	0.00	0.00	0.00	103.49	22.10	15.96	216.83	86.55	18.84	91.34	20.10
2031	0.00	0.00	361.98	0.00	93.47	0.00	455.45	24.37	16.00	209.02	84.95	21.63	93.62	8.82
2032	0.00	0.00	337.55	0.00	0.00	0.00	337.55	26.06	22.58	202.91	83.39	29.40	95.87	-5.74
2033	0.00	0.00	141.82	0.00	11.87	0.00	153.69	26.83	18.71	206.03	83.48	25.72	96.05	0.78
2034	0.00	0.00	10.45	0.00	0.00	0.00	10.45	26.88	25.51	212.09	81.20	52.09	94.49	-15.68
2035	0.00	0.00	224.49	0.00	0.00	0.00	224.49	28.00	25.51	197.97	79.18	57.18	97.00	-35.40
2036	0.00	0.00	324.97	0.00	0.00	0.00	324.97	29.63	25.51	189.81	77.72	63.53	99.08	-50.52
2037	0.00	0.00	145.84	0.00	0.00	0.00	145.84	30.36	25.52	191.41	78.09	57.74	97.97	-42.39
2038	0.00	0.00	239.99	0.00	0.00	0.00	239.99	31.56	31.67	191.40	75.81	82.81	98.84	-66.05
2039	0.00	0.00	331.84	0.00	0.00	0.00	331.84	33.22	31.68	185.30	74.47	91.39	107.91	-88.47
2040	0.00	0.00	148.92	0.00	78.64	0.00	227.56	34.35	31.68	182.44	73.97	93.57	108.23	-93.33
2041	0.00	0.00	10.97	0.00	0.00	0.00	10.97	34.41	38.49	185.66	72.12	119.63	108.07	-114.18
2042	0.00	0.00	235.73	0.00	0.00	0.00	235.73	35.59	41.33	176.98	70.38	133.13	111.49	-138.02
2043	0.00	0.00	341.23	0.00	0.00	0.00	341.23	37.29	38.49	169.66	69.06	142.81	114.04	-156.26
2044	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.06	38.49	167.04	68.62	146.06	114.39	-162.03
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.12	45.29	170.95	67.13	174.14	113.07	-183.39
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.29	165.56	65.94	185.69	116.37	-202.43
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	47.01	158.30	64.63	198.91	119.22	-224.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	47.01	164.94	65.90	186.24	116.22	-203.43
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	47.01	164.94	65.90	186.24	116.22	-203.43
2050	0.00	0.00	0.00	0.00	10.22	0.00	10.22	38.12	46.16	164.94	65.90	186.24	116.22	-203.43
2051	0.00	0.00	0.00	0.00	10.29	0.00	10.29	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2052	0.00	0.00	0.00	0.00	10.30	0.00	10.30	38.12	48.15	164.94	65.90	186.24	116.22	-203.43
2053	0.00	0.00	0.00	0.00	0.56	0.00	0.56	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2054	0.00	0.00	0.00	0.00	18.46	0.00	18.46	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2055	0.00	0.00	0.00	0.00	24.49	0.00	24.49	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2056	0.00	0.00	0.00	0.00	26.47	0.00	26.47	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2057	0.00	0.00	101.34	0.00	21.59	0.00	122.94	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2058	0.00	0.00	138.69	0.00	0.00	0.00	138.69	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2059	0.00	0.00	21.08	0.00	0.00	0.00	21.08	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2060	0.00	0.00	103.49	0.00	0.00	0.00	103.49	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2061	0.00	0.00	359.94	0.00	0.00	0.00	359.94	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2062	0.00	0.00	337.55	0.00	0.00	0.00	337.55	38.12	48.15	164.94	65.90	186.24	116.22	-203.43
2063	0.00	0.00	141.82	0.00	11.87	0.00	153.69	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2064	0.00	0.00	10.45	0.00	0.00	0.00	10.45	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2065	0.00	0.00	224.49	0.00	0.66	0.00	225.16	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2066	0.00	0.00	324.97	0.00	70.80	0.00	395.77	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2067	0.00	0.00	145.84	0.00	21.67	0.00	167.50	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2068	0.00	0.00	239.99	0.00	22.73	0.00	262.72	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2069	0.00	0.00	331.84	0.00	1.43	0.00	333.27	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2070	0.00	0.00	148.92	0.00	11.70	0.00	160.62	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2071	0.00	0.00	10.97	0.00	24.86	0.00	35.84	38.12	60.53	164.94	65.90	186.24	116.22	-203.43
2072	0.00	0.00	235.73	0.00	39.20	0.00	274.93	38.12	48.15	164.94	65.90	186.24	116.22	-203.43
2073	0.00	0.00	341.23	0.00	0.01	0.00	341.24	38.12	47.01	164.94	65.90	186.24	116.22	-203.43
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.12	47.01	164.94	65.90	186.24	116.22	-203.43
2075	0.00	0.00	11.28	0.00	58.98	0.00	70.26	38.12	47.01	164.94	65.90	186.24	116.22	-203.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	46.16	164.94	65.90	186.24	116.22	-203.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2081	0.00	0.00	0.00	0.00	23.37	0.00	23.37	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	48.15	164.94	65.90	186.24	116.22	-203.43
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2087	0.00	0.00	101.34	0.00	9.69	0.00	111.04	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2088	0.00	0.00	138.69	0.00	0.00	0.00	138.69	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2089	0.00	0.00	21.08	0.00	0.00	0.00	21.08	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
2090	0.00	0.00	0.00	0.00	19.66	0.00	19.66	38.12	45.30	164.94	65.90	186.24	116.22	-203.43
Salvage Value	0.00	0.00	93.33	0.00	17.07	0.00	110.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3154.41	2218.51	0.00	372.80	0.00	5745.73	694.55	684.05	6159.28	2308.68	2308.29	2827.68	-1285.36

Net Present Value: -8410

K22/C29

TABLE 207
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	Low
Capital Cost	High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	103.56	0.00	0.00	9.69	0.00	143.98	0.72	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.31	34.13	0.00	0.00	10.88	0.00	84.32	1.14	0.00	249.85	99.35	16.95	83.89	49.66
2016	11.08	36.65	0.00	0.00	10.98	0.00	58.72	1.44	0.00	256.27	97.51	17.52	85.41	55.83
2017	11.83	239.36	0.00	0.00	31.97	0.00	283.16	2.85	0.00	268.50	95.96	18.02	86.12	68.40
2018	11.92	467.46	0.00	0.00	11.42	0.00	490.80	5.30	0.00	257.14	93.31	20.13	86.67	57.02
2019	14.28	747.62	0.00	0.00	19.89	0.00	781.79	9.21	0.00	251.01	91.37	17.99	86.33	55.33
2020	181.67	840.88	0.00	0.00	36.19	0.00	1058.74	14.51	0.00	252.83	90.67	14.29	88.60	59.27
2021	273.94	683.97	0.00	0.00	51.33	0.00	1009.24	19.55	0.00	254.16	89.02	13.70	93.78	57.65
2022	297.17	398.08	0.00	0.00	60.79	0.00	756.04	23.33	12.78	257.37	89.01	15.61	89.36	63.39
2023	303.46	185.31	0.00	0.00	4.17	0.00	492.95	25.80	12.99	343.36	94.52	15.59	87.02	146.23
2024	823.83	64.22	0.00	0.00	4.16	0.00	892.22	30.26	12.71	369.30	94.32	17.71	92.60	164.67
2025	1311.89	0.00	0.00	0.00	50.75	0.00	1362.64	37.07	12.92	289.70	94.24	12.47	87.74	95.26
2026	1180.07	0.00	0.00	0.00	26.56	0.00	1206.63	43.11	12.75	276.44	92.40	12.63	88.91	82.50
2027	844.27	0.00	0.00	0.00	44.79	0.00	889.07	47.55	12.70	238.36	90.81	11.55	88.04	47.96
2028	585.80	0.00	0.00	0.00	77.88	0.00	663.68	50.87	12.47	223.43	88.96	12.71	90.00	31.76
2029	385.49	0.00	0.00	0.00	103.08	0.00	488.57	53.31	26.10	286.19	92.67	14.52	81.12	97.87
2030	142.25	0.00	0.00	0.00	120.74	0.00	262.98	54.63	26.31	377.79	99.55	14.22	77.90	186.11
2031	44.97	0.00	0.00	0.00	0.00	0.00	44.97	54.85	26.22	390.23	99.47	14.58	80.06	196.12
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	29.08	377.74	97.84	14.44	80.91	184.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	25.04	365.75	96.26	14.35	82.47	172.68
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	25.00	353.90	94.70	14.60	83.54	161.06
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	24.83	341.49	93.18	14.65	84.20	149.46
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	54.85	24.47	327.18	91.67	14.67	84.98	135.85
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	24.54	312.42	90.17	14.70	86.03	121.51
2038	0.00	0.00	130.85	0.00	0.00	0.00	130.85	55.40	24.00	297.97	88.70	14.67	87.91	106.70
2039	0.00	0.00	171.17	0.00	11.87	0.00	183.04	56.21	26.68	291.48	87.38	14.26	97.64	92.21
2040	0.00	0.00	22.76	0.00	0.00	0.00	22.76	56.32	27.75	283.07	85.70	24.25	97.91	75.22
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.32	27.75	274.90	84.28	27.16	100.23	63.24
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	56.88	30.59	266.92	82.91	28.07	103.98	51.96
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	57.71	27.75	258.29	81.48	28.35	108.98	39.48
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	58.40	31.66	250.88	80.06	43.11	107.07	20.63
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	59.65	31.02	243.11	78.85	46.18	109.64	8.43
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	59.77	34.94	248.21	78.45	45.50	112.81	11.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.65	230.20	76.33	59.91	114.28	-20.32
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.65	240.50	77.88	50.53	112.24	-0.15
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	39.50	240.50	77.88	50.53	112.24	-0.15
2050	0.00	0.00	0.00	0.00	10.22	0.00	10.22	59.77	35.80	240.50	77.88	50.53	112.24	-0.15
2051	0.00	0.00	0.00	0.00	10.29	0.00	10.29	59.77	34.96	240.50	77.88	50.53	112.24	-0.15
2052	0.00	0.00	0.00	0.00	10.30	0.00	10.30	59.77	37.81	240.50	77.88	50.53	112.24	-0.15
2053	0.00	0.00	0.00	0.00	0.56	0.00	0.56	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2054	0.00	0.00	0.00	0.00	18.46	0.00	18.46	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2055	0.00	0.00	0.00	0.00	24.49	0.00	24.49	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2056	0.00	0.00	0.00	0.00	26.47	0.00	26.47	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2057	0.00	0.00	0.00	0.00	21.59	0.00	21.59	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2058	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2059	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	53.04	240.50	77.88	50.53	112.24	-0.15
2060	0.00	0.00	0.00	0.00	12.34	0.00	12.34	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2061	0.00	0.00	0.00	0.00	6.17	0.00	6.17	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	59.77	37.81	240.50	77.88	50.53	112.24	-0.15
2063	0.00	0.00	0.00	0.00	17.48	0.00	17.48	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2064	0.00	0.00	0.00	0.00	24.68	0.00	24.68	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2065	0.00	0.00	0.00	0.00	30.49	0.00	30.49	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2066	0.00	0.00	0.00	0.00	0.70	0.00	0.70	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2067	0.00	0.00	0.00	0.00	21.67	0.00	21.67	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2068	0.00	0.00	109.42	0.00	10.86	0.00	120.28	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2069	0.00	0.00	149.75	0.00	1.43	0.00	151.17	59.77	53.04	240.50	77.88	50.53	112.24	-0.15
2070	0.00	0.00	22.76	0.00	11.70	0.00	34.46	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2071	0.00	0.00	0.00	0.00	24.86	0.00	24.86	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2072	0.00	0.00	112.52	0.00	39.20	0.00	151.72	59.77	53.04	240.50	77.88	50.53	112.24	-0.15
2073	0.00	0.00	153.98	0.00	3.15	0.00	157.13	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2074	0.00	0.00	137.51	0.00	15.00	0.00	152.51	59.77	51.90	240.50	77.88	50.53	112.24	-0.15
2075	0.00	0.00	156.15	0.00	38.41	0.00	194.55	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2076	0.00	0.00	23.73	0.00	20.39	0.00	44.12	59.77	51.05	240.50	77.88	50.53	112.24	-0.15
2077	0.00	0.00	0.00	0.00	34.51	0.00	34.51	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2078	0.00	0.00	0.00	0.00	72.27	0.00	72.27	59.77	50.19	240.50	77.88	50.53	112.24	-0.15
2079	0.00	0.00	0.00	0.00	78.40	0.00	78.40	59.77	37.81	240.50	77.88	50.53	112.24	-0.15
2080	0.00	0.00	0.00	0.00	161.02	0.00	161.02	59.77	51.90	240.50	77.88	50.53	112.24	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	54.75	240.50	77.88	50.53	112.24	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.68	240.50	77.88	50.53	112.24	-0.15
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	51.90	240.50	77.88	50.53	112.24	-0.15
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	37.81	240.50	77.88	50.53	112.24	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	34.97	240.50	77.88	50.53	112.24	-0.15
Salvage Value	43.51	0.00	30.49	0.00	38.99	0.00	112.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4453.86	3154.41	462.38	0.00	607.68	0.00	8678.34	1167.65	620.27	7769.83	2507.97	769.33	2708.09	1784.43

Net Present Value: -8682

SCGT/C26

TABLE 208
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	Low
Capital Cost	High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	249.85	99.35	16.95	83.89	49.66
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	256.51	97.51	17.52	85.40	56.08
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	269.09	95.95	18.02	86.09	69.02
2018	233.71	0.00	0.35	0.00	0.00	0.00	234.06	3.44	0.00	258.12	93.30	20.13	86.64	58.04
2019	281.38	0.00	0.00	0.00	0.00	0.00	281.38	4.85	0.00	251.88	91.36	17.99	86.31	56.23
2020	288.58	0.00	117.94	0.00	0.00	0.00	406.52	6.78	0.00	257.32	91.24	12.90	88.12	65.06
2021	796.95	0.00	153.51	0.00	11.87	0.00	962.32	11.48	0.00	258.09	89.47	12.26	93.32	63.04
2022	1281.79	0.00	20.08	0.00	0.79	0.00	1302.66	17.99	3.92	252.31	87.35	21.78	94.80	48.39
2023	1153.00	0.00	0.00	0.00	1.58	0.00	1154.58	23.77	3.92	248.43	85.02	27.45	100.07	35.89
2024	824.90	0.00	0.00	0.00	3.16	0.00	828.06	27.91	3.92	255.68	83.81	30.69	105.95	35.22
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	30.80	3.92	167.25	84.20	18.76	101.32	-37.02
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	32.70	17.97	205.56	88.07	13.76	86.10	17.63
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	33.40	18.18	289.60	95.51	13.36	80.08	100.64
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	33.62	17.90	312.81	95.76	14.61	84.99	117.45
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	18.11	300.38	94.09	15.05	86.10	105.13
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.94	290.79	92.91	14.93	86.21	96.75
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.89	276.79	91.02	16.03	87.93	81.81
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.66	260.47	89.15	17.19	89.58	64.54
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.23	249.50	87.29	20.21	92.31	49.69
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.23	241.32	85.73	23.42	94.40	37.78
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.27	235.33	84.47	26.09	95.92	28.85
2036	0.00	0.00	107.91	0.00	0.00	0.00	107.91	34.16	19.95	230.29	83.43	26.43	98.14	22.29
2037	0.00	0.00	147.72	0.00	11.87	0.00	159.58	34.96	17.10	221.71	81.95	26.83	103.25	9.68
2038	0.00	0.00	22.45	0.00	0.00	0.00	22.45	35.07	21.02	214.40	80.51	40.92	101.92	-8.95
2039	0.00	0.00	110.19	0.00	0.00	0.00	110.19	35.62	21.02	206.27	79.30	43.56	110.93	-27.52
2040	0.00	0.00	152.84	0.00	93.47	0.00	246.31	36.84	21.02	199.87	77.99	43.16	117.98	-39.27
2041	0.00	0.00	134.66	0.00	0.00	0.00	134.66	37.51	24.95	190.14	76.39	60.12	116.40	-62.78
2042	0.00	0.00	152.91	0.00	0.00	0.00	152.91	38.28	24.30	181.49	75.07	67.56	119.01	-80.15
2043	0.00	0.00	136.55	0.00	0.00	0.00	136.55	38.96	28.21	176.40	73.80	75.87	123.86	-97.12
2044	0.00	0.00	155.06	0.00	78.64	0.00	233.70	40.13	28.21	169.75	72.52	76.48	133.14	-112.40
2045	0.00	0.00	23.57	0.00	0.00	0.00	23.57	40.25	32.15	163.07	71.21	105.07	125.82	-139.02
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	35.00	156.58	70.05	116.03	127.87	-157.37
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.16	150.36	68.78	117.63	138.86	-174.91
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.17	156.67	70.01	112.91	130.85	-157.10
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.17	156.67	70.01	112.91	130.85	-157.10
2050	0.00	0.00	96.51	0.00	9.69	0.00	106.21	40.25	32.18	156.67	70.01	112.91	130.85	-157.10
2051	0.00	0.00	132.08	0.00	9.69	0.00	141.77	40.25	33.89	156.67	70.01	112.91	130.85	-157.10
2052	0.00	0.00	20.08	0.00	9.69	0.00	29.77	40.25	33.90	156.67	70.01	112.91	130.85	-157.10
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	156.67	70.01	112.91	130.85	-157.10
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	156.67	70.01	112.91	130.85	-157.10
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	156.67	70.01	112.91	130.85	-157.10
2056	0.00	0.00	0.00	0.00	11.87	0.00	11.87	40.25	35.04	156.67	70.01	112.91	130.85	-157.10
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2066	0.00	0.00	107.91	0.00	0.00	0.00	107.91	40.25	35.04	156.67	70.01	112.91	130.85	-157.10
2067	0.00	0.00	147.67	0.00	0.00	0.00	147.67	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2068	0.00	0.00	22.45	0.00	0.00	0.00	22.45	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2069	0.00	0.00	110.19	0.00	0.00	0.00	110.19	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2070	0.00	0.00	150.79	0.00	0.00	0.00	150.79	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2071	0.00	0.00	134.66	0.00	0.00	0.00	134.66	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2072	0.00	0.00	152.91	0.00	12.66	0.00	165.57	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2073	0.00	0.00	136.55	0.00	1.58	0.00	138.13	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2074	0.00	0.00	155.06	0.00	3.16	0.00	158.22	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2075	0.00	0.00	23.57	0.00	77.21	0.00	100.78	40.25	47.41	156.67	70.01	112.91	130.85	-157.10
2076	0.00	0.00	0.00	0.00	3.16	0.00	3.16	40.25	35.04	156.67	70.01	112.91	130.85	-157.10
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	49.12	156.67	70.01	112.91	130.85	-157.10
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	156.67	70.01	112.91	130.85	-157.10
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	40.25	49.12	156.67	70.01	112.91	130.85	-157.10
2080	0.00	0.00	96.51	0.00	0.00	0.00	96.51	40.25	33.90	156.67	70.01	112.91	130.85	-157.10
2081	0.00	0.00	132.08	0.00	0.00	0.00	132.08	40.25	49.12	156.67	70.01	112.91	130.85	-157.10
2082	0.00	0.00	20.08	0.00	0.00	0.00	20.08	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	35.04	156.67	70.01	112.91	130.85	-157.10
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
2090	0.00	0.00	0.00	0.00	23.37	0.00	23.37	40.25	32.19	156.67	70.01	112.91	130.85	-157.10
Salvage Value	16.99	0.00	49.93	0.00	12.59	0.00	79.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	944.22	0.00	159.84	0.00	5996.54	784.10	509.81	6176.56	2365.17	1458.80	2988.30	-635.70

Net Present Value: -7926

CCGT/C26

TABLE 209
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	249.85	99.35	16.95	83.89	49.66
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	256.51	97.51	17.52	85.40	56.08
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	269.09	95.95	18.02	86.09	69.02
2018	233.71	0.00	0.35	0.00	0.00	0.00	234.06	3.44	0.00	258.12	93.30	20.13	86.64	58.04
2019	281.38	0.00	200.79	0.00	0.00	0.00	482.17	5.86	0.00	251.88	91.36	17.99	86.31	56.23
2020	288.58	0.00	312.08	0.00	0.00	0.00	600.66	8.75	0.00	257.32	91.24	12.90	88.12	65.06
2021	796.95	0.00	151.86	0.00	11.87	0.00	960.68	13.45	0.00	261.96	90.15	10.78	92.35	68.68
2022	1281.79	0.00	9.61	0.00	0.79	0.00	1292.19	19.91	6.79	261.96	87.88	31.11	85.80	57.17
2023	1153.00	0.00	0.00	0.00	1.58	0.00	1154.58	25.68	6.79	262.98	85.85	37.37	90.07	49.69
2024	824.90	0.00	0.00	0.00	3.16	0.00	828.06	29.82	6.79	277.81	84.77	45.28	94.36	53.41
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	32.72	6.79	187.99	84.31	36.21	91.85	-24.38
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	34.62	20.85	219.03	87.97	27.71	82.18	21.16
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	35.31	21.06	298.11	95.47	20.03	78.37	104.24
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	35.53	20.78	322.51	95.84	21.41	82.59	122.68
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.99	311.39	94.20	22.66	83.74	110.80
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.82	295.29	92.14	24.32	85.48	93.35
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.77	296.18	92.05	21.70	84.23	98.20
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.54	274.25	89.34	25.38	87.01	72.52
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.11	265.31	87.65	28.35	89.14	60.16
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.11	255.01	85.72	32.25	92.11	44.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.15	248.20	84.29	34.74	94.05	35.12
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	22.83	239.40	82.71	40.04	95.89	20.77
2037	0.00	0.00	108.66	0.00	0.00	0.00	108.66	36.08	19.98	235.99	81.98	41.39	96.37	16.26
2038	0.00	0.00	148.75	0.00	11.87	0.00	160.62	36.88	19.98	229.79	80.83	42.10	100.15	6.70
2039	0.00	0.00	22.60	0.00	0.00	0.00	22.60	36.99	23.90	221.03	79.12	54.74	107.34	-20.16
2040	0.00	0.00	110.96	0.00	0.00	0.00	110.96	37.55	23.90	213.57	77.74	60.89	110.00	-35.05
2041	0.00	0.00	153.89	0.00	93.47	0.00	247.36	38.77	23.90	204.75	76.46	63.16	113.83	-48.70
2042	0.00	0.00	135.60	0.00	0.00	0.00	135.60	39.45	27.18	199.34	75.15	70.58	118.46	-64.86
2043	0.00	0.00	153.98	0.00	0.00	0.00	153.98	40.22	27.18	190.21	73.80	83.74	116.83	-84.15
2044	0.00	0.00	23.41	0.00	0.00	0.00	23.41	40.34	31.09	183.92	72.51	95.63	118.94	-103.16
2045	0.00	0.00	114.90	0.00	0.00	0.00	114.90	40.91	31.09	177.28	71.24	99.30	126.02	-119.28
2046	0.00	0.00	157.24	0.00	78.64	0.00	235.88	42.09	33.95	174.54	70.35	98.65	133.53	-127.99
2047	0.00	0.00	23.90	0.00	0.00	0.00	23.90	42.21	35.03	162.03	68.81	124.07	127.00	-157.85
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.04	171.28	70.13	107.34	128.85	-135.04
2049	0.00	0.00	200.79	0.00	9.69	0.00	210.48	42.21	35.05	171.28	70.13	107.34	128.85	-135.04
2050	0.00	0.00	290.65	0.00	9.69	0.00	300.35	42.21	35.05	171.28	70.13	107.34	128.85	-135.04
2051	0.00	0.00	130.44	0.00	9.69	0.00	140.13	42.21	36.76	171.28	70.13	107.34	128.85	-135.04
2052	0.00	0.00	9.61	0.00	9.69	0.00	19.30	42.21	36.77	171.28	70.13	107.34	128.85	-135.04
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.77	171.28	70.13	107.34	128.85	-135.04
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	171.28	70.13	107.34	128.85	-135.04
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	171.28	70.13	107.34	128.85	-135.04
2056	0.00	0.00	0.00	0.00	11.87	0.00	11.87	42.21	37.92	171.28	70.13	107.34	128.85	-135.04
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	37.92	171.28	70.13	107.34	128.85	-135.04
2067	0.00	0.00	108.66	0.00	0.00	0.00	108.66	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2068	0.00	0.00	148.71	0.00	0.00	0.00	148.71	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2069	0.00	0.00	22.60	0.00	0.00	0.00	22.60	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2070	0.00	0.00	110.96	0.00	0.00	0.00	110.96	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2071	0.00	0.00	151.85	0.00	0.00	0.00	151.85	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2072	0.00	0.00	135.60	0.00	0.79	0.00	136.39	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2073	0.00	0.00	153.98	0.00	13.45	0.00	167.43	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2074	0.00	0.00	23.41	0.00	3.16	0.00	26.56	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2075	0.00	0.00	114.90	0.00	7.11	0.00	122.01	42.21	50.29	171.28	70.13	107.34	128.85	-135.04
2076	0.00	0.00	157.24	0.00	73.26	0.00	230.50	42.21	37.92	171.28	70.13	107.34	128.85	-135.04
2077	0.00	0.00	23.90	0.00	0.00	0.00	23.90	42.21	52.00	171.28	70.13	107.34	128.85	-135.04
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	171.28	70.13	107.34	128.85	-135.04
2079	0.00	0.00	200.79	0.00	0.00	0.00	200.79	42.21	52.00	171.28	70.13	107.34	128.85	-135.04
2080	0.00	0.00	290.65	0.00	0.00	0.00	290.65	42.21	36.78	171.28	70.13	107.34	128.85	-135.04
2081	0.00	0.00	130.44	0.00	58.98	0.00	189.41	42.21	52.00	171.28	70.13	107.34	128.85	-135.04
2082	0.00	0.00	9.61	0.00	0.00	0.00	9.61	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	37.92	171.28	70.13	107.34	128.85	-135.04
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	171.28	70.13	107.34	128.85	-135.04
Salvage Value	16.99	0.00	78.22	0.00	11.25	0.00	106.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	1379.07	0.00	155.13	0.00	6426.68	825.88	563.34	6479.76	2368.57	1534.58	2907.25	-330.65

Net Present Value: -8147

Wind/C26

TABLE 210
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	231.34	101.04	15.19	79.32	35.79
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	249.85	99.35	16.95	83.89	49.66
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	256.51	97.51	17.52	85.40	56.08
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	269.09	95.95	18.02	86.09	69.02
2018	233.71	0.00	0.00	0.00	0.00	0.00	233.71	3.44	0.00	258.12	93.30	20.13	86.64	58.04
2019	281.38	0.00	0.00	0.00	0.00	0.00	281.38	4.85	0.00	251.88	91.36	17.99	86.31	56.23
2020	288.58	0.00	0.00	12.59	20.40	0.00	321.57	6.46	0.00	255.17	90.85	13.85	88.43	62.04
2021	796.95	0.00	0.00	384.42	34.00	0.00	1215.37	12.54	0.00	255.42	89.07	13.48	93.26	59.61
2022	1281.79	0.00	0.00	391.62	41.59	0.00	1715.00	21.11	6.10	258.44	87.46	13.51	93.57	63.90
2023	1153.00	0.00	0.00	379.03	21.98	0.00	1554.00	28.88	12.20	262.00	85.04	15.50	96.89	64.57
2024	824.90	0.00	0.00	7.20	9.96	0.00	842.06	33.09	18.31	275.05	83.11	16.09	103.28	72.57
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	35.99	18.31	185.33	82.94	10.56	118.86	-27.03
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	37.89	32.36	238.01	86.91	12.56	85.59	52.95
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	38.58	32.58	322.68	94.33	11.33	79.90	137.12
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	38.80	32.29	342.33	94.38	12.43	84.14	151.38
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.50	331.86	92.76	12.63	86.01	140.46
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.33	323.93	91.71	12.36	85.99	133.88
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.28	315.10	90.32	12.67	87.10	125.00
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	38.80	32.05	302.74	88.91	12.70	88.04	113.08
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	31.62	288.02	87.41	12.60	89.17	98.84
2034	0.00	0.00	127.84	0.00	0.00	0.00	127.84	39.33	31.62	273.63	85.98	12.61	89.97	85.06
2035	0.00	0.00	167.05	0.00	11.87	0.00	178.92	40.12	31.66	267.74	84.98	11.52	91.22	80.02
2036	0.00	0.00	130.04	0.00	0.00	0.00	130.04	40.77	38.26	256.41	82.97	20.75	92.31	60.39
2037	0.00	0.00	147.72	0.00	11.87	0.00	159.58	41.57	35.41	247.04	81.55	23.42	94.45	47.62
2038	0.00	0.00	22.45	0.00	0.00	0.00	22.45	41.68	39.32	241.49	80.34	30.51	96.29	34.36
2039	0.00	0.00	110.19	0.00	0.00	0.00	110.19	42.23	39.32	234.47	79.18	29.72	106.70	18.87
2040	0.00	0.00	152.84	12.59	93.47	0.00	258.90	43.52	39.32	223.28	77.56	37.48	108.01	0.22
2041	0.00	0.00	134.66	384.42	0.00	0.00	519.08	46.11	43.25	216.43	76.19	46.24	110.46	-16.46
2042	0.00	0.00	152.91	391.62	0.00	0.00	544.53	48.84	42.61	208.62	74.95	48.31	115.14	-29.79
2043	0.00	0.00	136.55	379.03	0.00	0.00	515.58	51.41	46.52	203.55	73.68	54.05	120.95	-45.13
2044	0.00	0.00	155.06	7.20	78.64	0.00	240.89	52.62	46.52	192.68	72.36	66.98	118.83	-65.49
2045	0.00	0.00	23.57	0.00	0.00	0.00	23.57	52.74	50.45	185.87	71.11	78.27	121.13	-84.64
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	53.31	178.72	69.87	79.65	129.24	-100.04
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.47	172.03	68.65	80.43	139.05	-116.10
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.47	178.87	69.88	79.45	129.81	-100.26
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.48	178.87	69.88	79.45	129.81	-100.26
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.48	178.87	69.88	79.45	129.81	-100.26
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2055	0.00	0.00	0.00	0.00	5.10	0.00	5.10	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2056	0.00	0.00	0.00	0.00	8.50	0.00	8.50	52.74	53.34	178.87	69.88	79.45	129.81	-100.26
2057	0.00	0.00	0.00	0.00	10.20	0.00	10.20	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2058	0.00	0.00	0.00	0.00	5.10	0.00	5.10	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2059	0.00	0.00	0.00	0.00	1.70	0.00	1.70	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2060	0.00	0.00	0.00	12.59	0.00	0.00	12.59	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2061	0.00	0.00	0.00	384.42	0.00	0.00	384.42	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2062	0.00	0.00	0.00	391.62	0.00	0.00	391.62	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2063	0.00	0.00	0.00	379.03	0.00	0.00	379.03	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2064	0.00	0.00	106.41	7.20	0.00	0.00	113.61	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2065	0.00	0.00	145.63	0.00	0.00	0.00	145.63	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2066	0.00	0.00	130.04	0.00	0.00	0.00	130.04	52.74	53.34	178.87	69.88	79.45	129.81	-100.26
2067	0.00	0.00	147.67	0.00	0.00	0.00	147.67	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2068	0.00	0.00	22.45	0.00	0.00	0.00	22.45	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2069	0.00	0.00	110.19	0.00	0.00	0.00	110.19	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2070	0.00	0.00	150.79	0.00	27.17	0.00	177.96	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2071	0.00	0.00	134.66	0.00	25.50	0.00	160.16	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2072	0.00	0.00	152.91	0.00	43.26	0.00	196.17	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2073	0.00	0.00	136.55	0.00	16.88	0.00	153.43	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2074	0.00	0.00	155.06	0.00	8.26	0.00	163.32	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2075	0.00	0.00	23.57	0.00	77.21	0.00	100.78	52.74	65.72	178.87	69.88	79.45	129.81	-100.26
2076	0.00	0.00	0.00	0.00	3.16	0.00	3.16	52.74	53.34	178.87	69.88	79.45	129.81	-100.26
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	67.43	178.87	69.88	79.45	129.81	-100.26
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	52.74	67.43	178.87	69.88	79.45	129.81	-100.26
2080	0.00	0.00	0.00	12.59	0.00	0.00	12.59	52.74	52.20	178.87	69.88	79.45	129.81	-100.26
2081	0.00	0.00	0.00	384.42	0.00	0.00	384.42	52.74	67.43	178.87	69.88	79.45	129.81	-100.26
2082	0.00	0.00	0.00	391.62	0.00	0.00	391.62	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2083	0.00	0.00	0.00	379.03	0.00	0.00	379.03	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2084	0.00	0.00	0.00	7.20	9.69	0.00	16.89	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	53.34	178.87	69.88	79.45	129.81	-100.26
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
2090	0.00	0.00	0.00	0.00	23.37	0.00	23.37	52.74	50.50	178.87	69.88	79.45	129.81	-100.26
Salvage Value	16.99	0.00	38.97	59.57	18.14	0.00	133.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	831.20	1678.05	266.07	0.00	7667.81	969.83	850.83	6705.70	2357.13	1068.48	2951.56	328.54

Net Present Value -9160

K19/C25/750MW (WPS Sale &Inv)

TABLE 211
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	2.97	249.43	1.25	0.00	238.00	101.04	15.21	79.47	42.28
2015	83.73	439.66	0.00	0.00	16.69	5.29	545.38	3.97	0.00	255.59	99.38	16.95	83.91	55.35
2016	166.43	579.79	0.00	0.00	22.08	13.33	781.64	7.88	0.00	263.34	97.53	17.51	85.46	62.84
2017	191.52	700.61	0.00	0.00	31.35	19.36	942.85	12.60	0.00	274.82	95.63	18.70	86.70	73.79
2018	228.68	492.58	0.00	0.00	30.79	81.40	833.45	16.76	0.00	267.87	93.59	19.58	86.56	68.13
2019	232.37	351.28	0.00	0.00	38.97	66.51	689.13	20.21	12.78	283.25	93.51	18.47	85.37	85.90
2020	638.66	143.03	0.00	0.00	2.50	125.91	910.10	24.76	44.08	441.59	100.52	13.16	92.75	235.16
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	30.27	42.24	516.02	101.06	14.52	97.25	303.19
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	34.93	40.92	517.07	99.86	14.58	98.26	304.37
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	38.32	39.11	507.74	97.57	14.45	100.82	294.90
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	40.80	37.57	507.16	95.36	16.05	106.11	289.64
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	42.59	50.01	451.64	99.78	14.36	89.42	248.09
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	43.49	48.49	590.38	107.64	14.29	88.97	379.47
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	43.66	47.09	619.79	107.86	14.01	93.96	403.96
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	46.10	620.49	106.23	14.51	95.59	404.16
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	47.36	610.02	104.35	14.51	97.34	393.82
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	42.28	603.95	103.02	14.19	98.33	388.40
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	40.98	596.21	101.41	14.53	99.92	380.35
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	39.52	584.84	99.74	14.55	101.52	369.04
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	38.53	571.13	97.98	14.52	103.24	355.39
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	37.61	557.34	96.29	14.58	104.78	341.70
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	38.86	506.68	94.64	14.42	102.79	294.83
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	35.47	429.41	93.02	14.66	95.94	225.79
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	43.66	34.96	404.23	91.43	14.76	96.63	201.41
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	34.46	388.54	89.82	14.70	99.13	184.88
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	43.91	36.82	373.88	88.24	14.66	108.00	162.98
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	44.28	33.50	353.42	86.99	13.93	112.49	140.01
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	44.33	36.31	335.68	85.03	23.94	112.54	114.16
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	44.58	35.87	325.73	83.53	26.82	115.09	100.29
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	44.96	35.44	317.99	82.20	28.38	118.47	88.95
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	45.26	40.65	315.02	81.00	32.71	122.66	78.64
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.86	43.10	297.96	79.21	41.28	122.43	55.05
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.91	43.79	290.07	77.80	50.52	124.75	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	42.56	281.92	76.54	52.89	129.08	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	41.34	289.98	77.85	48.23	125.42	38.49
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	45.91	43.83	289.98	77.85	48.23	125.42	38.49
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	45.91	42.36	289.98	77.85	48.23	125.42	38.49
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	45.91	42.03	289.98	77.85	48.23	125.42	38.49
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	45.91	41.72	289.98	77.85	48.23	125.42	38.49
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	45.91	41.42	289.98	77.85	48.23	125.42	38.49
2054	0.00	0.00	0.00	0.00	13.57	14.35	27.92	45.91	41.12	289.98	77.85	48.23	125.42	38.49
2055	0.00	0.00	0.00	0.00	0.62	14.88	15.49	45.91	41.96	289.98	77.85	48.23	125.42	38.49
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.91	54.06	289.98	77.85	48.23	125.42	38.49
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	45.91	38.57	289.98	77.85	48.23	125.42	38.49
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	45.91	53.53	289.98	77.85	48.23	125.42	38.49
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	45.91	40.90	289.98	77.85	48.23	125.42	38.49
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	45.91	50.37	289.98	77.85	48.23	125.42	38.49
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	65.59	289.98	77.85	48.23	125.42	38.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	45.91	65.59	289.98	77.85	48.23	125.42	38.49
2065	0.00	0.00	0.00	0.00	6.68	3.24	9.92	45.91	37.99	289.98	77.85	48.23	125.42	38.49
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	45.91	65.59	289.98	77.85	48.23	125.42	38.49
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	45.91	65.59	289.98	77.85	48.23	125.42	38.49
2069	0.00	0.00	49.93	0.00	25.40	43.73	119.06	45.91	37.99	289.98	77.85	48.23	125.42	38.49
2070	0.00	0.00	67.93	0.00	1.89	45.35	115.16	45.91	52.08	289.98	77.85	48.23	125.42	38.49
2071	0.00	0.00	10.26	0.00	23.04	0.00	33.31	45.91	36.85	289.98	77.85	48.23	125.42	38.49
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	45.91	52.08	289.98	77.85	48.23	125.42	38.49
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	45.91	36.00	289.98	77.85	48.23	125.42	38.49
2074	0.00	0.00	60.48	0.00	36.24	0.00	96.72	45.91	50.37	289.98	77.85	48.23	125.42	38.49
2075	0.00	0.00	68.27	0.00	53.67	0.00	121.94	45.91	37.99	289.98	77.85	48.23	125.42	38.49
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	45.91	52.08	289.98	77.85	48.23	125.42	38.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	36.85	289.98	77.85	48.23	125.42	38.49
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	45.91	52.08	289.98	77.85	48.23	125.42	38.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	39.70	289.98	77.85	48.23	125.42	38.49
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	45.91	52.08	289.98	77.85	48.23	125.42	38.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	45.91	37.99	289.98	77.85	48.23	125.42	38.49
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	45.91	35.14	289.98	77.85	48.23	125.42	38.49
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	45.91	37.99	289.98	77.85	48.23	125.42	38.49
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	45.91	37.99	289.98	77.85	48.23	125.42	38.49
Salvage Value	6.76	0.00	13.89	0.00	26.13	12.50	59.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	213.74	0.00	419.51	302.60	7601.58	1036.41	974.39	11022.41	2592.32	742.12	2984.79	4703.18

Net Present Value -4909

K19/C25/750MW

TABLE 212
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	4.21	250.66	1.25	0.00	230.96	101.05	15.21	79.33	35.37
2015	83.73	439.66	0.00	0.00	16.69	6.77	546.86	3.99	0.00	248.76	99.37	16.94	83.90	48.55
2016	166.43	579.79	0.00	0.00	22.08	13.97	782.28	7.90	0.00	255.33	97.52	17.49	85.43	54.89
2017	191.52	700.61	0.00	0.00	31.35	19.36	942.85	12.61	0.00	265.56	95.62	18.70	86.67	64.56
2018	228.68	492.58	0.00	0.00	30.79	116.38	868.43	16.96	0.00	257.37	93.58	19.55	86.59	57.64
2019	232.37	351.28	0.00	0.00	38.97	79.16	701.79	20.46	12.78	271.47	93.50	18.44	85.39	74.14
2020	638.66	143.03	0.00	0.00	2.50	224.44	1008.63	25.51	47.15	419.78	100.52	13.14	92.65	213.46
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	31.02	45.41	503.54	101.06	14.62	97.32	290.53
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	35.67	44.12	507.07	99.85	14.58	98.28	294.36
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	39.07	42.17	498.40	97.56	14.45	100.85	285.54
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	41.55	40.51	499.09	95.34	16.09	106.16	281.49
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	43.33	52.82	442.73	99.78	14.38	89.41	239.17
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	44.24	51.19	544.80	107.63	14.34	87.15	335.68
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	44.41	49.67	540.95	107.87	13.93	89.45	329.70
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	48.57	538.70	106.23	14.49	90.74	327.25
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	49.73	529.84	104.34	14.50	92.57	318.43
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	44.54	525.18	103.00	14.22	93.73	314.23
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	43.14	519.12	101.39	14.60	95.40	307.73
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	41.59	509.50	99.73	14.61	97.27	297.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	40.50	497.61	97.98	14.50	99.17	285.95
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	39.49	485.70	96.30	14.55	100.99	273.86
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	40.66	419.87	94.67	14.58	94.32	216.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	37.19	395.81	93.03	14.72	94.74	193.32
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	44.41	36.60	381.75	91.41	14.71	96.66	178.96
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	36.04	366.86	89.82	14.68	99.12	163.24
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	44.66	38.33	352.96	88.24	14.69	107.95	142.08
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	45.03	34.95	349.24	86.99	13.94	112.46	135.85
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	45.08	37.70	335.68	85.03	23.94	112.53	114.18
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	45.33	37.20	325.73	83.53	26.82	115.08	100.30
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	45.71	36.72	318.00	82.20	28.38	118.47	88.96
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	46.01	41.87	315.04	81.00	32.71	122.65	78.66
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	46.61	44.26	297.94	79.21	41.28	122.40	55.06
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	46.66	44.90	290.01	77.80	50.52	124.70	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	43.62	281.88	76.54	52.89	129.04	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	42.35	289.95	77.85	48.23	125.38	38.49
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	46.66	44.80	289.95	77.85	48.23	125.38	38.49
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	46.66	43.28	289.95	77.85	48.23	125.38	38.49
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	46.66	42.91	289.95	77.85	48.23	125.38	38.49
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	46.66	42.55	289.95	77.85	48.23	125.38	38.49
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	46.66	42.21	289.95	77.85	48.23	125.38	38.49
2054	0.00	0.00	0.00	0.00	13.57	14.35	27.92	46.66	41.87	289.95	77.85	48.23	125.38	38.49
2055	0.00	0.00	0.00	0.00	0.62	14.88	15.49	46.66	42.68	289.95	77.85	48.23	125.38	38.49
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	46.66	54.74	289.95	77.85	48.23	125.38	38.49
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	46.66	39.21	289.95	77.85	48.23	125.38	38.49
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	46.66	54.14	289.95	77.85	48.23	125.38	38.49
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	46.66	41.48	289.95	77.85	48.23	125.38	38.49
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	46.66	50.37	289.95	77.85	48.23	125.38	38.49
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	65.59	289.95	77.85	48.23	125.38	38.49
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	46.66	65.59	289.95	77.85	48.23	125.38	38.49
2065	0.00	0.00	0.00	0.00	6.68	3.24	9.92	46.66	37.99	289.95	77.85	48.23	125.38	38.49
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	46.66	65.59	289.95	77.85	48.23	125.38	38.49
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	46.66	65.59	289.95	77.85	48.23	125.38	38.49
2069	0.00	0.00	49.93	0.00	25.40	43.73	119.06	46.66	37.99	289.95	77.85	48.23	125.38	38.49
2070	0.00	0.00	67.93	0.00	1.89	45.35	115.16	46.66	52.08	289.95	77.85	48.23	125.38	38.49
2071	0.00	0.00	10.26	0.00	23.04	0.00	33.31	46.66	36.85	289.95	77.85	48.23	125.38	38.49
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	46.66	52.08	289.95	77.85	48.23	125.38	38.49
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	46.66	36.00	289.95	77.85	48.23	125.38	38.49
2074	0.00	0.00	60.48	0.00	36.24	0.00	96.72	46.66	50.37	289.95	77.85	48.23	125.38	38.49
2075	0.00	0.00	68.27	0.00	53.67	0.00	121.94	46.66	37.99	289.95	77.85	48.23	125.38	38.49
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	46.66	52.08	289.95	77.85	48.23	125.38	38.49
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	36.85	289.95	77.85	48.23	125.38	38.49
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	46.66	52.08	289.95	77.85	48.23	125.38	38.49
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	39.70	289.95	77.85	48.23	125.38	38.49
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	46.66	52.08	289.95	77.85	48.23	125.38	38.49
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	46.66	37.99	289.95	77.85	48.23	125.38	38.49
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	46.66	35.14	289.95	77.85	48.23	125.38	38.49
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	46.66	37.99	289.95	77.85	48.23	125.38	38.49
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	46.66	37.99	289.95	77.85	48.23	125.38	38.49
Salvage Value	6.76	0.00	13.89	0.00	26.13	12.50	59.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	213.74	0.00	419.51	428.11	7727.09	1053.94	1010.79	10436.83	2592.24	742.28	2957.55	4144.76

Net Present Value -5647

K19/Gas25/750MW (WPS Sale & INV)

TABLE 213
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	2.97	219.60	1.10	0.00	238.00	101.04	15.21	79.47	42.28
2015	0.00	439.66	0.00	0.00	16.69	5.29	461.65	3.41	0.00	255.60	99.38	16.95	83.91	55.36
2016	0.00	579.79	0.00	0.00	22.08	13.33	615.21	6.48	0.00	263.37	97.53	17.50	85.46	62.88
2017	0.00	700.61	0.00	0.00	31.35	19.36	751.32	10.24	0.00	275.01	95.62	18.69	86.67	74.02
2018	0.00	492.58	0.00	0.00	30.79	81.40	604.76	13.26	0.00	268.17	93.59	19.54	86.53	68.50
2019	0.00	351.28	0.00	0.00	36.48	66.51	454.27	15.53	12.78	283.75	93.51	18.46	85.36	86.42
2020	0.00	143.03	0.00	0.00	0.01	125.91	268.95	16.88	44.08	442.30	100.52	13.15	92.71	235.92
2021	0.00	49.49	0.35	0.00	0.00	0.00	49.84	17.13	42.24	517.27	101.06	14.51	97.17	304.52
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.13	40.92	518.47	99.85	14.55	98.16	305.90
2023	0.00	0.00	70.57	0.00	0.00	0.00	70.57	17.37	39.11	507.99	97.11	15.42	101.32	294.14
2024	0.00	0.00	137.47	0.00	6.64	0.00	144.10	17.99	37.57	509.45	95.04	16.96	106.44	291.00
2025	0.00	0.00	79.06	0.00	52.27	0.00	131.32	18.63	39.87	400.63	94.71	16.37	98.17	191.38
2026	0.00	0.00	59.40	0.00	0.00	0.00	59.40	18.93	42.07	428.52	93.41	19.40	101.03	214.68
2027	0.00	0.00	67.05	0.00	0.00	0.00	67.05	19.26	40.80	427.79	91.48	19.03	105.39	211.89
2028	0.00	0.00	10.13	0.00	0.00	0.00	10.13	19.31	43.51	420.30	89.20	27.96	107.99	195.16
2029	0.00	0.00	49.44	0.00	0.00	0.00	49.44	19.56	44.95	411.19	87.46	31.30	110.99	181.44
2030	0.00	0.00	67.25	0.00	43.97	0.00	111.22	20.12	39.91	409.54	86.39	34.37	113.44	175.34
2031	0.00	0.00	59.70	0.00	0.00	0.00	59.70	20.42	42.71	413.16	86.00	37.36	114.33	175.47
2032	0.00	0.00	67.39	0.00	0.00	0.00	67.39	20.75	41.62	400.27	83.71	44.56	118.82	153.19
2033	0.00	0.00	10.18	0.00	0.00	0.00	10.18	20.80	44.48	394.32	82.20	53.42	121.83	136.88
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	43.45	390.86	81.44	55.81	123.74	129.88
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	42.03	322.16	79.36	54.02	119.25	69.53
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	41.50	230.87	77.93	55.02	107.60	-9.68
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	40.99	206.44	76.54	60.37	108.14	-38.61
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	40.49	203.32	75.80	59.00	113.48	-44.96
2039	0.00	0.00	100.42	0.00	0.00	0.00	100.42	21.31	42.85	184.27	73.92	70.59	119.98	-80.23
2040	0.00	0.00	144.49	0.00	0.00	0.00	144.49	22.03	39.54	165.30	72.60	78.14	122.89	-108.34
2041	0.00	0.00	64.46	0.00	6.64	0.00	71.09	22.38	39.08	167.69	72.81	76.51	122.62	-104.26
2042	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.41	45.44	184.13	70.66	109.91	124.27	-120.72
2043	0.00	0.00	50.13	0.00	0.00	0.00	50.13	22.66	45.01	170.85	68.96	120.28	128.15	-146.54
2044	0.00	0.00	68.20	0.00	43.97	0.00	112.17	23.22	46.30	155.44	67.39	128.60	132.03	-172.58
2045	0.00	0.00	32.40	0.00	0.00	0.00	32.40	23.38	49.83	148.49	66.08	143.52	135.06	-196.18
2046	0.00	0.00	30.06	0.00	0.00	0.00	30.06	23.53	49.44	140.48	64.90	155.71	138.06	-218.19
2047	0.00	0.00	4.54	0.00	0.00	0.00	4.54	23.55	49.62	137.21	64.09	160.73	143.63	-231.25
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	48.40	142.06	65.02	153.32	138.92	-215.20
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	23.55	50.90	142.06	65.02	153.32	138.92	-215.20
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	23.55	47.72	142.06	65.02	153.32	138.92	-215.20
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	23.55	47.40	142.06	65.02	153.32	138.92	-215.20
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	23.55	47.08	142.06	65.02	153.32	138.92	-215.20
2053	0.00	0.00	49.14	0.00	15.88	14.35	79.37	23.55	46.77	142.06	65.02	153.32	138.92	-215.20
2054	0.00	0.00	116.04	0.00	12.96	14.35	143.34	23.55	46.47	142.06	65.02	153.32	138.92	-215.20
2055	0.00	0.00	77.02	0.00	0.00	14.88	91.89	23.55	46.18	142.06	65.02	153.32	138.92	-215.20
2056	0.00	0.00	59.40	0.00	0.00	0.00	59.40	23.55	61.13	142.06	65.02	153.32	138.92	-215.20
2057	0.00	0.00	67.05	0.00	0.00	0.00	67.05	23.55	45.63	142.06	65.02	153.32	138.92	-215.20
2058	0.00	0.00	10.13	0.00	0.00	0.00	10.13	23.55	60.60	142.06	65.02	153.32	138.92	-215.20
2059	0.00	0.00	49.44	0.00	6.64	0.00	56.07	23.55	47.96	142.06	65.02	153.32	138.92	-215.20
2060	0.00	0.00	67.25	0.00	39.20	0.00	106.45	23.55	57.43	142.06	65.02	153.32	138.92	-215.20
2061	0.00	0.00	59.70	0.00	0.00	0.00	59.70	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2062	0.00	0.00	67.39	0.00	0.00	0.00	67.39	23.55	57.43	142.06	65.02	153.32	138.92	-215.20
2063	0.00	0.00	10.18	0.00	0.00	0.00	10.18	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	23.55	57.43	142.06	65.02	153.32	138.92	-215.20
2065	0.00	0.00	0.00	0.00	39.66	3.24	42.90	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	23.55	57.43	142.06	65.02	153.32	138.92	-215.20
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	23.55	57.43	142.06	65.02	153.32	138.92	-215.20
2069	0.00	0.00	100.42	0.00	23.52	43.73	167.66	23.55	45.05	142.06	65.02	153.32	138.92	-215.20
2070	0.00	0.00	144.49	0.00	0.01	45.35	189.85	23.55	43.92	142.06	65.02	153.32	138.92	-215.20
2071	0.00	0.00	64.46	0.00	0.00	0.00	64.46	23.55	43.92	142.06	65.02	153.32	138.92	-215.20
2072	0.00	0.00	4.72	0.00	0.00	0.00	4.72	23.55	43.92	142.06	65.02	153.32	138.92	-215.20
2073	0.00	0.00	50.13	0.00	0.00	0.00	50.13	23.55	43.06	142.06	65.02	153.32	138.92	-215.20
2074	0.00	0.00	68.20	0.00	0.00	0.00	68.20	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2075	0.00	0.00	32.40	0.00	13.07	0.00	45.47	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2076	0.00	0.00	30.06	0.00	6.64	0.00	36.70	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2077	0.00	0.00	4.54	0.00	0.00	0.00	4.54	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	23.55	45.05	142.06	65.02	153.32	138.92	-215.20
2080	0.00	0.00	0.00	0.00	10.99	0.00	10.99	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2083	0.00	0.00	49.14	0.00	0.00	0.00	49.14	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2084	0.00	0.00	116.04	0.00	10.26	0.53	126.83	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2085	0.00	0.00	77.02	0.00	10.01	1.06	88.09	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2086	0.00	0.00	59.40	0.00	21.28	3.19	83.87	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2087	0.00	0.00	67.05	0.00	24.39	4.78	96.22	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2088	0.00	0.00	10.13	0.00	15.88	14.35	40.36	23.55	42.21	142.06	65.02	153.32	138.92	-215.20
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	23.55	45.05	142.06	65.02	153.32	138.92	-215.20
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	23.55	45.05	142.06	65.02	153.32	138.92	-215.20
Salvage Value	0.00	0.00	45.82	0.00	15.10	12.50	73.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	864.04	0.00	283.12	302.60	4137.31	528.20	1020.30	7956.88	2331.17	2023.06	3236.90	365.75

Net Present Value -5320

K19/C31/750MW

TABLE 214
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	198.32	0.00	0.00	18.31	4.21	250.04	1.25	0.00	230.96	101.05	15.21	79.33	35.37
2015	36.79	439.66	0.00	0.00	16.69	6.77	499.92	3.75	0.00	248.76	99.37	16.94	83.90	48.55
2016	10.34	579.79	0.00	0.00	22.08	13.97	626.18	6.88	0.00	255.33	97.52	17.49	85.43	54.89
2017	10.37	700.61	0.00	0.00	31.35	19.36	761.69	10.69	0.00	265.80	95.61	18.70	86.67	64.81
2018	12.29	492.58	0.00	0.00	30.79	116.38	652.04	13.95	0.00	257.66	93.57	19.54	86.56	57.98
2019	12.32	351.28	0.00	0.00	36.48	79.16	479.24	16.35	12.78	271.92	93.49	18.48	85.38	74.57
2020	12.36	143.03	0.00	0.00	0.01	224.44	379.84	18.24	47.15	420.55	100.51	13.17	92.64	214.22
2021	15.59	49.49	0.00	0.00	0.00	0.00	65.07	18.57	45.41	504.61	101.05	14.59	97.22	291.75
2022	146.66	0.00	0.00	0.00	0.00	0.00	146.66	19.30	44.12	508.59	99.87	14.56	98.17	295.98
2023	225.28	0.00	0.00	0.00	0.00	0.00	225.28	20.43	42.17	498.25	97.01	15.60	101.60	284.03
2024	241.57	0.00	0.00	0.00	0.00	0.00	241.57	21.64	40.51	500.15	94.87	17.36	107.07	280.85
2025	244.26	0.00	0.00	0.00	2.50	0.00	246.76	22.87	38.77	389.60	94.73	12.59	103.80	178.48
2026	657.87	0.00	0.00	0.00	2.50	0.00	660.37	26.17	36.92	374.43	92.87	12.99	112.40	156.18
2027	1040.67	0.00	0.00	0.00	30.45	0.00	1071.12	31.53	35.54	334.25	90.98	12.20	110.84	120.23
2028	931.65	0.00	0.00	0.00	15.94	0.00	947.58	36.27	34.22	321.68	89.41	12.67	120.02	99.57
2029	663.37	0.00	0.00	0.00	26.88	0.00	690.24	39.72	35.55	312.54	87.83	13.05	130.71	80.95
2030	458.09	0.00	0.00	0.00	46.73	0.00	504.82	42.24	30.41	310.10	86.53	13.36	139.20	71.01
2031	300.01	0.00	0.00	0.00	61.85	0.00	361.86	44.05	43.23	355.80	90.47	15.48	91.84	158.01
2032	110.18	0.00	0.00	0.00	72.44	0.00	182.62	44.96	42.25	465.28	97.37	15.22	91.40	261.29
2033	34.67	0.00	0.00	0.00	0.00	0.00	34.67	45.14	40.96	499.42	98.07	14.88	99.17	287.29
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	40.05	485.74	96.31	14.54	100.97	273.92
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	38.37	419.31	94.67	14.50	94.26	215.88
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	37.71	395.72	93.03	14.81	94.67	193.21
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	45.14	36.95	381.91	91.42	14.75	96.63	179.11
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	36.03	366.89	89.82	14.67	99.10	163.30
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	45.39	38.39	353.00	88.24	14.68	107.93	142.16
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	45.76	35.12	349.24	86.99	13.94	112.46	135.85
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	45.81	41.20	335.68	85.03	23.94	112.53	114.18
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	46.06	37.85	325.73	83.53	26.82	115.08	100.30
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	46.44	37.36	318.00	82.20	28.38	118.47	88.96
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	46.74	42.52	315.04	81.00	32.71	122.65	78.66
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	47.34	42.06	297.94	79.21	41.28	122.40	55.06
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	47.39	45.55	290.01	77.80	50.52	124.70	37.00
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	43.62	281.88	76.54	52.89	129.04	23.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	42.35	289.95	77.85	48.23	125.38	38.49
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	47.39	44.80	289.95	77.85	48.23	125.38	38.49
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	47.39	41.57	289.95	77.85	48.23	125.38	38.49
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	47.39	44.05	289.95	77.85	48.23	125.38	38.49
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	47.39	40.84	289.95	77.85	48.23	125.38	38.49
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	47.39	40.50	289.95	77.85	48.23	125.38	38.49
2054	0.00	0.00	0.00	0.00	12.96	14.35	27.30	47.39	40.16	289.95	77.85	48.23	125.38	38.49
2055	0.00	0.00	0.00	0.00	0.00	14.88	14.88	47.39	39.83	289.95	77.85	48.23	125.38	38.49
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	56.45	289.95	77.85	48.23	125.38	38.49
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	40.92	289.95	77.85	48.23	125.38	38.49
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	55.85	289.95	77.85	48.23	125.38	38.49
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	43.18	289.95	77.85	48.23	125.38	38.49
2060	0.00	0.00	0.00	0.00	0.62	0.00	0.62	47.39	52.08	289.95	77.85	48.23	125.38	38.49
2061	0.00	0.00	0.00	0.00	0.62	0.00	0.62	47.39	37.99	289.95	77.85	48.23	125.38	38.49
2062	0.00	0.00	0.00	0.00	7.40	0.00	7.40	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2063	0.00	0.00	0.00	0.00	3.70	0.00	3.70	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2064	0.00	0.00	0.00	0.00	14.22	1.62	15.84	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2065	0.00	0.00	0.00	0.00	17.17	3.24	20.41	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2066	0.00	0.00	0.00	0.00	15.61	9.72	25.33	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2067	0.00	0.00	0.00	0.00	24.86	14.58	39.44	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	47.39	65.59	289.95	77.85	48.23	125.38	38.49
2069	0.00	0.00	49.93	0.00	23.52	43.73	117.18	47.39	37.99	289.95	77.85	48.23	125.38	38.49
2070	0.00	0.00	67.93	0.00	0.01	45.35	113.28	47.39	52.08	289.95	77.85	48.23	125.38	38.49
2071	0.00	0.00	10.26	0.00	0.00	0.00	10.26	47.39	39.70	289.95	77.85	48.23	125.38	38.49
2072	0.00	0.00	50.08	0.00	0.00	0.00	50.08	47.39	52.08	289.95	77.85	48.23	125.38	38.49
2073	0.00	0.00	68.13	0.00	0.00	0.00	68.13	47.39	36.00	289.95	77.85	48.23	125.38	38.49
2074	0.00	0.00	60.48	0.00	0.00	0.00	60.48	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2075	0.00	0.00	68.27	0.00	8.52	0.00	76.78	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2076	0.00	0.00	10.31	0.00	1.88	0.00	12.20	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2077	0.00	0.00	0.00	0.00	23.04	0.00	23.04	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2078	0.00	0.00	0.00	0.00	18.87	0.00	18.87	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2079	0.00	0.00	0.00	0.00	20.70	0.00	20.70	47.39	37.99	289.95	77.85	48.23	125.38	38.49
2080	0.00	0.00	0.00	0.00	75.44	0.00	75.44	47.39	50.37	289.95	77.85	48.23	125.38	38.49
2081	0.00	0.00	0.00	0.00	47.04	0.00	47.04	47.39	37.99	289.95	77.85	48.23	125.38	38.49
2082	0.00	0.00	0.00	0.00	54.55	0.00	54.55	47.39	52.08	289.95	77.85	48.23	125.38	38.49
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	36.85	289.95	77.85	48.23	125.38	38.49
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	47.39	52.08	289.95	77.85	48.23	125.38	38.49
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	47.39	36.85	289.95	77.85	48.23	125.38	38.49
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	47.39	52.08	289.95	77.85	48.23	125.38	38.49
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	47.39	35.14	289.95	77.85	48.23	125.38	38.49
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	47.39	37.99	289.95	77.85	48.23	125.38	38.49
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	47.39	37.99	289.95	77.85	48.23	125.38	38.49
Salvage Value	48.98	0.00	13.89	0.00	29.11	12.50	104.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3336.80	2687.55	213.74	0.00	375.76	428.11	7041.96	954.59	953.49	9641.31	2529.12	739.28	3062.70	3310.20

Net Present Value -5640

K19/Gas31/750MW

TABLE 215
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	4.21	220.83	1.10	0.00	230.96	101.05	15.21	79.33	35.37
2015	0.00	439.66	0.00	0.00	16.69	6.77	463.13	3.42	0.00	248.76	99.37	16.94	83.90	48.55
2016	0.00	579.79	0.00	0.00	22.08	13.97	615.84	6.50	0.00	255.33	97.52	17.49	85.43	54.89
2017	0.00	700.61	0.00	0.00	31.35	19.36	751.32	10.26	0.00	265.80	95.61	18.70	86.67	64.81
2018	0.00	492.58	0.00	0.00	30.79	116.38	639.75	13.45	0.00	257.66	93.57	19.54	86.56	57.98
2019	0.00	351.28	0.00	0.00	36.48	79.16	466.92	15.79	12.78	271.92	93.49	18.48	85.38	74.57
2020	0.00	143.03	0.00	0.00	0.01	224.44	367.48	17.63	47.15	420.55	100.51	13.17	92.64	214.22
2021	0.00	49.49	0.00	0.00	0.00	0.00	49.49	17.87	45.41	504.61	101.05	14.59	97.22	291.75
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	44.12	508.55	99.86	14.58	98.19	295.92
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	42.17	498.52	97.01	15.60	101.58	284.32
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	40.51	500.67	94.87	17.37	107.05	281.38
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	38.77	390.86	94.73	12.60	103.99	179.54
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	36.92	376.77	92.86	13.08	112.80	158.03
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.87	35.54	337.25	90.97	12.25	111.18	122.86
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.87	34.22	326.22	89.40	12.68	120.81	103.33
2029	0.00	0.00	120.30	0.00	0.00	0.00	120.30	18.37	35.55	316.41	87.88	12.86	130.70	84.98
2030	0.00	0.00	205.42	0.00	13.27	0.00	218.69	19.35	30.41	317.48	87.29	11.40	136.90	81.90
2031	0.00	0.00	89.68	0.00	52.27	0.00	141.95	20.05	37.01	309.96	85.20	25.42	108.12	91.23
2032	0.00	0.00	59.76	0.00	0.00	0.00	59.76	20.35	39.74	303.27	83.64	32.39	110.34	76.90
2033	0.00	0.00	67.45	0.00	0.00	0.00	67.45	20.69	38.59	294.71	82.23	35.74	112.96	63.79
2034	0.00	0.00	10.19	0.00	0.00	0.00	10.19	20.74	41.38	294.21	81.44	38.65	115.71	58.41
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.74	39.87	221.82	79.38	46.24	105.44	-9.23
2036	0.00	0.00	100.12	0.00	0.00	0.00	100.12	21.24	39.26	200.50	77.98	50.67	105.91	-34.06
2037	0.00	0.00	144.06	0.00	0.00	0.00	144.06	21.96	38.68	191.15	76.68	55.55	108.20	-49.29
2038	0.00	0.00	64.26	0.00	43.97	0.00	108.23	22.50	38.12	194.32	76.53	50.82	113.25	-46.28
2039	0.00	0.00	4.71	0.00	0.00	0.00	4.71	22.53	47.22	207.07	74.36	85.21	117.52	-70.01
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.53	43.85	193.54	72.52	93.73	121.29	-93.99
2041	0.00	0.00	50.03	0.00	0.00	0.00	50.03	22.78	43.33	183.72	71.08	102.21	124.40	-113.97
2042	0.00	0.00	168.78	0.00	0.00	0.00	168.78	23.62	42.83	174.30	69.76	111.46	127.39	-134.31
2043	0.00	0.00	155.21	0.00	0.00	0.00	155.21	24.40	46.26	171.07	68.91	119.12	130.49	-147.45
2044	0.00	0.00	64.65	0.00	43.97	0.00	108.62	24.94	47.51	168.43	68.55	111.40	136.67	-148.19
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.96	53.86	178.73	66.67	150.42	131.97	-170.34
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	53.43	170.03	65.49	159.20	134.89	-189.54
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	52.15	159.46	64.26	168.82	137.89	-211.50
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	50.88	169.41	65.47	159.48	134.92	-190.46
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	24.96	53.33	169.41	65.47	159.48	134.92	-190.46
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	24.96	50.10	169.41	65.47	159.48	134.92	-190.46
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	24.96	49.74	169.41	65.47	159.48	134.92	-190.46
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	24.96	49.38	169.41	65.47	159.48	134.92	-190.46
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	24.96	49.03	169.41	65.47	159.48	134.92	-190.46
2054	0.00	0.00	0.00	0.00	12.96	14.35	27.30	24.96	48.69	169.41	65.47	159.48	134.92	-190.46
2055	0.00	0.00	0.00	0.00	0.00	14.88	14.88	24.96	48.36	169.41	65.47	159.48	134.92	-190.46
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	63.27	169.41	65.47	159.48	134.92	-190.46
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	47.74	169.41	65.47	159.48	134.92	-190.46
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	62.67	169.41	65.47	159.48	134.92	-190.46
2059	0.00	0.00	98.87	0.00	0.00	0.00	98.87	24.96	50.00	169.41	65.47	159.48	134.92	-190.46
2060	0.00	0.00	183.99	0.00	0.00	0.00	183.99	24.96	58.90	169.41	65.47	159.48	134.92	-190.46
2061	0.00	0.00	87.64	0.00	0.00	0.00	87.64	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2062	0.00	0.00	59.76	0.00	0.00	0.00	59.76	24.96	58.90	169.41	65.47	159.48	134.92	-190.46
2063	0.00	0.00	67.45	0.00	0.00	0.00	67.45	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2064	0.00	0.00	10.19	0.00	8.05	1.62	19.86	24.96	58.90	169.41	65.47	159.48	134.92	-190.46
2065	0.00	0.00	0.00	0.00	19.96	3.24	23.20	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2066	0.00	0.00	100.12	0.00	40.00	9.72	149.84	24.96	58.90	169.41	65.47	159.48	134.92	-190.46
2067	0.00	0.00	144.06	0.00	6.97	14.58	165.61	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2068	0.00	0.00	64.26	0.00	14.91	43.73	122.90	24.96	58.90	169.41	65.47	159.48	134.92	-190.46
2069	0.00	0.00	4.71	0.00	23.52	43.73	71.96	24.96	46.52	169.41	65.47	159.48	134.92	-190.46
2070	0.00	0.00	0.00	0.00	0.01	45.35	45.36	24.96	45.38	169.41	65.47	159.48	134.92	-190.46
2071	0.00	0.00	50.03	0.00	0.00	0.00	50.03	24.96	45.38	169.41	65.47	159.48	134.92	-190.46
2072	0.00	0.00	168.78	0.00	0.00	0.00	168.78	24.96	45.38	169.41	65.47	159.48	134.92	-190.46
2073	0.00	0.00	155.21	0.00	32.98	0.00	188.19	24.96	44.53	169.41	65.47	159.48	134.92	-190.46
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2075	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	24.96	46.52	169.41	65.47	159.48	134.92	-190.46
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2081	0.00	0.00	0.00	0.00	13.07	0.00	13.07	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2088	0.00	0.00	0.00	0.00	26.87	14.35	41.22	24.96	43.67	169.41	65.47	159.48	134.92	-190.46
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	24.96	46.52	169.41	65.47	159.48	134.92	-190.46
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	24.96	46.52	169.41	65.47	159.48	134.92	-190.46
Salvage Value	0.00	0.00	26.02	0.00	16.46	12.50	54.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	843.11	0.00	266.09	428.11	4224.86	542.43	1017.33	7561.87	2334.49	2004.76	3230.31	-7.68

Net Present Value -5792

K19/C25/250MW

TABLE 216
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	3.72	250.18	1.26	0.00	230.96	101.05	15.21	79.33	35.37
2015	83.73	439.66	0.00	0.00	16.69	2.31	542.40	3.98	0.00	248.76	99.37	16.94	83.90	48.55
2016	166.43	579.79	0.00	0.00	22.08	2.80	771.11	7.83	0.00	255.33	97.52	17.49	85.43	54.89
2017	191.52	700.61	0.00	0.00	31.35	4.20	927.68	12.47	0.00	265.56	95.62	18.70	86.67	64.56
2018	228.68	492.58	0.00	0.00	30.79	12.59	764.64	16.29	0.00	254.04	93.05	21.12	86.26	53.61
2019	232.37	351.28	0.00	0.00	38.97	12.59	635.21	19.47	12.78	268.85	92.64	20.88	87.13	68.19
2020	638.66	143.03	0.00	0.00	2.50	13.05	797.24	23.46	12.99	400.91	100.81	13.60	85.00	201.50
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	28.97	12.75	477.47	101.38	13.94	86.91	275.24
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	33.62	12.97	476.15	99.52	14.58	88.35	273.70
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	37.02	12.80	473.40	97.35	14.57	94.13	267.35
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	39.50	12.75	478.24	95.03	16.19	102.80	264.22
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	41.28	26.59	414.27	99.62	14.47	82.46	217.72
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	42.19	26.40	503.03	106.98	14.10	80.15	301.79
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	42.36	26.29	488.66	106.57	13.38	81.71	287.00
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	26.56	483.79	104.88	13.92	82.88	282.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	29.04	475.31	103.11	14.09	84.57	273.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	25.13	469.25	101.88	13.90	84.79	268.69
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.96	460.99	100.31	14.23	85.74	260.71
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.60	450.18	98.71	14.32	86.90	250.26
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.67	438.04	97.05	14.36	88.49	238.14
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.78	425.05	95.45	14.46	89.62	225.51
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	26.81	375.07	93.85	14.51	88.63	178.07
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	42.36	23.97	351.45	92.31	14.79	88.70	155.67
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	23.97	335.93	90.77	14.72	89.62	140.82
2038	0.00	0.00	71.31	0.00	0.00	0.00	71.31	42.61	23.97	319.63	89.24	14.70	91.11	124.57
2039	0.00	0.00	89.29	0.00	6.64	0.00	95.92	42.98	26.81	312.73	88.07	13.77	99.85	111.04
2040	0.00	0.00	10.25	0.00	0.00	0.00	10.25	43.03	27.88	301.47	86.11	23.36	101.24	90.77
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.03	27.23	292.32	84.64	26.35	103.63	77.69
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	43.28	27.23	284.78	83.34	28.12	106.33	66.99
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	43.65	27.23	276.98	81.98	27.86	111.26	55.89
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	43.96	32.86	268.05	80.45	41.36	110.35	35.90
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	44.56	35.70	258.41	79.07	45.76	113.03	20.55
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	44.61	36.78	252.48	77.73	52.10	117.46	5.19
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.93	243.69	76.37	52.76	124.24	-9.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.08	251.53	77.72	50.20	118.24	5.36
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	44.61	37.92	251.53	77.72	50.20	118.24	5.36
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	44.61	36.79	251.53	77.72	50.20	118.24	5.36
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	44.61	36.80	251.53	77.72	50.20	118.24	5.36
2052	0.00	0.00	0.00	0.00	24.39	1.04	25.42	44.61	36.80	251.53	77.72	50.20	118.24	5.36
2053	0.00	0.00	0.00	0.00	15.88	3.11	18.99	44.61	36.81	251.53	77.72	50.20	118.24	5.36
2054	0.00	0.00	0.00	0.00	13.57	3.11	16.68	44.61	36.81	251.53	77.72	50.20	118.24	5.36
2055	0.00	0.00	0.00	0.00	0.62	3.22	3.84	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	44.61	50.33	251.53	77.72	50.20	118.24	5.36
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	44.61	50.33	251.53	77.72	50.20	118.24	5.36
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	44.61	50.33	251.53	77.72	50.20	118.24	5.36
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	65.55	251.53	77.72	50.20	118.24	5.36
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2064	0.00	0.00	0.00	0.00	8.05	3.61	11.66	44.61	65.55	251.53	77.72	50.20	118.24	5.36
2065	0.00	0.00	0.00	0.00	6.68	2.08	8.76	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2066	0.00	0.00	0.00	0.00	0.80	2.11	2.91	44.61	65.55	251.53	77.72	50.20	118.24	5.36
2067	0.00	0.00	0.00	0.00	6.97	3.16	10.13	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2068	0.00	0.00	49.88	0.00	14.91	9.48	74.27	44.61	65.55	251.53	77.72	50.20	118.24	5.36
2069	0.00	0.00	67.86	0.00	25.40	9.48	102.74	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2070	0.00	0.00	10.25	0.00	1.89	9.83	21.97	44.61	52.03	251.53	77.72	50.20	118.24	5.36
2071	0.00	0.00	0.00	0.00	23.04	0.00	23.04	44.61	36.81	251.53	77.72	50.20	118.24	5.36
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	44.61	52.03	251.53	77.72	50.20	118.24	5.36
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	44.61	35.95	251.53	77.72	50.20	118.24	5.36
2074	0.00	0.00	60.48	0.00	42.88	0.00	103.35	44.61	50.33	251.53	77.72	50.20	118.24	5.36
2075	0.00	0.00	68.27	0.00	47.04	0.00	115.30	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	44.61	52.03	251.53	77.72	50.20	118.24	5.36
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	36.81	251.53	77.72	50.20	118.24	5.36
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	44.61	52.03	251.53	77.72	50.20	118.24	5.36
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	39.65	251.53	77.72	50.20	118.24	5.36
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	44.61	52.03	251.53	77.72	50.20	118.24	5.36
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2084	0.00	0.00	0.00	0.00	10.26	0.12	10.37	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2087	0.00	0.00	0.00	0.00	24.39	1.04	25.42	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2088	0.00	0.00	0.00	0.00	15.88	3.11	18.99	44.61	35.10	251.53	77.72	50.20	118.24	5.36
2089	0.00	0.00	0.00	0.00	12.96	3.11	16.07	44.61	37.95	251.53	77.72	50.20	118.24	5.36
2090	0.00	0.00	0.00	0.00	0.00	3.22	3.22	44.61	37.95	251.53	77.72	50.20	118.24	5.36
Salvage Value	6.76	0.00	13.53	0.00	26.11	3.14	49.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	217.19	0.00	419.65	55.88	7358.44	1005.71	692.55	9500.93	2581.75	769.28	2779.18	3370.72

Net Present Value -5686

K19/Gas24/250MW

TABLE 217
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	3.72	220.34	1.12	0.00	230.96	101.05	15.21	79.33	35.37
2015	0.00	439.66	0.00	0.00	16.69	2.31	458.67	3.41	0.00	248.76	99.37	16.94	83.90	48.55
2016	0.00	579.79	0.00	0.00	22.08	2.80	604.67	6.43	0.00	255.33	97.52	17.49	85.43	54.89
2017	0.00	700.61	0.00	0.00	31.35	4.20	736.16	10.11	0.00	265.80	95.61	18.70	86.67	64.81
2018	0.00	492.58	0.00	0.00	30.79	12.59	535.95	12.79	0.00	254.37	93.05	21.09	86.23	54.00
2019	0.00	351.28	0.00	0.00	36.48	12.59	400.34	14.79	12.78	269.36	92.64	20.88	87.11	68.73
2020	0.00	143.03	0.35	0.00	0.01	13.05	156.44	15.57	12.99	401.67	100.81	13.60	84.99	202.27
2021	0.00	49.49	0.00	0.00	0.00	0.00	49.49	15.82	12.75	478.67	101.36	13.95	86.87	276.49
2022	0.00	0.00	70.52	0.00	0.00	0.00	70.52	16.07	12.97	479.52	99.92	13.78	87.65	278.17
2023	0.00	0.00	88.21	0.00	6.64	0.00	94.85	16.43	12.80	482.05	98.81	11.56	90.44	281.24
2024	0.00	0.00	10.09	0.00	0.00	0.00	10.09	16.49	16.67	489.89	96.96	18.03	94.30	280.61
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	16.49	16.45	359.70	94.76	13.39	91.10	160.45
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.49	16.05	341.72	92.57	15.45	92.68	141.01
2027	0.00	0.00	49.34	0.00	0.00	0.00	49.34	16.73	16.07	307.83	90.56	16.92	93.73	106.62
2028	0.00	0.00	69.16	0.00	52.27	0.00	121.42	17.33	16.13	297.75	88.77	19.76	96.40	92.83
2029	0.00	0.00	109.56	0.00	0.00	0.00	109.56	17.88	22.71	291.89	87.04	27.18	98.52	79.14
2030	0.00	0.00	143.06	0.00	0.00	0.00	143.06	18.59	18.84	291.08	86.15	29.67	99.81	75.44
2031	0.00	0.00	63.82	0.00	6.64	0.00	70.45	18.94	18.84	298.37	86.62	25.31	99.32	87.12
2032	0.00	0.00	4.67	0.00	0.00	0.00	4.67	18.97	25.64	306.94	84.24	52.64	97.97	72.09
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.97	25.65	299.61	82.73	57.12	100.46	59.30
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.97	25.65	292.57	81.28	62.49	102.83	45.97
2035	0.00	0.00	100.02	0.00	0.00	0.00	100.02	19.47	25.01	223.01	79.32	59.80	100.72	-16.82
2036	0.00	0.00	143.92	0.00	0.00	0.00	143.92	20.19	25.02	201.74	77.87	64.49	101.41	-42.03
2037	0.00	0.00	64.20	0.00	0.00	0.00	64.20	20.51	25.02	203.54	78.24	59.10	100.24	-34.03
2038	0.00	0.00	105.02	0.00	0.00	0.00	105.02	21.03	31.81	204.85	75.92	86.02	101.06	-58.15
2039	0.00	0.00	144.35	0.00	0.00	0.00	144.35	21.76	34.66	198.88	74.56	94.86	110.22	-80.76
2040	0.00	0.00	64.39	0.00	43.97	0.00	108.36	22.30	31.81	194.47	73.93	97.49	110.96	-87.91
2041	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.32	38.62	198.96	72.18	123.74	110.55	-107.51
2042	0.00	0.00	100.72	0.00	0.00	0.00	100.72	22.82	38.62	190.48	70.47	136.44	114.02	-130.45
2043	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.55	38.62	182.61	69.15	145.45	116.59	-148.58
2044	0.00	0.00	64.65	0.00	0.00	0.00	64.65	23.87	40.33	177.24	68.59	148.75	117.28	-157.38
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	23.90	47.13	178.99	66.47	184.17	117.79	-189.43
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	47.13	182.23	66.52	183.11	118.16	-185.57
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	46.28	169.85	64.73	200.54	121.86	-217.28
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	23.90	48.28	177.02	65.91	189.27	119.27	-197.43
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2052	0.00	0.00	49.09	0.00	24.39	1.04	74.51	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2053	0.00	0.00	66.78	0.00	15.88	3.11	85.77	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2054	0.00	0.00	10.09	0.00	12.96	3.11	26.16	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2055	0.00	0.00	0.00	0.00	0.00	3.22	3.22	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2057	0.00	0.00	49.34	0.00	0.00	0.00	49.34	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2058	0.00	0.00	67.12	0.00	6.64	0.00	73.75	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2059	0.00	0.00	109.56	0.00	0.00	0.00	109.56	23.90	48.28	177.02	65.91	189.27	119.27	-197.43
2060	0.00	0.00	143.06	0.00	0.00	0.00	143.06	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2061	0.00	0.00	63.82	0.00	0.00	0.00	63.82	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2062	0.00	0.00	4.67	0.00	0.00	0.00	4.67	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2063	0.00	0.00	0.00	0.00	39.20	2.76	41.95	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2064	0.00	0.00	0.00	0.00	8.05	3.61	11.66	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2065	0.00	0.00	100.02	0.00	6.68	2.08	108.78	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2066	0.00	0.00	143.92	0.00	7.44	2.11	153.46	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2067	0.00	0.00	64.20	0.00	6.97	3.16	74.33	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2068	0.00	0.00	105.02	0.00	14.91	9.48	129.40	23.90	60.66	177.02	65.91	189.27	119.27	-197.43
2069	0.00	0.00	144.35	0.00	23.52	9.48	177.34	23.90	48.28	177.02	65.91	189.27	119.27	-197.43
2070	0.00	0.00	64.39	0.00	0.01	9.83	74.23	23.90	47.14	177.02	65.91	189.27	119.27	-197.43
2071	0.00	0.00	4.72	0.00	0.00	0.00	4.72	23.90	47.14	177.02	65.91	189.27	119.27	-197.43
2072	0.00	0.00	100.72	0.00	0.00	0.00	100.72	23.90	47.14	177.02	65.91	189.27	119.27	-197.43
2073	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.90	46.29	177.02	65.91	189.27	119.27	-197.43
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2075	0.00	0.00	4.74	0.00	32.98	0.00	37.71	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2078	0.00	0.00	0.00	0.00	13.07	0.00	13.07	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	48.28	177.02	65.91	189.27	119.27	-197.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2082	0.00	0.00	49.09	0.00	0.00	0.00	49.09	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2083	0.00	0.00	66.78	0.00	0.00	0.00	66.78	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2084	0.00	0.00	10.09	0.00	10.26	0.12	20.46	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2087	0.00	0.00	49.34	0.00	24.39	1.04	74.76	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2088	0.00	0.00	67.12	0.00	15.88	3.11	86.11	23.90	45.44	177.02	65.91	189.27	119.27	-197.43
2089	0.00	0.00	10.14	0.00	12.96	3.11	26.21	23.90	48.28	177.02	65.91	189.27	119.27	-197.43
2090	0.00	0.00	0.00	0.00	10.99	3.22	14.22	23.90	48.28	177.02	65.91	189.27	119.27	-197.43
Salvage Value	0.00	0.00	47.66	0.00	14.40	3.14	65.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	1068.52	0.00	251.44	55.88	4063.40	513.67	744.62	7457.55	2341.63	2406.96	2894.88	-185.92

Net Present Value -5508

K19/C31/250MW

TABLE 218
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	198.32	0.00	0.00	18.31	3.72	249.56	1.26	0.00	230.96	101.05	15.21	79.33	35.37
2015	36.79	439.66	0.00	0.00	16.69	2.31	495.46	3.74	0.00	248.76	99.37	16.94	83.90	48.55
2016	10.34	579.79	0.00	0.00	22.08	2.80	615.01	6.81	0.00	255.33	97.52	17.49	85.43	54.89
2017	10.37	700.61	0.00	0.00	31.35	4.20	746.53	10.55	0.00	265.80	95.61	18.70	86.67	64.81
2018	12.29	492.58	0.00	0.00	30.79	12.59	548.24	13.29	0.00	254.37	93.05	21.09	86.23	54.00
2019	12.32	351.28	0.00	0.00	36.48	12.59	412.67	15.35	12.78	269.36	92.64	20.88	87.11	68.73
2020	12.36	143.03	0.35	0.00	0.01	13.05	168.80	16.19	12.99	401.67	100.81	13.60	84.99	202.27
2021	15.59	49.49	0.00	0.00	0.00	0.00	65.07	16.52	12.75	478.67	101.36	13.95	86.87	276.49
2022	146.66	0.00	70.52	0.00	0.00	0.00	217.18	17.50	12.97	479.45	99.91	13.80	87.66	278.08
2023	225.28	0.00	88.21	0.00	6.64	0.00	320.13	18.99	12.80	481.75	98.78	11.65	90.56	280.76
2024	241.57	0.00	10.09	0.00	0.00	0.00	251.66	20.25	16.67	489.50	96.93	18.14	94.47	279.95
2025	244.26	0.00	0.00	0.00	2.50	0.00	246.76	21.48	16.45	359.04	94.73	13.49	91.29	159.53
2026	657.87	0.00	0.00	0.00	2.50	0.00	660.37	24.78	16.05	341.10	92.56	15.59	92.90	140.04
2027	1040.67	0.00	49.34	0.00	30.45	0.00	1120.46	30.39	16.07	306.79	90.55	17.18	93.90	105.15
2028	931.65	0.00	67.12	0.00	22.57	0.00	1021.34	35.49	16.13	296.24	88.70	20.22	96.78	90.54
2029	663.37	0.00	10.14	0.00	26.88	0.00	700.38	39.00	22.70	289.98	87.01	27.79	98.91	76.28
2030	458.09	0.00	0.00	0.00	46.73	0.00	504.82	41.52	18.83	301.40	87.99	24.43	96.53	92.45
2031	300.01	0.00	0.00	0.00	61.85	0.00	361.86	43.33	32.89	334.53	91.04	19.75	83.50	140.24
2032	110.18	0.00	0.00	0.00	72.44	0.00	182.62	44.24	33.10	430.74	97.73	19.53	81.62	231.86
2033	34.67	0.00	0.00	0.00	0.00	0.00	34.67	44.42	32.96	449.13	97.88	20.20	85.98	245.06
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	33.18	433.75	96.17	20.71	86.73	230.14
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.36	383.12	94.53	20.97	85.89	181.73
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.31	360.62	92.98	21.42	85.96	160.26
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.15	343.03	91.15	22.28	87.49	142.10
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.79	323.61	89.26	23.18	89.82	121.35
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	34.70	309.51	87.42	25.49	98.74	97.87
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.97	299.79	85.73	28.89	101.54	83.63
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	34.64	289.59	84.12	32.91	104.32	68.24
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	44.42	31.80	286.49	83.28	33.55	105.78	63.89
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.80	279.19	81.97	33.31	110.33	53.58
2044	0.00	0.00	50.18	0.00	0.00	0.00	50.18	44.67	33.50	268.15	80.46	41.35	110.36	35.98
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.27	33.50	258.45	79.07	45.74	113.03	20.61
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.32	37.43	252.52	77.74	52.08	117.45	5.26
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.93	243.69	76.37	52.76	124.24	-9.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.08	251.55	77.73	50.19	118.24	5.40
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	45.32	37.92	251.55	77.73	50.19	118.24	5.40
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	45.32	35.08	251.55	77.73	50.19	118.24	5.40
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	45.32	37.94	251.55	77.73	50.19	118.24	5.40
2052	0.00	0.00	49.09	0.00	24.39	1.04	74.51	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2053	0.00	0.00	66.78	0.00	15.88	3.11	85.77	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2054	0.00	0.00	10.09	0.00	12.96	3.11	26.16	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2055	0.00	0.00	0.00	0.00	0.00	3.22	3.22	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2057	0.00	0.00	49.34	0.00	0.00	0.00	49.34	45.32	36.81	251.55	77.73	50.19	118.24	5.40
2058	0.00	0.00	67.12	0.00	6.64	0.00	73.75	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2059	0.00	0.00	10.14	0.00	0.00	0.00	10.14	45.32	39.65	251.55	77.73	50.19	118.24	5.40
2060	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2061	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.32	37.95	251.55	77.73	50.19	118.24	5.40
2062	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2063	0.00	0.00	0.00	0.00	10.34	2.76	13.09	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2064	0.00	0.00	0.00	0.00	14.22	3.61	17.83	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2065	0.00	0.00	0.00	0.00	17.17	2.08	19.25	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2066	0.00	0.00	0.00	0.00	15.61	2.11	17.72	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2067	0.00	0.00	0.00	0.00	24.86	3.16	28.02	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2068	0.00	0.00	0.00	0.00	14.91	9.48	24.38	45.32	65.55	251.55	77.73	50.19	118.24	5.40
2069	0.00	0.00	0.00	0.00	23.52	9.48	33.00	45.32	37.95	251.55	77.73	50.19	118.24	5.40
2070	0.00	0.00	0.00	0.00	0.01	9.83	9.83	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	39.65	251.55	77.73	50.19	118.24	5.40
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.95	251.55	77.73	50.19	118.24	5.40
2074	0.00	0.00	50.18	0.00	0.00	0.00	50.18	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2075	0.00	0.00	68.27	0.00	1.88	0.00	70.15	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2076	0.00	0.00	10.31	0.00	1.88	0.00	12.20	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2077	0.00	0.00	0.00	0.00	23.04	0.00	23.04	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2078	0.00	0.00	0.00	0.00	12.23	0.00	12.23	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2079	0.00	0.00	0.00	0.00	20.70	0.00	20.70	45.32	37.95	251.55	77.73	50.19	118.24	5.40
2080	0.00	0.00	0.00	0.00	75.44	0.00	75.44	45.32	50.33	251.55	77.73	50.19	118.24	5.40
2081	0.00	0.00	0.00	0.00	47.04	0.00	47.04	45.32	37.95	251.55	77.73	50.19	118.24	5.40
2082	0.00	0.00	49.09	0.00	54.55	0.00	103.64	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2083	0.00	0.00	66.78	0.00	0.00	0.00	66.78	45.32	36.81	251.55	77.73	50.19	118.24	5.40
2084	0.00	0.00	10.09	0.00	10.26	0.12	20.46	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	45.32	36.81	251.55	77.73	50.19	118.24	5.40
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	45.32	52.03	251.55	77.73	50.19	118.24	5.40
2087	0.00	0.00	49.34	0.00	24.39	1.04	74.76	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2088	0.00	0.00	67.12	0.00	15.88	3.11	86.11	45.32	35.10	251.55	77.73	50.19	118.24	5.40
2089	0.00	0.00	10.14	0.00	12.96	3.11	26.21	45.32	37.95	251.55	77.73	50.19	118.24	5.40
2090	0.00	0.00	0.00	0.00	0.00	3.22	3.22	45.32	37.95	251.55	77.73	50.19	118.24	5.40
Salvage Value	48.98	0.00	23.82	0.00	28.62	3.14	104.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3336.80	2687.55	338.65	0.00	381.19	55.88	6800.06	917.54	699.58	8863.53	2527.85	829.78	2805.04	2700.86

Net Present Value -5716

All Gas

TABLE 219
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	256.51	97.51	17.52	85.40	56.08
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	269.08	95.95	18.02	86.09	69.01
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	258.37	93.30	20.12	86.63	58.32
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	252.27	91.36	17.99	86.30	56.62
2020	0.00	0.00	70.42	0.00	0.00	0.00	70.42	0.75	0.00	258.00	91.26	12.83	88.11	65.81
2021	0.00	0.00	88.12	0.00	6.64	0.00	94.76	1.11	0.00	258.69	89.49	12.11	93.08	64.00
2022	0.00	0.00	10.07	0.00	0.00	0.00	10.07	1.16	3.92	253.01	87.33	21.48	94.55	49.65
2023	0.00	0.00	49.14	0.00	0.00	0.00	49.14	1.41	3.92	250.03	85.15	26.46	99.65	38.77
2024	0.00	0.00	68.89	0.00	52.27	0.00	121.15	2.01	3.92	255.66	83.63	30.97	105.74	35.32
2025	0.00	0.00	10.10	0.00	0.00	0.00	10.10	2.06	7.84	165.07	83.09	25.99	97.86	-41.87
2026	0.00	0.00	49.29	0.00	0.00	0.00	49.29	2.30	7.84	151.35	81.82	26.46	98.51	-55.44
2027	0.00	0.00	67.05	0.00	0.00	0.00	67.05	2.64	7.84	141.16	80.01	26.64	104.76	-70.26
2028	0.00	0.00	109.45	0.00	0.00	0.00	109.45	3.19	11.76	133.50	78.13	40.74	104.36	-89.73
2029	0.00	0.00	142.91	0.00	0.00	0.00	142.91	3.90	11.76	123.83	76.73	46.20	106.29	-105.39
2030	0.00	0.00	63.75	0.00	6.64	0.00	70.39	4.25	11.77	130.46	77.55	42.47	103.97	-93.53
2031	0.00	0.00	4.67	0.00	0.00	0.00	4.67	4.28	18.57	137.40	75.29	70.56	101.28	-109.73
2032	0.00	0.00	49.59	0.00	0.00	0.00	49.59	4.52	18.58	123.90	73.43	77.72	104.63	-131.88
2033	0.00	0.00	67.45	0.00	43.97	0.00	111.42	5.08	18.58	112.06	71.76	86.08	107.54	-153.32
2034	0.00	0.00	110.11	0.00	0.00	0.00	110.11	5.63	22.50	103.89	70.37	97.82	109.58	-173.88
2035	0.00	0.00	143.77	0.00	0.00	0.00	143.77	6.35	22.50	96.37	69.46	104.02	110.46	-187.57
2036	0.00	0.00	64.14	0.00	0.00	0.00	64.14	6.67	22.50	95.41	69.35	101.47	113.74	-189.15
2037	0.00	0.00	104.91	0.00	0.00	0.00	104.91	7.20	29.30	93.40	67.48	128.23	108.10	-210.41
2038	0.00	0.00	144.20	0.00	0.00	0.00	144.20	7.92	29.31	84.85	66.28	138.40	111.01	-230.84
2039	0.00	0.00	64.33	0.00	0.00	0.00	64.33	8.24	29.31	81.52	66.13	140.54	117.37	-242.52
2040	0.00	0.00	4.71	0.00	0.00	0.00	4.71	8.26	36.11	80.82	64.38	163.74	116.42	-263.72
2041	0.00	0.00	100.62	0.00	0.00	0.00	100.62	8.76	36.12	75.24	62.63	183.05	121.10	-291.56
2042	0.00	0.00	144.78	0.00	0.00	0.00	144.78	9.49	36.12	72.89	61.58	198.74	123.62	-311.06
2043	0.00	0.00	64.59	0.00	43.97	0.00	108.56	10.03	36.12	73.27	61.49	202.63	123.68	-314.52
2044	0.00	0.00	4.73	0.00	0.00	0.00	4.73	10.05	42.93	73.42	60.08	226.08	122.37	-335.12
2045	0.00	0.00	22.10	0.00	0.00	0.00	22.10	10.17	42.93	68.41	58.56	247.65	125.78	-363.58
2046	0.00	0.00	30.06	0.00	0.00	0.00	30.06	10.32	42.93	65.22	57.46	264.89	128.96	-386.10
2047	0.00	0.00	4.54	0.00	0.00	0.00	4.54	10.34	44.34	60.88	56.62	278.79	131.01	-405.55
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.35	64.83	57.55	263.78	128.58	-385.07
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	10.34	44.35	64.83	57.55	263.78	128.58	-385.07
2050	0.00	0.00	48.99	0.00	9.69	0.00	58.69	10.34	44.36	64.83	57.55	263.78	128.58	-385.07
2051	0.00	0.00	66.65	0.00	9.69	0.00	76.34	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2052	0.00	0.00	10.07	0.00	9.69	0.00	19.76	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2053	0.00	0.00	49.14	0.00	0.00	0.00	49.14	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2054	0.00	0.00	66.85	0.00	0.00	0.00	66.85	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2055	0.00	0.00	10.10	0.00	0.00	0.00	10.10	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2056	0.00	0.00	49.29	0.00	6.64	0.00	55.93	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2057	0.00	0.00	67.05	0.00	0.00	0.00	67.05	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2058	0.00	0.00	109.45	0.00	0.00	0.00	109.45	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2059	0.00	0.00	142.91	0.00	39.20	0.00	182.11	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2060	0.00	0.00	63.75	0.00	0.00	0.00	63.75	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2061	0.00	0.00	4.67	0.00	0.00	0.00	4.67	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2062	0.00	0.00	49.59	0.00	0.00	0.00	49.59	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2063	0.00	0.00	67.45	0.00	0.00	0.00	67.45	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2064	0.00	0.00	110.11	0.00	0.00	0.00	110.11	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2065	0.00	0.00	143.77	0.00	6.64	0.00	150.41	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2066	0.00	0.00	64.14	0.00	0.00	0.00	64.14	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2067	0.00	0.00	104.91	0.00	0.00	0.00	104.91	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2068	0.00	0.00	144.20	0.00	32.98	0.00	177.18	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2069	0.00	0.00	64.33	0.00	0.00	0.00	64.33	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2070	0.00	0.00	4.71	0.00	0.00	0.00	4.71	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2071	0.00	0.00	100.62	0.00	0.00	0.00	100.62	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2072	0.00	0.00	144.78	0.00	0.00	0.00	144.78	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2073	0.00	0.00	64.59	0.00	0.00	0.00	64.59	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2074	0.00	0.00	4.73	0.00	13.07	0.00	17.80	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2075	0.00	0.00	22.10	0.00	0.00	0.00	22.10	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2076	0.00	0.00	30.06	0.00	0.00	0.00	30.06	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2077	0.00	0.00	4.54	0.00	0.00	0.00	4.54	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2078	0.00	0.00	0.00	0.00	32.98	0.00	32.98	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2080	0.00	0.00	48.99	0.00	0.00	0.00	48.99	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2081	0.00	0.00	66.65	0.00	0.00	0.00	66.65	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2082	0.00	0.00	10.07	0.00	0.00	0.00	10.07	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2083	0.00	0.00	49.14	0.00	10.99	0.00	60.13	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2084	0.00	0.00	66.85	0.00	9.69	0.00	76.54	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2085	0.00	0.00	10.10	0.00	9.69	0.00	19.79	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2086	0.00	0.00	49.29	0.00	9.69	0.00	58.98	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2087	0.00	0.00	67.05	0.00	9.69	0.00	76.74	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2088	0.00	0.00	10.13	0.00	0.00	0.00	10.13	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	64.83	57.55	263.78	128.58	-385.07
Salvage Value	0.00	0.00	70.13	0.00	7.48	0.00	77.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1348.54	0.00	156.29	0.00	1566.69	154.57	608.54	4109.01	2117.85	3445.52	3079.94	-4534.30

Net Present Value -6864

Wind/Gas

TABLE 220
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	256.51	97.51	17.52	85.40	56.08
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	269.09	95.95	18.02	86.09	69.02
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	258.37	93.30	20.12	86.63	58.32
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	252.27	91.36	17.99	86.30	56.62
2020	0.00	0.00	0.00	6.94	10.37	0.00	17.31	0.59	0.00	255.62	90.84	13.88	88.43	62.47
2021	0.00	0.00	0.35	211.88	17.29	0.00	229.52	1.74	0.00	255.81	89.07	13.42	93.01	60.31
2022	0.00	0.00	0.00	215.84	20.88	0.00	236.73	2.92	6.10	259.04	87.46	13.52	93.08	64.98
2023	0.00	0.00	119.71	208.90	10.93	0.00	339.54	4.51	12.20	262.63	85.03	15.53	96.38	65.68
2024	0.00	0.00	155.17	3.97	18.40	0.00	177.53	5.29	18.31	276.74	83.21	15.90	102.09	75.54
2025	0.00	0.00	20.20	3.47	3.33	0.00	27.00	5.43	26.14	193.18	83.18	18.13	93.32	-1.46
2026	0.00	0.00	49.29	105.94	8.37	0.00	163.60	6.24	26.14	182.78	82.22	17.21	93.18	-9.84
2027	0.00	0.00	69.09	107.92	65.56	0.00	242.57	7.45	29.19	174.10	79.95	20.97	95.01	-21.83
2028	0.00	0.00	10.13	107.92	18.43	0.00	136.48	8.13	36.17	174.09	78.23	27.11	97.34	-28.58
2029	0.00	0.00	49.44	107.92	18.50	0.00	175.86	9.01	39.22	169.51	76.68	29.24	99.07	-35.48
2030	0.00	0.00	67.25	107.92	18.50	0.00	193.67	9.98	42.27	170.72	75.80	30.64	99.55	-35.28
2031	0.00	0.00	59.70	107.92	18.50	0.00	186.12	10.91	49.24	171.01	74.61	36.28	100.30	-40.17
2032	0.00	0.00	67.39	107.92	62.47	0.00	237.78	12.10	52.29	168.61	73.52	36.58	102.11	-43.60
2033	0.00	0.00	10.18	107.92	18.50	0.00	136.60	12.78	59.28	170.85	72.87	38.61	103.05	-43.68
2034	0.00	0.00	49.68	107.92	18.50	0.00	176.11	13.66	62.33	163.04	71.12	44.68	104.04	-56.81
2035	0.00	0.00	67.59	107.92	18.50	0.00	194.01	14.63	65.39	155.38	69.51	48.59	105.90	-68.62
2036	0.00	0.00	60.00	107.92	18.50	0.00	186.42	15.56	72.36	151.91	68.19	56.02	107.20	-79.50
2037	0.00	0.00	67.72	107.92	18.50	0.00	194.15	16.53	75.41	146.21	66.95	59.46	109.26	-89.46
2038	0.00	0.00	60.12	107.92	18.50	0.00	186.54	17.46	82.39	144.84	65.94	65.39	111.50	-97.99
2039	0.00	0.00	67.86	107.92	62.47	0.00	238.25	18.66	85.44	139.72	64.83	64.41	122.84	-112.36
2040	0.00	0.00	10.25	114.86	18.50	0.00	143.62	19.37	92.43	140.27	64.03	67.93	125.79	-117.48
2041	0.00	0.00	50.03	319.80	18.50	0.00	388.33	21.32	95.48	131.10	62.58	80.00	123.94	-135.42
2042	0.00	0.00	68.06	323.77	18.50	0.00	410.33	23.37	98.53	124.06	61.27	85.80	127.06	-150.06
2043	0.00	0.00	60.42	316.83	18.36	0.00	395.61	25.35	105.50	120.61	60.13	95.16	129.19	-163.87
2044	0.00	0.00	68.20	111.89	17.95	0.00	198.03	26.34	108.55	117.14	59.22	98.71	131.88	-172.66
2045	0.00	0.00	32.40	111.39	16.84	0.00	160.63	27.14	115.53	115.05	58.16	104.63	136.90	-184.65
2046	0.00	0.00	30.06	210.39	15.17	0.00	255.62	28.42	118.58	111.96	57.16	105.06	144.42	-194.69
2047	0.00	0.00	4.54	109.91	10.13	0.00	124.58	29.04	123.06	107.49	56.13	108.86	145.86	-203.36
2048	0.00	0.00	0.00	107.92	5.20	0.00	113.13	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2049	0.00	0.00	0.00	107.92	9.76	0.00	117.69	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2050	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2051	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2052	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2053	0.00	0.00	98.28	107.92	0.00	0.00	206.20	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2054	0.00	0.00	133.70	107.92	0.00	0.00	241.62	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2055	0.00	0.00	20.20	107.92	2.59	0.00	130.72	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2056	0.00	0.00	49.29	107.92	4.32	0.00	161.53	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2057	0.00	0.00	67.05	107.92	5.26	0.00	180.23	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2058	0.00	0.00	10.13	107.92	2.94	0.00	120.99	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2059	0.00	0.00	49.44	107.92	14.76	0.00	172.12	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2060	0.00	0.00	67.25	114.86	1.46	0.00	183.57	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2061	0.00	0.00	59.70	319.80	2.34	0.00	381.83	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2062	0.00	0.00	67.39	323.77	42.58	0.00	433.73	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2063	0.00	0.00	10.18	316.83	4.63	0.00	331.63	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2064	0.00	0.00	49.68	111.89	4.63	0.00	166.20	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2065	0.00	0.00	67.59	111.39	4.63	0.00	183.61	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2066	0.00	0.00	60.00	210.39	4.63	0.00	275.01	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2067	0.00	0.00	67.72	109.91	37.60	0.00	215.23	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2068	0.00	0.00	60.12	107.92	4.63	0.00	172.66	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2069	0.00	0.00	67.86	107.92	4.63	0.00	180.41	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2070	0.00	0.00	10.25	107.92	12.40	0.00	130.58	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2071	0.00	0.00	50.03	107.92	17.59	0.00	175.55	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2072	0.00	0.00	68.06	107.92	20.25	0.00	196.24	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2073	0.00	0.00	60.42	107.92	12.61	0.00	180.95	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2074	0.00	0.00	68.20	107.92	41.24	0.00	217.36	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2075	0.00	0.00	32.40	107.92	6.50	0.00	146.82	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2076	0.00	0.00	30.06	107.92	10.66	0.00	148.64	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2077	0.00	0.00	4.54	107.92	27.61	0.00	140.08	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2078	0.00	0.00	0.00	107.92	18.36	0.00	126.28	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2079	0.00	0.00	0.00	107.92	18.15	0.00	126.08	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2080	0.00	0.00	0.00	114.86	17.88	0.00	132.74	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2081	0.00	0.00	0.00	319.80	17.04	0.00	336.84	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2082	0.00	0.00	0.00	323.77	27.16	0.00	350.92	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2083	0.00	0.00	98.28	316.83	15.12	0.00	430.23	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2084	0.00	0.00	133.70	111.89	23.50	0.00	269.09	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2085	0.00	0.00	20.20	111.39	23.36	0.00	154.95	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2086	0.00	0.00	49.29	210.39	22.53	0.00	282.21	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2087	0.00	0.00	67.05	109.91	21.70	0.00	198.65	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2088	0.00	0.00	10.13	107.92	7.84	0.00	125.89	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2089	0.00	0.00	0.00	104.45	14.95	0.00	119.40	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
2090	0.00	0.00	0.00	1.98	0.07	0.00	2.05	29.04	123.06	111.50	57.15	106.19	142.39	-194.23
Salvage Value	0.00	0.00	47.38	130.86	27.47	0.00	205.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1003.30	2864.89	417.95	0.00	4348.00	405.26	1713.36	5021.21	2110.75	1554.98	3171.75	-1816.27

Net Present Value -8283

K22/Gas

TABLE 221
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: Low
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	98.15	0.00	0.00	9.69	0.00	107.84	0.54	0.00	231.34	101.04	15.19	79.32	35.79
2015	0.00	29.32	0.00	0.00	10.40	0.00	39.72	0.74	0.00	249.85	99.35	16.95	83.89	49.66
2016	0.00	25.47	0.00	0.00	10.47	0.00	35.94	0.92	0.00	256.27	97.51	17.52	85.41	55.83
2017	0.00	189.44	0.00	0.00	23.06	0.00	212.50	1.98	0.00	268.50	95.96	18.02	86.12	68.40
2018	0.00	368.39	0.00	0.00	6.85	0.00	375.25	3.86	0.00	257.14	93.31	20.13	86.67	57.02
2019	0.00	599.13	0.00	0.00	11.93	0.00	611.06	6.91	0.00	251.01	91.37	17.99	86.33	55.33
2020	0.00	665.27	0.00	0.00	21.71	0.00	686.99	10.35	0.00	252.83	90.67	14.29	88.60	59.27
2021	0.00	542.28	0.00	0.00	30.80	0.00	573.08	13.21	0.00	254.28	89.02	13.70	93.68	57.87
2022	0.00	314.02	0.00	0.00	36.48	0.00	350.50	14.96	12.78	257.53	89.00	15.63	89.27	63.63
2023	0.00	145.56	0.00	0.00	0.01	0.00	145.57	15.69	12.99	343.85	94.52	15.55	86.97	146.81
2024	0.00	50.19	0.00	0.00	0.00	0.00	50.19	15.94	12.71	370.42	94.33	17.71	92.55	165.83
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	15.94	12.92	291.08	94.22	12.45	87.64	96.77
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.94	12.75	278.13	92.40	12.60	88.77	84.36
2027	0.00	0.00	70.77	0.00	0.00	0.00	70.77	16.19	12.70	239.54	90.59	12.06	88.11	48.78
2028	0.00	0.00	88.59	0.00	6.64	0.00	95.23	16.56	12.47	227.52	89.06	12.57	89.66	36.22
2029	0.00	0.00	10.14	0.00	0.00	0.00	10.14	16.61	15.96	223.80	88.21	15.54	89.74	30.32
2030	0.00	0.00	49.49	0.00	0.00	0.00	49.49	16.86	15.96	216.83	86.55	18.84	91.34	20.10
2031	0.00	0.00	168.98	0.00	52.27	0.00	221.24	17.95	16.00	209.02	84.95	21.63	93.62	8.82
2032	0.00	0.00	153.51	0.00	0.00	0.00	153.51	18.72	22.58	202.91	83.39	29.40	95.87	-5.74
2033	0.00	0.00	63.94	0.00	6.64	0.00	70.58	19.07	18.71	206.03	83.48	25.72	96.05	0.78
2034	0.00	0.00	4.68	0.00	0.00	0.00	4.68	19.10	25.51	212.09	81.20	52.09	94.49	-15.68
2035	0.00	0.00	100.02	0.00	0.00	0.00	100.02	19.60	25.51	197.97	79.18	57.18	97.00	-35.40
2036	0.00	0.00	143.92	0.00	0.00	0.00	143.92	20.32	25.51	189.81	77.72	63.53	99.08	-50.52
2037	0.00	0.00	64.20	0.00	0.00	0.00	64.20	20.64	25.52	191.41	78.09	57.74	97.97	-42.39
2038	0.00	0.00	105.02	0.00	0.00	0.00	105.02	21.16	31.67	191.40	75.81	82.81	98.84	-66.05
2039	0.00	0.00	144.35	0.00	0.00	0.00	144.35	21.88	31.68	185.30	74.47	91.39	107.91	-88.47
2040	0.00	0.00	64.39	0.00	43.97	0.00	108.36	22.43	31.68	182.44	73.97	93.57	108.23	-93.33
2041	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.45	38.49	185.66	72.12	119.63	108.07	-114.18
2042	0.00	0.00	100.72	0.00	0.00	0.00	100.72	22.95	41.33	176.98	70.38	133.13	111.49	-138.02
2043	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.68	38.49	169.66	69.06	142.81	114.04	-156.26
2044	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.00	38.49	167.04	68.62	146.06	114.39	-162.03
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.02	45.29	170.95	67.13	174.14	113.07	-183.39
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.29	165.56	65.94	185.69	116.37	-202.43
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	47.01	158.30	64.63	198.91	119.22	-224.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	47.01	164.94	65.90	186.24	116.22	-203.43
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	47.01	164.94	65.90	186.24	116.22	-203.43
2050	0.00	0.00	0.00	0.00	10.01	0.00	10.01	24.02	46.16	164.94	65.90	186.24	116.22	-203.43
2051	0.00	0.00	0.00	0.00	10.05	0.00	10.05	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2052	0.00	0.00	0.00	0.00	10.06	0.00	10.06	24.02	48.15	164.94	65.90	186.24	116.22	-203.43
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2054	0.00	0.00	0.00	0.00	11.08	0.00	11.08	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2055	0.00	0.00	0.00	0.00	14.69	0.00	14.69	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2056	0.00	0.00	0.00	0.00	15.88	0.00	15.88	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2057	0.00	0.00	49.34	0.00	12.96	0.00	62.29	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2058	0.00	0.00	67.12	0.00	0.00	0.00	67.12	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2059	0.00	0.00	10.14	0.00	0.00	0.00	10.14	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2060	0.00	0.00	49.49	0.00	0.00	0.00	49.49	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2061	0.00	0.00	166.93	0.00	0.00	0.00	166.93	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2062	0.00	0.00	153.51	0.00	0.00	0.00	153.51	24.02	48.15	164.94	65.90	186.24	116.22	-203.43
2063	0.00	0.00	63.94	0.00	6.64	0.00	70.58	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2064	0.00	0.00	4.68	0.00	0.00	0.00	4.68	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2065	0.00	0.00	100.02	0.00	0.40	0.00	100.41	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2066	0.00	0.00	143.92	0.00	39.62	0.00	183.53	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2067	0.00	0.00	64.20	0.00	13.00	0.00	77.20	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2068	0.00	0.00	105.02	0.00	13.15	0.00	118.17	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2069	0.00	0.00	144.35	0.00	0.86	0.00	145.20	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2070	0.00	0.00	64.39	0.00	7.02	0.00	71.41	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2071	0.00	0.00	4.72	0.00	14.92	0.00	19.63	24.02	60.53	164.94	65.90	186.24	116.22	-203.43
2072	0.00	0.00	100.72	0.00	23.52	0.00	124.24	24.02	48.15	164.94	65.90	186.24	116.22	-203.43
2073	0.00	0.00	144.93	0.00	0.01	0.00	144.93	24.02	47.01	164.94	65.90	186.24	116.22	-203.43
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.02	47.01	164.94	65.90	186.24	116.22	-203.43
2075	0.00	0.00	4.74	0.00	32.98	0.00	37.71	24.02	47.01	164.94	65.90	186.24	116.22	-203.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	46.16	164.94	65.90	186.24	116.22	-203.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2081	0.00	0.00	0.00	0.00	13.07	0.00	13.07	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	48.15	164.94	65.90	186.24	116.22	-203.43
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2087	0.00	0.00	49.34	0.00	9.69	0.00	59.03	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2088	0.00	0.00	67.12	0.00	0.00	0.00	67.12	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2089	0.00	0.00	10.14	0.00	0.00	0.00	10.14	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
2090	0.00	0.00	0.00	0.00	10.99	0.00	10.99	24.02	45.30	164.94	65.90	186.24	116.22	-203.43
Salvage Value	0.00	0.00	41.60	0.00	11.10	0.00	52.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2515.06	1011.47	0.00	238.43	0.00	3764.96	473.01	684.05	6159.28	2308.68	2308.29	2827.68	-1285.36

Net Present Value: -6207

K22/C29

TABLE 222
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	98.15	0.00	0.00	9.69	0.00	137.06	0.69	0.00	231.34	101.04	15.19	79.32	35.79
2015	37.30	29.32	0.00	0.00	10.40	0.00	77.02	1.07	0.00	249.85	99.35	16.95	83.89	49.66
2016	10.85	25.47	0.00	0.00	10.47	0.00	46.79	1.30	0.00	256.27	97.51	17.52	85.41	55.83
2017	11.52	189.44	0.00	0.00	23.06	0.00	224.03	2.42	0.00	268.50	95.96	18.02	86.12	68.40
2018	11.56	368.39	0.00	0.00	6.85	0.00	386.80	4.36	0.00	257.14	93.31	20.13	86.67	57.02
2019	13.78	599.13	0.00	0.00	11.93	0.00	624.84	7.48	0.00	251.01	91.37	17.99	86.33	55.33
2020	148.85	665.27	0.00	0.00	21.71	0.00	835.83	11.66	0.00	252.83	90.67	14.29	88.60	59.27
2021	227.01	542.28	0.00	0.00	30.80	0.00	800.10	15.66	0.00	254.16	89.02	13.70	93.78	57.65
2022	240.14	314.02	0.00	0.00	36.48	0.00	590.64	18.62	12.78	257.37	89.01	15.61	89.36	63.39
2023	242.82	145.56	0.00	0.00	2.50	0.00	390.88	20.57	12.99	343.36	94.52	15.59	87.02	146.23
2024	653.98	50.19	0.00	0.00	2.50	0.00	706.66	24.10	12.71	369.30	94.32	17.71	92.60	164.67
2025	1034.51	0.00	0.00	0.00	30.45	0.00	1064.96	29.43	12.92	289.70	94.24	12.47	87.74	95.26
2026	926.14	0.00	0.00	0.00	15.94	0.00	942.07	34.14	12.75	276.44	92.40	12.63	88.91	82.50
2027	659.44	0.00	0.00	0.00	26.88	0.00	686.32	37.57	12.70	238.36	90.81	11.55	88.04	47.96
2028	455.38	0.00	0.00	0.00	46.73	0.00	502.11	40.08	12.47	223.43	88.96	12.71	90.00	31.76
2029	298.24	0.00	0.00	0.00	61.85	0.00	360.08	41.88	26.10	286.19	92.67	14.52	81.12	97.87
2030	109.53	0.00	0.00	0.00	72.44	0.00	181.97	42.79	26.31	377.79	99.55	14.22	77.90	186.11
2031	34.46	0.00	0.00	0.00	0.00	0.00	34.46	42.96	26.22	390.23	99.47	14.58	80.06	196.12
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	29.08	377.74	97.84	14.44	80.91	184.55
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	25.04	365.75	96.26	14.35	82.47	172.68
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	25.00	353.90	94.70	14.60	83.54	161.06
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	24.83	341.49	93.18	14.65	84.20	149.46
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	42.96	24.47	327.18	91.67	14.67	84.98	135.85
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	24.54	312.42	90.17	14.70	86.03	121.51
2038	0.00	0.00	71.31	0.00	0.00	0.00	71.31	43.21	24.00	297.97	88.70	14.67	87.91	106.70
2039	0.00	0.00	89.29	0.00	6.64	0.00	95.92	43.59	26.68	291.48	87.38	14.26	97.64	92.21
2040	0.00	0.00	10.25	0.00	0.00	0.00	10.25	43.64	27.75	283.07	85.70	24.25	97.91	75.22
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.64	27.75	274.90	84.28	27.16	100.23	63.24
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	43.89	30.59	266.92	82.91	28.07	103.98	51.96
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	44.26	27.75	258.29	81.48	28.35	108.98	39.48
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	44.56	31.66	250.88	80.06	43.11	107.07	20.63
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.17	31.02	243.11	78.85	46.18	109.64	8.43
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.22	34.94	248.21	78.45	45.50	112.81	11.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.65	230.20	76.33	59.91	114.28	-20.32
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.65	240.50	77.88	50.53	112.24	-0.15
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	39.50	240.50	77.88	50.53	112.24	-0.15
2050	0.00	0.00	0.00	0.00	10.01	0.00	10.01	45.22	35.80	240.50	77.88	50.53	112.24	-0.15
2051	0.00	0.00	0.00	0.00	10.05	0.00	10.05	45.22	34.96	240.50	77.88	50.53	112.24	-0.15
2052	0.00	0.00	0.00	0.00	10.06	0.00	10.06	45.22	37.81	240.50	77.88	50.53	112.24	-0.15
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2054	0.00	0.00	0.00	0.00	11.08	0.00	11.08	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2055	0.00	0.00	0.00	0.00	14.69	0.00	14.69	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2056	0.00	0.00	0.00	0.00	15.88	0.00	15.88	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2057	0.00	0.00	0.00	0.00	12.96	0.00	12.96	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2058	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2059	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.22	53.04	240.50	77.88	50.53	112.24	-0.15
2060	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2061	0.00	0.00	0.00	0.00	3.70	0.00	3.70	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2062	0.00	0.00	0.00	0.00	6.17	0.00	6.17	45.22	37.81	240.50	77.88	50.53	112.24	-0.15
2063	0.00	0.00	0.00	0.00	10.49	0.00	10.49	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2064	0.00	0.00	0.00	0.00	14.81	0.00	14.81	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2065	0.00	0.00	0.00	0.00	18.29	0.00	18.29	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2066	0.00	0.00	0.00	0.00	0.42	0.00	0.42	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2067	0.00	0.00	0.00	0.00	13.00	0.00	13.00	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2068	0.00	0.00	49.88	0.00	6.52	0.00	56.40	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2069	0.00	0.00	67.86	0.00	0.86	0.00	68.71	45.22	53.04	240.50	77.88	50.53	112.24	-0.15
2070	0.00	0.00	10.25	0.00	7.02	0.00	17.27	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2071	0.00	0.00	0.00	0.00	14.92	0.00	14.92	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2072	0.00	0.00	50.08	0.00	23.52	0.00	73.60	45.22	53.04	240.50	77.88	50.53	112.24	-0.15
2073	0.00	0.00	68.13	0.00	1.89	0.00	70.02	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2074	0.00	0.00	60.48	0.00	8.52	0.00	69.00	45.22	51.90	240.50	77.88	50.53	112.24	-0.15
2075	0.00	0.00	68.27	0.00	23.04	0.00	91.31	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2076	0.00	0.00	10.31	0.00	12.23	0.00	22.55	45.22	51.05	240.50	77.88	50.53	112.24	-0.15
2077	0.00	0.00	0.00	0.00	20.70	0.00	20.70	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2078	0.00	0.00	0.00	0.00	42.88	0.00	42.88	45.22	50.19	240.50	77.88	50.53	112.24	-0.15
2079	0.00	0.00	0.00	0.00	47.04	0.00	47.04	45.22	37.81	240.50	77.88	50.53	112.24	-0.15
2080	0.00	0.00	0.00	0.00	93.75	0.00	93.75	45.22	51.90	240.50	77.88	50.53	112.24	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	54.75	240.50	77.88	50.53	112.24	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.68	240.50	77.88	50.53	112.24	-0.15
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	51.90	240.50	77.88	50.53	112.24	-0.15
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	37.81	240.50	77.88	50.53	112.24	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	34.97	240.50	77.88	50.53	112.24	-0.15
Salvage Value	34.56	0.00	13.53	0.00	24.36	0.00	72.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3537.62	2515.06	217.19	0.00	382.32	0.00	6652.19	902.35	620.27	7769.83	2507.97	769.33	2708.09	1784.43

Net Present Value -6390

SCGT/C26

TABLE 223
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	231.34	101.04	15.19	79.32	35.79
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	249.85	99.35	16.95	83.89	49.66
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	256.51	97.51	17.52	85.40	56.08
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	269.09	95.95	18.02	86.09	69.02
2018	192.09	0.00	0.35	0.00	0.00	0.00	192.45	3.06	0.00	258.12	93.30	20.13	86.64	58.04
2019	229.36	0.00	0.00	0.00	0.00	0.00	229.36	4.20	0.00	251.88	91.36	17.99	86.31	56.23
2020	233.06	0.00	70.42	0.00	0.00	0.00	303.48	5.61	0.00	257.32	91.24	12.90	88.12	65.06
2021	640.56	0.00	88.08	0.00	6.64	0.00	735.27	9.18	0.00	258.09	89.47	12.26	93.32	63.04
2022	1025.35	0.00	10.07	0.00	0.47	0.00	1035.89	14.36	3.92	252.31	87.35	21.78	94.80	48.39
2023	917.93	0.00	0.00	0.00	0.95	0.00	918.88	18.96	3.92	248.43	85.02	27.45	100.07	35.89
2024	653.60	0.00	0.00	0.00	1.90	0.00	655.50	22.23	3.92	255.68	83.81	30.69	105.95	35.22
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	24.51	3.92	167.25	84.20	18.76	101.32	-37.02
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	26.00	17.97	205.56	88.07	13.76	86.10	17.63
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	26.54	18.18	289.60	95.51	13.36	80.08	100.64
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	26.71	17.90	312.81	95.76	14.61	84.99	117.45
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	18.11	300.38	94.09	15.05	86.10	105.13
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.94	290.79	92.91	14.93	86.21	96.75
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.89	276.79	91.02	16.03	87.93	81.81
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.66	260.47	89.15	17.19	89.58	64.54
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.23	249.50	87.29	20.21	92.31	49.69
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.23	241.32	85.73	23.42	94.40	37.78
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.27	235.33	84.47	26.09	95.92	28.85
2036	0.00	0.00	49.78	0.00	0.00	0.00	49.78	26.96	19.95	230.29	83.43	26.43	98.14	22.29
2037	0.00	0.00	67.77	0.00	6.64	0.00	74.40	27.33	17.10	221.71	81.95	26.83	103.25	9.68
2038	0.00	0.00	10.23	0.00	0.00	0.00	10.23	27.39	21.02	214.40	80.51	40.92	101.92	-8.95
2039	0.00	0.00	49.93	0.00	0.00	0.00	49.93	27.64	21.02	206.27	79.30	43.56	110.93	-27.52
2040	0.00	0.00	69.97	0.00	52.27	0.00	122.23	28.24	21.02	199.87	77.99	43.16	117.98	-39.27
2041	0.00	0.00	60.30	0.00	0.00	0.00	60.30	28.54	24.95	190.14	76.39	60.12	116.40	-62.78
2042	0.00	0.00	68.06	0.00	0.00	0.00	68.06	28.88	24.30	181.49	75.07	67.56	119.01	-80.15
2043	0.00	0.00	60.42	0.00	0.00	0.00	60.42	29.18	28.21	176.40	73.80	75.87	123.86	-97.12
2044	0.00	0.00	68.20	0.00	43.97	0.00	112.17	29.74	28.21	169.75	72.52	76.48	133.14	-112.40
2045	0.00	0.00	10.30	0.00	0.00	0.00	10.30	29.79	32.15	163.07	71.21	105.07	125.82	-139.02
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	35.00	156.58	70.05	116.03	127.87	-157.37
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.16	150.36	68.78	117.63	138.86	-174.91
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.17	156.67	70.01	112.91	130.85	-157.10
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.17	156.67	70.01	112.91	130.85	-157.10
2050	0.00	0.00	48.99	0.00	9.69	0.00	58.69	29.79	32.18	156.67	70.01	112.91	130.85	-157.10
2051	0.00	0.00	66.65	0.00	9.69	0.00	76.34	29.79	33.89	156.67	70.01	112.91	130.85	-157.10
2052	0.00	0.00	10.07	0.00	9.69	0.00	19.76	29.79	33.90	156.67	70.01	112.91	130.85	-157.10
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	156.67	70.01	112.91	130.85	-157.10
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	156.67	70.01	112.91	130.85	-157.10
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	156.67	70.01	112.91	130.85	-157.10
2056	0.00	0.00	0.00	0.00	6.64	0.00	6.64	29.79	35.04	156.67	70.01	112.91	130.85	-157.10
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2066	0.00	0.00	49.78	0.00	0.00	0.00	49.78	29.79	35.04	156.67	70.01	112.91	130.85	-157.10
2067	0.00	0.00	67.72	0.00	0.00	0.00	67.72	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2068	0.00	0.00	10.23	0.00	0.00	0.00	10.23	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2069	0.00	0.00	49.93	0.00	0.00	0.00	49.93	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2070	0.00	0.00	67.93	0.00	0.00	0.00	67.93	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2071	0.00	0.00	60.30	0.00	0.00	0.00	60.30	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2072	0.00	0.00	68.06	0.00	7.11	0.00	75.17	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2073	0.00	0.00	60.42	0.00	0.95	0.00	61.37	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2074	0.00	0.00	68.20	0.00	1.90	0.00	70.09	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2075	0.00	0.00	10.30	0.00	43.46	0.00	53.77	29.79	47.41	156.67	70.01	112.91	130.85	-157.10
2076	0.00	0.00	0.00	0.00	1.90	0.00	1.90	29.79	35.04	156.67	70.01	112.91	130.85	-157.10
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	49.12	156.67	70.01	112.91	130.85	-157.10
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	156.67	70.01	112.91	130.85	-157.10
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	29.79	49.12	156.67	70.01	112.91	130.85	-157.10
2080	0.00	0.00	48.99	0.00	0.00	0.00	48.99	29.79	33.90	156.67	70.01	112.91	130.85	-157.10
2081	0.00	0.00	66.65	0.00	0.00	0.00	66.65	29.79	49.12	156.67	70.01	112.91	130.85	-157.10
2082	0.00	0.00	10.07	0.00	0.00	0.00	10.07	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	35.04	156.67	70.01	112.91	130.85	-157.10
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
2090	0.00	0.00	0.00	0.00	13.07	0.00	13.07	29.79	32.19	156.67	70.01	112.91	130.85	-157.10
Salvage Value	13.69	0.00	23.21	0.00	8.38	0.00	45.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	460.49	0.00	111.62	0.00	4525.00	601.92	509.81	6176.56	2365.17	1458.80	2988.30	-635.70

Net Present Value -6272

CCGT/C26

TABLE 224
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	231.34	101.04	15.19	79.32	35.79
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	249.85	99.35	16.95	83.89	49.66
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	256.51	97.51	17.52	85.40	56.08
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	269.09	95.95	18.02	86.09	69.02
2018	192.09	0.00	0.35	0.00	0.00	0.00	192.45	3.06	0.00	258.12	93.30	20.13	86.64	58.04
2019	229.36	0.00	98.43	0.00	0.00	0.00	327.79	4.70	0.00	251.88	91.36	17.99	86.31	56.23
2020	233.06	0.00	163.06	0.00	0.00	0.00	396.12	6.57	0.00	257.32	91.24	12.90	88.12	65.06
2021	640.56	0.00	84.61	0.00	6.64	0.00	731.80	10.12	0.00	261.96	90.15	10.78	92.35	68.68
2022	1025.35	0.00	4.63	0.00	0.47	0.00	1030.45	15.27	6.79	261.96	87.88	31.11	85.80	57.17
2023	917.93	0.00	0.00	0.00	0.95	0.00	918.88	19.87	6.79	262.98	85.85	37.37	90.07	49.69
2024	653.60	0.00	0.00	0.00	1.90	0.00	655.50	23.15	6.79	277.81	84.77	45.28	94.36	53.41
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	25.42	6.79	187.99	84.31	36.21	91.85	-24.38
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	26.91	20.85	219.03	87.97	27.71	82.18	21.16
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	27.45	21.06	298.11	95.47	20.03	78.37	104.24
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	27.62	20.78	322.51	95.84	21.41	82.59	122.68
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.99	311.39	94.20	22.66	83.74	110.80
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.82	295.29	92.14	24.32	85.48	93.35
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.77	296.18	92.05	21.70	84.23	98.20
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.54	274.25	89.34	25.38	87.01	72.52
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.11	265.31	87.65	28.35	89.14	60.16
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.11	255.01	85.72	32.25	92.11	44.94
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.15	248.20	84.29	34.74	94.05	35.12
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	22.83	239.40	82.71	40.04	95.89	20.77
2037	0.00	0.00	49.83	0.00	0.00	0.00	49.83	27.87	19.98	235.99	81.98	41.39	96.37	16.26
2038	0.00	0.00	67.83	0.00	6.64	0.00	74.47	28.25	19.98	229.79	80.83	42.10	100.15	6.70
2039	0.00	0.00	10.24	0.00	0.00	0.00	10.24	28.30	23.90	221.03	79.12	54.74	107.34	-20.16
2040	0.00	0.00	49.98	0.00	0.00	0.00	49.98	28.55	23.90	213.57	77.74	60.89	110.00	-35.05
2041	0.00	0.00	70.04	0.00	52.27	0.00	122.30	29.15	23.90	204.75	76.46	63.16	113.83	-48.70
2042	0.00	0.00	60.36	0.00	0.00	0.00	60.36	29.45	27.18	199.34	75.15	70.58	118.46	-64.86
2043	0.00	0.00	68.13	0.00	0.00	0.00	68.13	29.79	27.18	190.21	73.80	83.74	116.83	-84.15
2044	0.00	0.00	10.29	0.00	0.00	0.00	10.29	29.84	31.09	183.92	72.51	95.63	118.94	-103.16
2045	0.00	0.00	50.23	0.00	0.00	0.00	50.23	30.09	31.09	177.28	71.24	99.30	126.02	-119.28
2046	0.00	0.00	68.33	0.00	43.97	0.00	112.30	30.65	33.95	174.54	70.35	98.65	133.53	-127.99
2047	0.00	0.00	10.33	0.00	0.00	0.00	10.33	30.71	35.03	162.03	68.81	124.07	127.00	-157.85
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.04	171.28	70.13	107.34	128.85	-135.04
2049	0.00	0.00	98.43	0.00	9.69	0.00	108.12	30.71	35.05	171.28	70.13	107.34	128.85	-135.04
2050	0.00	0.00	141.63	0.00	9.69	0.00	151.33	30.71	35.05	171.28	70.13	107.34	128.85	-135.04
2051	0.00	0.00	63.18	0.00	9.69	0.00	72.88	30.71	36.76	171.28	70.13	107.34	128.85	-135.04
2052	0.00	0.00	4.63	0.00	9.69	0.00	14.32	30.71	36.77	171.28	70.13	107.34	128.85	-135.04
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.77	171.28	70.13	107.34	128.85	-135.04
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	171.28	70.13	107.34	128.85	-135.04
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	171.28	70.13	107.34	128.85	-135.04
2056	0.00	0.00	0.00	0.00	6.64	0.00	6.64	30.71	37.92	171.28	70.13	107.34	128.85	-135.04
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	37.92	171.28	70.13	107.34	128.85	-135.04
2067	0.00	0.00	49.83	0.00	0.00	0.00	49.83	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2068	0.00	0.00	67.79	0.00	0.00	0.00	67.79	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2069	0.00	0.00	10.24	0.00	0.00	0.00	10.24	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2070	0.00	0.00	49.98	0.00	0.00	0.00	49.98	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2071	0.00	0.00	67.99	0.00	0.00	0.00	67.99	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2072	0.00	0.00	60.36	0.00	0.47	0.00	60.83	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2073	0.00	0.00	68.13	0.00	7.58	0.00	75.71	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2074	0.00	0.00	10.29	0.00	1.90	0.00	12.19	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2075	0.00	0.00	50.23	0.00	4.26	0.00	54.50	30.71	50.29	171.28	70.13	107.34	128.85	-135.04
2076	0.00	0.00	68.33	0.00	41.09	0.00	109.43	30.71	37.92	171.28	70.13	107.34	128.85	-135.04
2077	0.00	0.00	10.33	0.00	0.00	0.00	10.33	30.71	52.00	171.28	70.13	107.34	128.85	-135.04
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	171.28	70.13	107.34	128.85	-135.04
2079	0.00	0.00	98.43	0.00	0.00	0.00	98.43	30.71	52.00	171.28	70.13	107.34	128.85	-135.04
2080	0.00	0.00	141.63	0.00	0.00	0.00	141.63	30.71	36.78	171.28	70.13	107.34	128.85	-135.04
2081	0.00	0.00	63.18	0.00	32.98	0.00	96.16	30.71	52.00	171.28	70.13	107.34	128.85	-135.04
2082	0.00	0.00	4.63	0.00	0.00	0.00	4.63	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	37.92	171.28	70.13	107.34	128.85	-135.04
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	171.28	70.13	107.34	128.85	-135.04
Salvage Value	13.69	0.00	36.42	0.00	7.63	0.00	57.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	666.39	0.00	108.99	0.00	4728.28	621.66	563.34	6479.76	2368.57	1534.58	2907.25	-330.65

Net Present Value -6244

Wind/C26

TABLE 225
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	231.34	101.04	15.19	79.32	35.79
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	249.85	99.35	16.95	83.89	49.66
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	256.51	97.51	17.52	85.40	56.08
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	269.09	95.95	18.02	86.09	69.02
2018	192.09	0.00	0.00	0.00	0.00	0.00	192.09	3.06	0.00	258.12	93.30	20.13	86.64	58.04
2019	229.36	0.00	0.00	0.00	0.00	0.00	229.36	4.20	0.00	251.88	91.36	17.99	86.31	56.23
2020	233.06	0.00	0.00	6.94	10.37	0.00	250.37	5.46	0.00	255.17	90.85	13.85	88.43	62.04
2021	640.56	0.00	0.00	211.88	17.29	0.00	869.72	9.80	0.00	255.42	89.07	13.48	93.26	59.61
2022	1025.35	0.00	0.00	215.84	21.22	0.00	1262.41	16.12	6.10	258.44	87.46	13.51	93.57	63.90
2023	917.93	0.00	0.00	208.90	11.32	0.00	1138.16	21.81	12.20	262.00	85.04	15.50	96.89	64.57
2024	653.60	0.00	0.00	3.97	5.35	0.00	662.92	25.12	18.31	275.05	83.11	16.09	103.28	72.57
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	27.40	18.31	185.33	82.94	10.56	118.86	-27.03
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	28.89	32.36	238.01	86.91	12.56	85.59	52.95
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	29.43	32.58	322.68	94.33	11.33	79.90	137.12
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	29.60	32.29	342.33	94.38	12.43	84.14	151.38
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.50	331.86	92.76	12.63	86.01	140.46
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.33	323.93	91.71	12.36	85.99	133.88
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.28	315.10	90.32	12.67	87.10	125.00
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	29.60	32.05	302.74	88.91	12.70	88.04	113.08
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	31.62	288.02	87.41	12.60	89.17	98.84
2034	0.00	0.00	71.11	0.00	0.00	0.00	71.11	29.85	31.62	273.63	85.98	12.61	89.97	85.06
2035	0.00	0.00	89.02	0.00	6.64	0.00	95.65	30.22	31.66	267.74	84.98	11.52	91.22	80.02
2036	0.00	0.00	60.00	0.00	0.00	0.00	60.00	30.52	38.26	256.41	82.97	20.75	92.31	60.39
2037	0.00	0.00	67.77	0.00	6.64	0.00	74.40	30.89	35.41	247.04	81.55	23.42	94.45	47.62
2038	0.00	0.00	10.23	0.00	0.00	0.00	10.23	30.94	39.32	241.49	80.34	30.51	96.29	34.36
2039	0.00	0.00	49.93	0.00	0.00	0.00	49.93	31.19	39.32	234.47	79.18	29.72	106.70	18.87
2040	0.00	0.00	69.97	6.94	52.27	0.00	129.17	31.83	39.32	223.28	77.56	37.48	108.01	0.22
2041	0.00	0.00	60.30	211.88	0.00	0.00	272.18	33.19	43.25	216.43	76.19	46.24	110.46	-16.46
2042	0.00	0.00	68.06	215.84	0.00	0.00	283.91	34.61	42.61	208.62	74.95	48.31	115.14	-29.79
2043	0.00	0.00	60.42	208.90	0.00	0.00	269.32	35.96	46.52	203.55	73.68	54.05	120.95	-45.13
2044	0.00	0.00	68.20	3.97	43.97	0.00	116.13	36.54	46.52	192.68	72.36	66.98	118.83	-65.49
2045	0.00	0.00	10.30	0.00	0.00	0.00	10.30	36.59	50.45	185.87	71.11	78.27	121.13	-84.64
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	53.31	178.72	69.87	79.65	129.24	-100.04
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.47	172.03	68.65	80.43	139.05	-116.10
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.47	178.87	69.88	79.45	129.81	-100.26
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.48	178.87	69.88	79.45	129.81	-100.26
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.48	178.87	69.88	79.45	129.81	-100.26
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2055	0.00	0.00	0.00	0.00	2.59	0.00	2.59	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2056	0.00	0.00	0.00	0.00	4.32	0.00	4.32	36.59	53.34	178.87	69.88	79.45	129.81	-100.26
2057	0.00	0.00	0.00	0.00	5.19	0.00	5.19	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2058	0.00	0.00	0.00	0.00	2.59	0.00	2.59	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2059	0.00	0.00	0.00	0.00	0.86	0.00	0.86	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2060	0.00	0.00	0.00	6.94	0.00	0.00	6.94	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2061	0.00	0.00	0.00	211.88	0.00	0.00	211.88	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2062	0.00	0.00	0.00	215.84	0.00	0.00	215.84	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2063	0.00	0.00	0.00	208.90	0.00	0.00	208.90	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2064	0.00	0.00	49.68	3.97	0.00	0.00	53.65	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2065	0.00	0.00	67.59	0.00	0.00	0.00	67.59	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2066	0.00	0.00	60.00	0.00	0.00	0.00	60.00	36.59	53.34	178.87	69.88	79.45	129.81	-100.26
2067	0.00	0.00	67.72	0.00	0.00	0.00	67.72	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2068	0.00	0.00	10.23	0.00	0.00	0.00	10.23	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2069	0.00	0.00	49.93	0.00	0.00	0.00	49.93	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2070	0.00	0.00	67.93	0.00	14.42	0.00	82.34	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2071	0.00	0.00	60.30	0.00	12.97	0.00	73.26	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2072	0.00	0.00	68.06	0.00	22.67	0.00	90.73	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2073	0.00	0.00	60.42	0.00	8.73	0.00	69.14	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2074	0.00	0.00	68.20	0.00	4.49	0.00	72.69	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2075	0.00	0.00	10.30	0.00	43.46	0.00	53.77	36.59	65.72	178.87	69.88	79.45	129.81	-100.26
2076	0.00	0.00	0.00	0.00	1.90	0.00	1.90	36.59	53.34	178.87	69.88	79.45	129.81	-100.26
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	67.43	178.87	69.88	79.45	129.81	-100.26
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	36.59	67.43	178.87	69.88	79.45	129.81	-100.26
2080	0.00	0.00	0.00	6.94	0.00	0.00	6.94	36.59	52.20	178.87	69.88	79.45	129.81	-100.26
2081	0.00	0.00	0.00	211.88	0.00	0.00	211.88	36.59	67.43	178.87	69.88	79.45	129.81	-100.26
2082	0.00	0.00	0.00	215.84	0.00	0.00	215.84	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2083	0.00	0.00	0.00	208.90	0.00	0.00	208.90	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2084	0.00	0.00	0.00	3.97	9.69	0.00	13.66	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	53.34	178.87	69.88	79.45	129.81	-100.26
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
2090	0.00	0.00	0.00	0.00	13.07	0.00	13.07	36.59	50.50	178.87	69.88	79.45	129.81	-100.26
Salvage Value	13.69	0.00	17.51	32.83	11.22	0.00	75.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	389.40	924.88	165.38	0.00	5432.56	703.43	850.83	6705.70	2357.13	1068.48	2951.56	328.54

Net Present Value -6658

K19/C25/750MW (WPS Sale &Inv)

TABLE 226
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	3.86	283.93	1.42	0.00	247.47	105.06	15.82	82.63	43.96
2015	89.38	496.39	0.00	0.00	19.33	6.90	611.99	4.48	0.00	265.75	103.33	17.62	87.25	57.55
2016	186.20	657.29	0.00	0.00	26.45	17.53	887.47	8.92	0.00	273.81	101.41	18.21	88.86	65.34
2017	216.63	796.58	0.00	0.00	38.71	25.50	1077.42	14.30	0.00	285.75	99.44	19.45	90.14	76.72
2018	260.39	561.68	0.00	0.00	40.69	105.59	968.35	19.15	0.00	278.52	97.31	20.36	90.00	70.84
2019	266.64	401.73	0.00	0.00	51.81	87.01	807.19	23.18	13.29	294.51	97.23	19.20	88.76	89.31
2020	734.99	164.04	0.00	0.00	3.62	161.28	1063.92	28.50	45.83	459.15	104.52	13.69	96.43	244.51
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	34.90	43.92	536.54	105.08	15.10	101.11	315.24
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	40.32	42.55	537.63	103.83	15.16	102.16	316.47
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	44.29	40.67	527.93	101.45	15.02	104.83	306.63
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	47.24	39.07	527.33	99.15	16.69	110.33	301.15
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	49.40	52.00	469.60	103.74	14.93	92.98	257.95
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	50.56	50.42	613.85	111.92	14.85	92.51	394.56
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	50.76	48.96	644.44	112.15	14.57	97.70	420.03
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	47.93	645.16	110.45	15.09	99.39	420.23
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	49.25	634.27	108.50	15.09	101.21	409.48
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	43.96	627.96	107.12	14.76	102.24	403.85
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	42.61	619.92	105.44	15.11	103.89	395.48
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	41.09	608.10	103.70	15.13	105.56	383.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	40.06	593.84	101.88	15.10	107.34	369.52
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	39.10	579.51	100.12	15.16	108.94	355.29
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	40.40	526.83	98.41	14.99	106.87	306.55
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	36.88	446.49	96.72	15.25	99.75	234.77
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	50.76	36.35	420.30	95.07	15.34	100.48	209.42
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	35.83	403.99	93.39	15.29	103.08	192.23
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	51.16	38.28	388.75	91.74	15.25	112.30	169.46
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	51.76	34.83	367.48	90.45	14.48	116.96	145.58
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	51.84	37.76	349.03	88.41	24.89	117.02	118.70
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	52.24	37.30	338.68	86.85	27.88	119.67	104.27
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	52.85	36.85	330.64	85.46	29.51	123.18	92.49
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	53.34	42.27	327.55	84.22	34.02	127.54	81.77
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	54.27	44.81	309.81	82.35	42.92	127.30	57.24
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	54.36	45.53	301.60	80.89	52.53	129.71	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	44.25	293.13	79.59	54.99	134.22	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	42.98	301.51	80.94	50.15	130.41	40.02
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	54.36	45.58	301.51	80.94	50.15	130.41	40.02
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	54.36	44.04	301.51	80.94	50.15	130.41	40.02
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	54.36	43.70	301.51	80.94	50.15	130.41	40.02
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	54.36	43.38	301.51	80.94	50.15	130.41	40.02
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	54.36	43.06	301.51	80.94	50.15	130.41	40.02
2054	0.00	0.00	0.00	0.00	18.01	18.89	36.91	54.36	42.75	301.51	80.94	50.15	130.41	40.02
2055	0.00	0.00	0.00	0.00	0.89	19.59	20.49	54.36	43.63	301.51	80.94	50.15	130.41	40.02
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	54.36	56.21	301.51	80.94	50.15	130.41	40.02
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	54.36	40.10	301.51	80.94	50.15	130.41	40.02
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	54.36	55.66	301.51	80.94	50.15	130.41	40.02
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	54.36	42.53	301.51	80.94	50.15	130.41	40.02
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	54.36	52.37	301.51	80.94	50.15	130.41	40.02
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	68.20	301.51	80.94	50.15	130.41	40.02
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	54.36	68.20	301.51	80.94	50.15	130.41	40.02
2065	0.00	0.00	0.00	0.00	8.83	4.27	13.10	54.36	39.50	301.51	80.94	50.15	130.41	40.02
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	54.36	68.20	301.51	80.94	50.15	130.41	40.02
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	54.36	68.20	301.51	80.94	50.15	130.41	40.02
2069	0.00	0.00	80.00	0.00	33.80	57.59	171.40	54.36	39.50	301.51	80.94	50.15	130.41	40.02
2070	0.00	0.00	109.27	0.00	2.73	59.73	171.72	54.36	54.15	301.51	80.94	50.15	130.41	40.02
2071	0.00	0.00	16.58	0.00	33.14	0.00	49.72	54.36	38.32	301.51	80.94	50.15	130.41	40.02
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	54.36	54.15	301.51	80.94	50.15	130.41	40.02
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	54.36	37.43	301.51	80.94	50.15	130.41	40.02
2074	0.00	0.00	98.85	0.00	51.10	0.00	149.95	54.36	52.37	301.51	80.94	50.15	130.41	40.02
2075	0.00	0.00	112.03	0.00	76.86	0.00	188.89	54.36	39.50	301.51	80.94	50.15	130.41	40.02
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	54.36	54.15	301.51	80.94	50.15	130.41	40.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	38.32	301.51	80.94	50.15	130.41	40.02
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	54.36	54.15	301.51	80.94	50.15	130.41	40.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	41.28	301.51	80.94	50.15	130.41	40.02
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	54.36	54.15	301.51	80.94	50.15	130.41	40.02
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	54.36	39.50	301.51	80.94	50.15	130.41	40.02
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	54.36	36.54	301.51	80.94	50.15	130.41	40.02
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	54.36	39.50	301.51	80.94	50.15	130.41	40.02
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	54.36	39.50	301.51	80.94	50.15	130.41	40.02
Salvage Value	0.87	0.00	2.40	0.00	3.80	1.76	8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	128.68	0.00	397.09	314.63	7367.28	591.87	494.22	6753.60	1607.87	347.40	1660.56	3137.77

Net Present Value -5316

K19/C25/750MW

TABLE 227
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	5.40	285.47	1.43	0.00	240.15	105.07	15.82	82.48	36.77
2015	89.38	496.39	0.00	0.00	19.33	8.74	613.84	4.50	0.00	258.65	103.32	17.61	87.24	50.48
2016	186.20	657.29	0.00	0.00	26.45	18.32	888.26	8.94	0.00	265.48	101.40	18.19	88.83	57.07
2017	216.63	796.58	0.00	0.00	38.71	25.50	1077.42	14.32	0.00	276.12	99.43	19.45	90.12	67.13
2018	260.39	561.68	0.00	0.00	40.69	149.24	1012.00	19.39	0.00	267.60	97.30	20.33	90.04	59.94
2019	266.64	401.73	0.00	0.00	51.81	102.80	822.98	23.50	13.29	282.27	97.22	19.17	88.78	77.09
2020	734.99	164.04	0.00	0.00	3.62	284.21	1186.86	29.43	49.02	436.47	104.52	13.67	96.34	221.95
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	35.84	47.22	523.56	105.08	15.20	101.19	302.09
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	41.25	45.88	527.23	103.82	15.16	102.18	306.07
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	45.22	43.85	518.22	101.44	15.02	104.86	296.90
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	48.17	42.12	518.93	99.13	16.73	110.39	292.69
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	50.34	54.92	460.33	103.74	14.95	92.96	248.68
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	51.49	53.22	566.47	111.91	14.91	90.62	349.03
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	51.69	51.65	562.46	112.16	14.48	93.01	342.81
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	50.50	560.12	110.45	15.07	94.34	340.26
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	51.71	550.91	108.49	15.08	96.25	331.09
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	46.31	546.06	107.10	14.79	97.45	326.72
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	44.86	539.76	105.42	15.18	99.19	319.96
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	43.24	529.76	103.69	15.19	101.13	309.74
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	42.11	517.40	101.88	15.08	103.12	297.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	41.06	505.01	100.13	15.13	105.01	284.75
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	42.27	436.57	98.44	15.16	98.07	224.90
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	38.67	411.55	96.73	15.31	98.50	201.01
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	51.69	38.06	396.93	95.04	15.30	100.51	186.08
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	37.47	381.45	93.39	15.27	103.07	169.73
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	52.09	39.86	367.00	91.74	15.28	112.24	147.73
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	52.69	36.34	363.13	90.45	14.49	116.93	141.25
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	52.77	39.20	349.03	88.41	24.89	117.01	118.71
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	53.18	38.68	338.68	86.85	27.88	119.66	104.29
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	53.78	38.18	330.65	85.46	29.51	123.18	92.50
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	54.27	43.53	327.56	84.22	34.02	127.53	81.79
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	55.21	46.02	309.79	82.35	42.92	127.27	57.25
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	55.29	46.69	301.55	80.89	52.53	129.65	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	45.35	293.09	79.59	54.99	134.17	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	44.04	301.48	80.94	50.15	130.36	40.02
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	55.29	46.58	301.48	80.94	50.15	130.36	40.02
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	55.29	45.00	301.48	80.94	50.15	130.36	40.02
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	55.29	44.62	301.48	80.94	50.15	130.36	40.02
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	55.29	44.24	301.48	80.94	50.15	130.36	40.02
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	55.29	43.89	301.48	80.94	50.15	130.36	40.02
2054	0.00	0.00	0.00	0.00	18.01	18.89	36.91	55.29	43.53	301.48	80.94	50.15	130.36	40.02
2055	0.00	0.00	0.00	0.00	0.89	19.59	20.49	55.29	44.38	301.48	80.94	50.15	130.36	40.02
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	55.29	56.92	301.48	80.94	50.15	130.36	40.02
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	55.29	40.77	301.48	80.94	50.15	130.36	40.02
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	55.29	56.29	301.48	80.94	50.15	130.36	40.02
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	55.29	43.13	301.48	80.94	50.15	130.36	40.02
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	55.29	52.37	301.48	80.94	50.15	130.36	40.02
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	68.20	301.48	80.94	50.15	130.36	40.02
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	55.29	68.20	301.48	80.94	50.15	130.36	40.02
2065	0.00	0.00	0.00	0.00	8.83	4.27	13.10	55.29	39.50	301.48	80.94	50.15	130.36	40.02
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	55.29	68.20	301.48	80.94	50.15	130.36	40.02
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	55.29	68.20	301.48	80.94	50.15	130.36	40.02
2069	0.00	0.00	80.00	0.00	33.80	57.59	171.40	55.29	39.50	301.48	80.94	50.15	130.36	40.02
2070	0.00	0.00	109.27	0.00	2.73	59.73	171.72	55.29	54.15	301.48	80.94	50.15	130.36	40.02
2071	0.00	0.00	16.58	0.00	33.14	0.00	49.72	55.29	38.32	301.48	80.94	50.15	130.36	40.02
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	55.29	54.15	301.48	80.94	50.15	130.36	40.02
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	55.29	37.43	301.48	80.94	50.15	130.36	40.02
2074	0.00	0.00	98.85	0.00	51.10	0.00	149.95	55.29	52.37	301.48	80.94	50.15	130.36	40.02
2075	0.00	0.00	112.03	0.00	76.86	0.00	188.89	55.29	39.50	301.48	80.94	50.15	130.36	40.02
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	55.29	54.15	301.48	80.94	50.15	130.36	40.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	38.32	301.48	80.94	50.15	130.36	40.02
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	55.29	54.15	301.48	80.94	50.15	130.36	40.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	41.28	301.48	80.94	50.15	130.36	40.02
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	55.29	54.15	301.48	80.94	50.15	130.36	40.02
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	55.29	39.50	301.48	80.94	50.15	130.36	40.02
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	55.29	36.54	301.48	80.94	50.15	130.36	40.02
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	55.29	39.50	301.48	80.94	50.15	130.36	40.02
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	55.29	39.50	301.48	80.94	50.15	130.36	40.02
Salvage Value	0.87	0.00	2.40	0.00	3.80	1.76	8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	128.68	0.00	397.09	448.31	7500.96	602.70	518.00	6360.52	1607.80	347.48	1643.51	2761.73

Net Present Value -5860

K19/Gas25/750MW (WPS Sale & INV)

TABLE 228
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	3.86	251.54	1.26	0.00	247.47	105.06	15.82	82.63	43.96
2015	0.00	496.39	0.00	0.00	19.33	6.90	522.61	3.87	0.00	265.76	103.33	17.62	87.25	57.56
2016	0.00	657.29	0.00	0.00	26.45	17.53	701.27	7.38	0.00	273.84	101.41	18.20	88.86	65.38
2017	0.00	796.58	0.00	0.00	38.71	25.50	860.79	11.68	0.00	285.95	99.43	19.44	90.12	76.96
2018	0.00	561.68	0.00	0.00	40.69	105.59	707.96	15.22	0.00	278.83	97.31	20.32	89.97	71.22
2019	0.00	401.73	0.00	0.00	48.21	87.01	536.95	17.91	13.29	295.03	97.23	19.19	88.75	89.86
2020	0.00	164.04	0.00	0.00	0.01	161.28	325.33	19.53	45.83	459.89	104.52	13.68	96.39	245.30
2021	0.00	56.92	0.37	0.00	0.00	0.00	57.29	19.82	43.92	537.84	105.08	15.09	101.04	316.63
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	19.82	42.55	539.08	103.82	15.13	102.07	318.07
2023	0.00	0.00	96.15	0.00	0.00	0.00	96.15	20.19	40.67	528.19	100.98	16.03	105.35	305.83
2024	0.00	0.00	197.40	0.00	9.48	0.00	206.89	21.11	39.07	529.70	98.82	17.63	110.67	302.58
2025	0.00	0.00	118.82	0.00	74.66	0.00	193.48	22.07	41.46	416.56	98.47	17.02	102.08	198.99
2026	0.00	0.00	90.36	0.00	0.00	0.00	90.36	22.52	43.74	445.55	97.12	20.17	105.05	223.21
2027	0.00	0.00	102.41	0.00	0.00	0.00	102.41	23.03	42.42	444.80	95.12	19.79	109.58	220.32
2028	0.00	0.00	15.54	0.00	0.00	0.00	15.54	23.11	45.24	437.01	92.74	29.07	112.29	202.92
2029	0.00	0.00	76.11	0.00	0.00	0.00	76.11	23.49	46.73	427.54	90.94	32.54	115.40	188.66
2030	0.00	0.00	103.95	0.00	62.81	0.00	166.76	24.32	41.50	425.82	89.82	35.73	117.95	182.31
2031	0.00	0.00	92.64	0.00	0.00	0.00	92.64	24.79	44.41	429.59	89.42	38.84	118.87	182.45
2032	0.00	0.00	104.99	0.00	0.00	0.00	104.99	25.31	43.28	416.19	87.03	46.33	123.54	159.28
2033	0.00	0.00	15.93	0.00	0.00	0.00	15.93	25.39	46.25	410.00	85.46	55.54	126.67	142.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	45.18	406.40	84.68	58.03	128.66	135.04
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	43.70	334.97	82.51	56.17	123.99	72.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	43.15	240.05	81.03	57.21	111.88	-10.07
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	42.62	214.65	79.59	62.77	112.44	-40.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	42.10	211.40	78.81	61.35	117.99	-46.75
2039	0.00	0.00	164.92	0.00	0.00	0.00	164.92	26.21	44.56	191.59	76.86	73.40	124.75	-83.42
2040	0.00	0.00	238.26	0.00	0.00	0.00	238.26	27.41	41.11	171.87	75.49	81.25	127.78	-112.65
2041	0.00	0.00	106.71	0.00	9.48	0.00	116.19	27.99	40.64	174.35	75.70	79.55	127.50	-108.40
2042	0.00	0.00	7.85	0.00	0.00	0.00	7.85	28.03	47.24	191.45	73.47	114.28	129.21	-125.52
2043	0.00	0.00	81.62	0.00	0.00	0.00	81.62	28.43	46.80	177.64	71.70	125.06	133.25	-152.37
2044	0.00	0.00	111.47	0.00	62.81	0.00	174.28	29.31	48.14	161.62	70.07	133.72	137.28	-179.45
2045	0.00	0.00	53.17	0.00	0.00	0.00	53.17	29.57	51.81	154.40	68.71	149.23	140.43	-203.98
2046	0.00	0.00	49.52	0.00	0.00	0.00	49.52	29.82	51.40	146.07	67.48	161.90	143.55	-226.86
2047	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.86	51.60	142.66	66.64	167.12	149.35	-240.44
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	50.33	147.71	67.61	159.41	144.44	-223.76
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	29.86	52.93	147.71	67.61	159.41	144.44	-223.76
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	29.86	49.62	147.71	67.61	159.41	144.44	-223.76
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	29.86	49.28	147.71	67.61	159.41	144.44	-223.76
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	29.86	48.95	147.71	67.61	159.41	144.44	-223.76
2053	0.00	0.00	73.87	0.00	20.99	18.89	113.75	29.86	48.63	147.71	67.61	159.41	144.44	-223.76
2054	0.00	0.00	175.12	0.00	17.12	18.89	211.14	29.86	48.32	147.71	67.61	159.41	144.44	-223.76
2055	0.00	0.00	116.70	0.00	0.00	19.59	136.29	29.86	48.02	147.71	67.61	159.41	144.44	-223.76
2056	0.00	0.00	90.36	0.00	0.00	0.00	90.36	29.86	63.56	147.71	67.61	159.41	144.44	-223.76
2057	0.00	0.00	102.41	0.00	0.00	0.00	102.41	29.86	47.45	147.71	67.61	159.41	144.44	-223.76
2058	0.00	0.00	15.54	0.00	0.00	0.00	15.54	29.86	63.01	147.71	67.61	159.41	144.44	-223.76
2059	0.00	0.00	76.11	0.00	9.48	0.00	85.59	29.86	49.87	147.71	67.61	159.41	144.44	-223.76
2060	0.00	0.00	103.95	0.00	56.00	0.00	159.95	29.86	59.72	147.71	67.61	159.41	144.44	-223.76
2061	0.00	0.00	92.64	0.00	0.00	0.00	92.64	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2062	0.00	0.00	104.99	0.00	0.00	0.00	104.99	29.86	59.72	147.71	67.61	159.41	144.44	-223.76
2063	0.00	0.00	15.93	0.00	0.00	0.00	15.93	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	29.86	59.72	147.71	67.61	159.41	144.44	-223.76
2065	0.00	0.00	0.00	0.00	55.94	4.27	60.21	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	29.86	59.72	147.71	67.61	159.41	144.44	-223.76
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	29.86	59.72	147.71	67.61	159.41	144.44	-223.76
2069	0.00	0.00	164.92	0.00	31.08	57.59	253.60	29.86	46.85	147.71	67.61	159.41	144.44	-223.76
2070	0.00	0.00	238.26	0.00	0.01	59.73	298.00	29.86	45.66	147.71	67.61	159.41	144.44	-223.76
2071	0.00	0.00	106.71	0.00	0.00	0.00	106.71	29.86	45.66	147.71	67.61	159.41	144.44	-223.76
2072	0.00	0.00	7.85	0.00	0.00	0.00	7.85	29.86	45.66	147.71	67.61	159.41	144.44	-223.76
2073	0.00	0.00	81.62	0.00	0.00	0.00	81.62	29.86	44.77	147.71	67.61	159.41	144.44	-223.76
2074	0.00	0.00	111.47	0.00	0.00	0.00	111.47	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2075	0.00	0.00	53.17	0.00	18.67	0.00	71.84	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2076	0.00	0.00	49.52	0.00	9.48	0.00	59.01	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2077	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	29.86	46.85	147.71	67.61	159.41	144.44	-223.76
2080	0.00	0.00	0.00	0.00	15.70	0.00	15.70	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2083	0.00	0.00	73.87	0.00	0.00	0.00	73.87	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2084	0.00	0.00	175.12	0.00	10.82	0.70	186.65	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2085	0.00	0.00	116.70	0.00	10.50	1.40	128.59	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2086	0.00	0.00	90.36	0.00	25.39	4.20	119.95	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2087	0.00	0.00	102.41	0.00	29.50	6.30	138.20	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2088	0.00	0.00	15.54	0.00	20.99	18.89	55.42	29.86	43.89	147.71	67.61	159.41	144.44	-223.76
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	29.86	46.85	147.71	67.61	159.41	144.44	-223.76
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	29.86	46.85	147.71	67.61	159.41	144.44	-223.76
Salvage Value	0.00	0.00	7.66	0.00	2.07	1.76	11.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	683.17	0.00	258.06	314.63	4066.00	317.59	507.22	5374.98	1490.35	780.17	1771.35	1333.12

Net Present Value -3558

K19/C31/750MW

TABLE 229
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	226.22	0.00	0.00	21.46	5.40	284.83	1.42	0.00	240.15	105.07	15.82	82.48	36.77
2015	40.08	496.39	0.00	0.00	19.33	8.74	564.54	4.25	0.00	258.65	103.32	17.61	87.24	50.48
2016	10.89	657.29	0.00	0.00	26.45	18.32	712.95	7.81	0.00	265.48	101.40	18.19	88.83	57.07
2017	10.95	796.58	0.00	0.00	38.71	25.50	871.74	12.17	0.00	276.37	99.42	19.45	90.12	67.38
2018	13.02	561.68	0.00	0.00	40.69	149.24	764.63	15.99	0.00	267.90	97.29	20.32	90.00	60.29
2019	13.09	401.73	0.00	0.00	48.21	102.80	565.83	18.82	13.29	282.73	97.21	19.21	88.77	77.54
2020	13.17	164.04	0.00	0.00	0.01	284.21	461.44	21.13	49.02	437.27	104.51	13.70	96.33	222.74
2021	16.66	56.92	0.00	0.00	0.00	0.00	73.58	21.50	47.22	524.67	105.07	15.17	101.08	303.35
2022	168.48	0.00	0.00	0.00	0.00	0.00	168.48	22.34	45.88	528.81	103.84	15.14	102.08	307.75
2023	257.00	0.00	0.00	0.00	0.00	0.00	257.00	23.63	43.85	518.06	100.87	16.22	105.64	295.33
2024	279.20	0.00	0.00	0.00	0.00	0.00	279.20	25.02	42.12	520.04	98.64	18.05	111.33	292.02
2025	284.55	0.00	0.00	0.00	3.61	0.00	288.16	26.46	40.31	405.09	98.49	13.09	107.92	185.58
2026	769.74	0.00	0.00	0.00	3.61	0.00	773.35	30.33	38.38	389.32	96.56	13.51	116.87	162.39
2027	1222.24	0.00	0.00	0.00	43.84	0.00	1266.08	36.66	36.95	347.54	94.60	12.69	115.25	125.01
2028	1097.38	0.00	0.00	0.00	22.74	0.00	1120.12	42.26	35.58	334.47	92.96	13.18	124.79	103.53
2029	783.65	0.00	0.00	0.00	38.26	0.00	821.91	46.37	36.97	324.96	91.32	13.57	135.90	84.17
2030	542.72	0.00	0.00	0.00	66.25	0.00	608.98	49.41	31.62	322.43	89.97	13.89	144.73	73.83
2031	356.48	0.00	0.00	0.00	88.77	0.00	445.24	51.64	44.95	369.95	94.07	16.10	95.49	164.30
2032	131.29	0.00	0.00	0.00	104.61	0.00	235.91	52.82	43.93	483.78	101.24	15.83	95.03	271.68
2033	41.43	0.00	0.00	0.00	0.00	0.00	41.43	53.03	42.59	519.27	101.97	15.47	103.12	298.71
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	41.65	505.06	100.14	15.12	104.99	284.81
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	39.90	435.98	98.44	15.08	98.00	224.46
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	39.21	411.45	96.73	15.40	98.44	200.89
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	53.03	38.42	397.10	95.05	15.33	100.48	186.24
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	37.46	381.48	93.39	15.26	103.04	169.79
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	53.43	39.92	367.04	91.74	15.27	112.22	147.81
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	54.02	36.52	363.13	90.45	14.49	116.93	141.25
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	54.10	42.83	349.03	88.41	24.89	117.01	118.71
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	54.51	39.35	338.68	86.85	27.88	119.66	104.29
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	55.11	38.85	330.65	85.46	29.51	123.18	92.50
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	55.61	44.21	327.56	84.22	34.02	127.53	81.79
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	56.54	43.73	309.79	82.35	42.92	127.27	57.25
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	56.62	47.36	301.55	80.89	52.53	129.65	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	45.35	293.09	79.59	54.99	134.17	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	44.04	301.48	80.94	50.15	130.36	40.02
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	56.62	46.58	301.48	80.94	50.15	130.36	40.02
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	56.62	43.22	301.48	80.94	50.15	130.36	40.02
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	56.62	45.80	301.48	80.94	50.15	130.36	40.02
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	56.62	42.47	301.48	80.94	50.15	130.36	40.02
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	56.62	42.11	301.48	80.94	50.15	130.36	40.02
2054	0.00	0.00	0.00	0.00	17.12	18.89	36.02	56.62	41.76	301.48	80.94	50.15	130.36	40.02
2055	0.00	0.00	0.00	0.00	0.00	19.59	19.59	56.62	41.42	301.48	80.94	50.15	130.36	40.02
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	58.69	301.48	80.94	50.15	130.36	40.02
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	42.55	301.48	80.94	50.15	130.36	40.02
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	58.07	301.48	80.94	50.15	130.36	40.02
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	44.90	301.48	80.94	50.15	130.36	40.02
2060	0.00	0.00	0.00	0.00	0.89	0.00	0.89	56.62	54.15	301.48	80.94	50.15	130.36	40.02
2061	0.00	0.00	0.00	0.00	0.89	0.00	0.89	56.62	39.50	301.48	80.94	50.15	130.36	40.02
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2063	0.00	0.00	0.00	0.00	5.35	0.00	5.35	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2064	0.00	0.00	0.00	0.00	19.55	2.13	21.69	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2065	0.00	0.00	0.00	0.00	23.98	4.27	28.25	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2066	0.00	0.00	0.00	0.00	22.45	12.80	35.25	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2067	0.00	0.00	0.00	0.00	35.05	19.20	54.25	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	56.62	68.20	301.48	80.94	50.15	130.36	40.02
2069	0.00	0.00	80.00	0.00	31.08	57.59	168.68	56.62	39.50	301.48	80.94	50.15	130.36	40.02
2070	0.00	0.00	109.27	0.00	0.01	59.73	169.00	56.62	54.15	301.48	80.94	50.15	130.36	40.02
2071	0.00	0.00	16.58	0.00	0.00	0.00	16.58	56.62	41.28	301.48	80.94	50.15	130.36	40.02
2072	0.00	0.00	81.21	0.00	0.00	0.00	81.21	56.62	54.15	301.48	80.94	50.15	130.36	40.02
2073	0.00	0.00	110.91	0.00	0.00	0.00	110.91	56.62	37.43	301.48	80.94	50.15	130.36	40.02
2074	0.00	0.00	98.85	0.00	0.00	0.00	98.85	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2075	0.00	0.00	112.03	0.00	12.20	0.00	124.22	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2076	0.00	0.00	16.99	0.00	2.72	0.00	19.71	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2077	0.00	0.00	0.00	0.00	33.14	0.00	33.14	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2078	0.00	0.00	0.00	0.00	26.87	0.00	26.87	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2079	0.00	0.00	0.00	0.00	29.35	0.00	29.35	56.62	39.50	301.48	80.94	50.15	130.36	40.02
2080	0.00	0.00	0.00	0.00	107.10	0.00	107.10	56.62	52.37	301.48	80.94	50.15	130.36	40.02
2081	0.00	0.00	0.00	0.00	67.38	0.00	67.38	56.62	39.50	301.48	80.94	50.15	130.36	40.02
2082	0.00	0.00	0.00	0.00	78.77	0.00	78.77	56.62	54.15	301.48	80.94	50.15	130.36	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	38.32	301.48	80.94	50.15	130.36	40.02
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	56.62	54.15	301.48	80.94	50.15	130.36	40.02
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	56.62	38.32	301.48	80.94	50.15	130.36	40.02
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	56.62	54.15	301.48	80.94	50.15	130.36	40.02
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	56.62	36.54	301.48	80.94	50.15	130.36	40.02
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	56.62	39.50	301.48	80.94	50.15	130.36	40.02
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	56.62	39.50	301.48	80.94	50.15	130.36	40.02
Salvage Value	6.45	0.00	2.40	0.00	4.26	1.76	14.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2694.54	2810.14	128.68	0.00	330.78	448.31	6412.45	514.15	479.28	5822.89	1564.79	345.44	1715.91	2196.76

Net Present Value -5209

K19/Gas31/750MW

TABLE 230
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	5.40	253.08	1.27	0.00	240.15	105.07	15.82	82.48	36.77
2015	0.00	496.39	0.00	0.00	19.33	8.74	524.46	3.89	0.00	258.65	103.32	17.61	87.24	50.48
2016	0.00	657.29	0.00	0.00	26.45	18.32	702.06	7.40	0.00	265.48	101.40	18.19	88.83	57.07
2017	0.00	796.58	0.00	0.00	38.71	25.50	860.79	11.70	0.00	276.37	99.42	19.45	90.12	67.38
2018	0.00	561.68	0.00	0.00	40.69	149.24	751.61	15.46	0.00	267.90	97.29	20.32	90.00	60.29
2019	0.00	401.73	0.00	0.00	48.21	102.80	552.73	18.22	13.29	282.73	97.21	19.21	88.77	77.54
2020	0.00	164.04	0.00	0.00	0.01	284.21	448.27	20.46	49.02	437.27	104.51	13.70	96.33	222.74
2021	0.00	56.92	0.00	0.00	0.00	0.00	56.92	20.75	47.22	524.67	105.07	15.17	101.08	303.35
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	45.88	528.77	103.83	15.16	102.09	307.69
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	43.85	518.34	100.87	16.22	105.62	295.63
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	42.12	520.58	98.64	18.06	111.31	292.57
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	40.31	406.40	98.49	13.10	108.13	186.68
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	38.38	391.75	96.55	13.60	117.28	164.32
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	20.75	36.95	350.66	94.59	12.73	115.60	127.74
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	20.75	35.58	339.19	92.95	13.19	125.61	107.44
2029	0.00	0.00	174.50	0.00	0.00	0.00	174.50	21.51	36.97	328.99	91.37	13.37	135.89	88.36
2030	0.00	0.00	306.68	0.00	18.96	0.00	325.64	23.03	31.62	330.11	90.76	11.85	142.34	85.16
2031	0.00	0.00	138.13	0.00	74.66	0.00	212.80	24.08	38.48	322.29	88.58	26.43	112.42	94.85
2032	0.00	0.00	93.11	0.00	0.00	0.00	93.11	24.55	41.32	315.33	86.97	33.68	114.73	79.96
2033	0.00	0.00	105.52	0.00	0.00	0.00	105.52	25.07	40.12	306.43	85.50	37.16	117.45	66.32
2034	0.00	0.00	16.01	0.00	0.00	0.00	16.01	25.15	43.03	305.91	84.68	40.19	120.31	60.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.15	41.46	230.64	82.53	48.07	109.63	-9.60
2036	0.00	0.00	162.47	0.00	0.00	0.00	162.47	25.97	40.82	208.48	81.08	52.69	110.12	-35.42
2037	0.00	0.00	234.72	0.00	0.00	0.00	234.72	27.14	40.22	198.75	79.73	57.76	112.50	-51.25
2038	0.00	0.00	105.13	0.00	62.81	0.00	167.94	27.98	39.63	202.05	79.57	52.84	117.75	-48.12
2039	0.00	0.00	7.73	0.00	0.00	0.00	7.73	28.02	49.10	215.31	77.31	88.59	122.19	-72.79
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.02	45.59	201.24	75.41	97.45	126.11	-97.73
2041	0.00	0.00	80.81	0.00	0.00	0.00	80.81	28.42	45.05	191.02	73.91	106.27	129.35	-118.50
2042	0.00	0.00	277.77	0.00	0.00	0.00	277.77	29.81	44.53	181.23	72.53	115.89	132.45	-139.65
2043	0.00	0.00	258.60	0.00	0.00	0.00	258.60	31.10	48.10	177.88	71.65	123.86	135.68	-153.31
2044	0.00	0.00	108.32	0.00	62.81	0.00	171.13	31.96	49.39	175.13	71.28	115.83	142.10	-154.08
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	32.00	56.01	185.83	69.33	156.40	137.22	-177.11
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	55.55	176.79	68.09	165.53	140.25	-197.08
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	54.22	165.80	66.81	175.53	143.37	-219.91
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	52.90	176.14	68.08	165.82	140.28	-198.04
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	32.00	55.45	176.14	68.08	165.82	140.28	-198.04
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	32.00	52.10	176.14	68.08	165.82	140.28	-198.04
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	32.00	51.71	176.14	68.08	165.82	140.28	-198.04
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	32.00	51.34	176.14	68.08	165.82	140.28	-198.04
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	32.00	50.98	176.14	68.08	165.82	140.28	-198.04
2054	0.00	0.00	0.00	0.00	17.12	18.89	36.02	32.00	50.63	176.14	68.08	165.82	140.28	-198.04
2055	0.00	0.00	0.00	0.00	0.00	19.59	19.59	32.00	50.28	176.14	68.08	165.82	140.28	-198.04
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	65.79	176.14	68.08	165.82	140.28	-198.04
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	49.64	176.14	68.08	165.82	140.28	-198.04
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	65.16	176.14	68.08	165.82	140.28	-198.04
2059	0.00	0.00	152.22	0.00	0.00	0.00	152.22	32.00	51.99	176.14	68.08	165.82	140.28	-198.04
2060	0.00	0.00	284.40	0.00	0.00	0.00	284.40	32.00	61.24	176.14	68.08	165.82	140.28	-198.04
2061	0.00	0.00	136.01	0.00	0.00	0.00	136.01	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2062	0.00	0.00	93.11	0.00	0.00	0.00	93.11	32.00	61.24	176.14	68.08	165.82	140.28	-198.04
2063	0.00	0.00	105.52	0.00	0.00	0.00	105.52	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2064	0.00	0.00	16.01	0.00	10.64	2.13	28.78	32.00	61.24	176.14	68.08	165.82	140.28	-198.04
2065	0.00	0.00	0.00	0.00	27.80	4.27	32.06	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2066	0.00	0.00	162.47	0.00	57.06	12.80	232.33	32.00	61.24	176.14	68.08	165.82	140.28	-198.04
2067	0.00	0.00	234.72	0.00	9.21	19.20	263.13	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2068	0.00	0.00	105.13	0.00	19.70	57.59	182.42	32.00	61.24	176.14	68.08	165.82	140.28	-198.04
2069	0.00	0.00	7.73	0.00	31.08	57.59	96.41	32.00	48.37	176.14	68.08	165.82	140.28	-198.04
2070	0.00	0.00	0.00	0.00	0.01	59.73	59.73	32.00	47.18	176.14	68.08	165.82	140.28	-198.04
2071	0.00	0.00	80.81	0.00	0.00	0.00	80.81	32.00	47.18	176.14	68.08	165.82	140.28	-198.04
2072	0.00	0.00	277.77	0.00	0.00	0.00	277.77	32.00	47.18	176.14	68.08	165.82	140.28	-198.04
2073	0.00	0.00	258.60	0.00	47.11	0.00	305.71	32.00	46.30	176.14	68.08	165.82	140.28	-198.04
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2075	0.00	0.00	7.97	0.00	0.00	0.00	7.97	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	32.00	48.37	176.14	68.08	165.82	140.28	-198.04
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2081	0.00	0.00	0.00	0.00	18.67	0.00	18.67	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2088	0.00	0.00	0.00	0.00	36.69	18.89	55.59	32.00	45.41	176.14	68.08	165.82	140.28	-198.04
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	32.00	48.37	176.14	68.08	165.82	140.28	-198.04
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	32.00	48.37	176.14	68.08	165.82	140.28	-198.04
Salvage Value	0.00	0.00	4.63	0.00	2.27	1.76	8.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	609.60	0.00	235.24	448.31	4103.30	322.16	500.27	5007.90	1490.95	747.02	1783.03	986.89

Net Present Value -3939

K19/C25/250MW

TABLE 231
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	4.06	284.13	1.43	0.00	240.15	105.07	15.82	82.48	36.77
2015	89.38	496.39	0.00	0.00	19.33	2.78	607.88	4.47	0.00	258.65	103.32	17.61	87.24	50.48
2016	186.20	657.29	0.00	0.00	26.45	4.05	873.99	8.84	0.00	265.48	101.40	18.19	88.83	57.07
2017	216.63	796.58	0.00	0.00	38.71	6.07	1057.99	14.13	0.00	276.12	99.43	19.45	90.12	67.13
2018	260.39	561.68	0.00	0.00	40.69	18.21	880.97	18.54	0.00	264.15	96.75	21.96	89.69	55.74
2019	266.64	401.73	0.00	0.00	51.81	18.21	738.39	22.23	13.29	279.54	96.33	21.71	90.60	70.91
2020	734.99	164.04	0.00	0.00	3.62	18.88	921.52	26.84	13.51	416.85	104.82	14.14	88.38	209.52
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	33.24	13.26	496.45	105.41	14.49	90.37	286.18
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	38.65	13.48	495.08	103.48	15.16	91.86	284.58
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	42.63	13.31	492.23	101.22	15.15	97.88	277.98
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	45.58	13.26	497.26	98.81	16.84	106.88	274.72
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	47.74	27.65	430.74	103.59	15.04	85.74	226.37
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	48.90	27.45	523.03	111.23	14.66	83.34	313.79
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	49.10	27.33	508.09	110.81	13.91	84.95	298.42
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.62	503.03	109.05	14.47	86.17	293.33
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	30.20	494.21	107.21	14.65	87.94	284.41
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	26.13	487.91	105.93	14.45	88.16	279.37
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.96	479.32	104.30	14.80	89.14	271.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.58	468.08	102.63	14.89	90.35	260.21
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.65	455.45	100.91	14.93	92.01	247.60
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.77	441.95	99.25	15.03	93.19	234.48
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.88	389.98	97.58	15.09	92.16	185.15
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	49.10	24.92	365.43	95.98	15.37	92.22	161.86
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	24.92	349.29	94.38	15.31	93.19	146.42
2038	0.00	0.00	101.89	0.00	0.00	0.00	101.89	49.50	24.92	332.34	92.78	15.29	94.74	129.53
2039	0.00	0.00	131.00	0.00	9.48	0.00	140.49	50.09	27.88	325.16	91.57	14.31	103.82	115.46
2040	0.00	0.00	16.49	0.00	0.00	0.00	16.49	50.17	28.99	313.46	89.54	24.29	105.26	94.38
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	28.32	303.94	88.01	27.39	107.75	80.78
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	50.58	28.32	296.10	86.65	29.24	110.56	69.65
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	51.18	28.32	288.00	85.24	28.97	115.68	58.11
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	51.67	34.16	278.71	83.65	43.00	114.74	37.33
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	52.61	37.12	268.69	82.22	47.58	117.53	21.37
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	52.69	38.25	262.52	80.82	54.17	122.13	5.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	37.36	253.38	79.40	54.85	129.18	-10.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.47	261.53	80.81	52.20	122.94	5.57
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	52.69	39.43	261.53	80.81	52.20	122.94	5.57
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	52.69	38.25	261.53	80.81	52.20	122.94	5.57
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	52.69	38.26	261.53	80.81	52.20	122.94	5.57
2052	0.00	0.00	0.00	0.00	29.50	1.50	30.99	52.69	38.27	261.53	80.81	52.20	122.94	5.57
2053	0.00	0.00	0.00	0.00	20.99	4.50	25.49	52.69	38.27	261.53	80.81	52.20	122.94	5.57
2054	0.00	0.00	0.00	0.00	18.01	4.50	22.51	52.69	38.27	261.53	80.81	52.20	122.94	5.57
2055	0.00	0.00	0.00	0.00	0.89	4.66	5.56	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	52.69	52.33	261.53	80.81	52.20	122.94	5.57
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	52.69	52.33	261.53	80.81	52.20	122.94	5.57
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	52.69	52.33	261.53	80.81	52.20	122.94	5.57
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	68.16	261.53	80.81	52.20	122.94	5.57
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2064	0.00	0.00	0.00	0.00	10.64	3.89	14.53	52.69	68.16	261.53	80.81	52.20	122.94	5.57
2065	0.00	0.00	0.00	0.00	8.83	2.45	11.28	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2066	0.00	0.00	0.00	0.00	1.06	3.05	4.11	52.69	68.16	261.53	80.81	52.20	122.94	5.57
2067	0.00	0.00	0.00	0.00	9.21	4.57	13.78	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2068	0.00	0.00	79.61	0.00	19.70	13.71	113.01	52.69	68.16	261.53	80.81	52.20	122.94	5.57
2069	0.00	0.00	108.72	0.00	33.80	13.71	156.23	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2070	0.00	0.00	16.49	0.00	2.73	14.22	33.44	52.69	54.10	261.53	80.81	52.20	122.94	5.57
2071	0.00	0.00	0.00	0.00	33.14	0.00	33.14	52.69	38.27	261.53	80.81	52.20	122.94	5.57
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	52.69	54.10	261.53	80.81	52.20	122.94	5.57
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	52.69	37.38	261.53	80.81	52.20	122.94	5.57
2074	0.00	0.00	98.85	0.00	60.58	0.00	159.43	52.69	52.33	261.53	80.81	52.20	122.94	5.57
2075	0.00	0.00	112.03	0.00	67.38	0.00	179.41	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	52.69	54.10	261.53	80.81	52.20	122.94	5.57
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	38.27	261.53	80.81	52.20	122.94	5.57
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	52.69	54.10	261.53	80.81	52.20	122.94	5.57
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	41.23	261.53	80.81	52.20	122.94	5.57
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	52.69	54.10	261.53	80.81	52.20	122.94	5.57
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2084	0.00	0.00	0.00	0.00	10.82	0.17	10.99	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2087	0.00	0.00	0.00	0.00	29.50	1.50	30.99	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2088	0.00	0.00	0.00	0.00	20.99	4.50	25.49	52.69	36.50	261.53	80.81	52.20	122.94	5.57
2089	0.00	0.00	0.00	0.00	17.12	4.50	21.62	52.69	39.46	261.53	80.81	52.20	122.94	5.57
2090	0.00	0.00	0.00	0.00	0.00	4.66	4.66	52.69	39.46	261.53	80.81	52.20	122.94	5.57
Salvage Value	0.87	0.00	2.34	0.00	3.80	0.47	7.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	132.14	0.00	397.23	61.74	7117.98	572.28	303.25	5894.05	1601.43	357.67	1552.41	2382.55

Net Present Value -5611

K19/Gas24/250MW

TABLE 232
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	4.06	251.74	1.27	0.00	240.15	105.07	15.82	82.48	36.77
2015	0.00	496.39	0.00	0.00	19.33	2.78	518.50	3.87	0.00	258.65	103.32	17.61	87.24	50.48
2016	0.00	657.29	0.00	0.00	26.45	4.05	687.79	7.30	0.00	265.48	101.40	18.19	88.83	57.07
2017	0.00	796.58	0.00	0.00	38.71	6.07	841.36	11.51	0.00	276.37	99.42	19.45	90.12	67.38
2018	0.00	561.68	0.00	0.00	40.69	18.21	620.58	14.61	0.00	264.49	96.75	21.93	89.65	56.15
2019	0.00	401.73	0.00	0.00	48.21	18.21	468.14	16.95	13.29	280.07	96.33	21.71	90.58	71.46
2020	0.00	164.04	0.37	0.00	0.01	18.88	183.30	17.87	13.51	417.64	104.82	14.14	88.37	210.31
2021	0.00	56.92	0.00	0.00	0.00	0.00	56.92	18.15	13.26	497.70	105.39	14.50	90.32	287.49
2022	0.00	0.00	95.78	0.00	0.00	0.00	95.78	18.52	13.48	498.58	103.89	14.32	91.14	289.23
2023	0.00	0.00	122.67	0.00	9.48	0.00	132.15	19.07	13.31	501.21	102.74	12.02	94.04	292.42
2024	0.00	0.00	15.23	0.00	0.00	0.00	15.23	19.15	17.33	509.37	100.82	18.75	98.05	291.76
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	19.15	17.11	374.00	98.52	13.92	94.73	166.83
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.15	16.68	355.31	96.25	16.06	96.37	146.62
2027	0.00	0.00	75.36	0.00	0.00	0.00	75.36	19.52	16.71	320.07	94.16	17.59	97.45	110.86
2028	0.00	0.00	105.04	0.00	74.66	0.00	179.71	20.41	16.77	309.59	92.30	20.54	100.23	96.52
2029	0.00	0.00	172.51	0.00	0.00	0.00	172.51	21.27	23.61	303.50	90.50	28.26	102.44	82.29
2030	0.00	0.00	226.67	0.00	0.00	0.00	226.67	22.41	19.59	302.65	89.58	30.85	103.78	78.44
2031	0.00	0.00	101.52	0.00	9.48	0.00	111.00	22.96	19.59	310.24	90.07	26.31	103.27	90.59
2032	0.00	0.00	7.47	0.00	0.00	0.00	7.47	23.00	26.66	319.15	87.59	54.74	101.87	74.96
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.00	26.66	311.52	86.02	59.39	104.46	61.65
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.00	26.67	304.20	84.51	64.98	106.92	47.80
2035	0.00	0.00	161.67	0.00	0.00	0.00	161.67	23.81	26.00	231.88	82.47	62.17	104.72	-17.49
2036	0.00	0.00	233.56	0.00	0.00	0.00	233.56	24.98	26.01	209.76	80.96	67.05	105.44	-43.70
2037	0.00	0.00	104.61	0.00	0.00	0.00	104.61	25.50	26.01	211.64	81.35	61.45	104.22	-35.38
2038	0.00	0.00	171.80	0.00	0.00	0.00	171.80	26.36	33.08	213.00	78.94	89.44	105.08	-60.47
2039	0.00	0.00	237.08	0.00	0.00	0.00	237.08	27.54	36.03	206.79	77.53	98.63	114.60	-83.97
2040	0.00	0.00	106.18	0.00	62.81	0.00	168.99	28.39	33.08	202.20	76.87	101.37	115.37	-91.40
2041	0.00	0.00	7.81	0.00	0.00	0.00	7.81	28.43	40.15	206.87	75.05	128.66	114.95	-111.79
2042	0.00	0.00	167.41	0.00	0.00	0.00	167.41	29.26	40.15	198.06	73.27	141.87	118.56	-135.64
2043	0.00	0.00	241.85	0.00	0.00	0.00	241.85	30.47	40.15	189.88	71.90	151.23	121.23	-154.49
2044	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.02	41.93	184.28	71.32	154.66	121.94	-163.64
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	31.06	49.00	186.11	69.11	191.49	122.47	-196.96
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	49.01	189.47	69.17	190.40	122.86	-192.95
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	48.12	176.60	67.30	208.52	126.70	-225.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	31.06	50.20	184.06	68.53	196.80	124.01	-205.28
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2052	0.00	0.00	73.50	0.00	29.50	1.50	104.50	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2053	0.00	0.00	100.38	0.00	20.99	4.50	125.87	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2054	0.00	0.00	15.23	0.00	17.12	4.50	36.85	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2055	0.00	0.00	0.00	0.00	0.00	4.66	4.66	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2057	0.00	0.00	75.36	0.00	0.00	0.00	75.36	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2058	0.00	0.00	102.92	0.00	9.48	0.00	112.40	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2059	0.00	0.00	172.51	0.00	0.00	0.00	172.51	31.06	50.20	184.06	68.53	196.80	124.01	-205.28
2060	0.00	0.00	226.67	0.00	0.00	0.00	226.67	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2061	0.00	0.00	101.52	0.00	0.00	0.00	101.52	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2062	0.00	0.00	7.47	0.00	0.00	0.00	7.47	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2063	0.00	0.00	0.00	0.00	56.00	2.86	58.86	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2064	0.00	0.00	0.00	0.00	10.64	3.89	14.53	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2065	0.00	0.00	161.67	0.00	8.83	2.45	172.95	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2066	0.00	0.00	233.56	0.00	10.54	3.05	247.15	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2067	0.00	0.00	104.61	0.00	9.21	4.57	118.39	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2068	0.00	0.00	171.80	0.00	19.70	13.71	205.20	31.06	63.07	184.06	68.53	196.80	124.01	-205.28
2069	0.00	0.00	237.08	0.00	31.08	13.71	281.87	31.06	50.20	184.06	68.53	196.80	124.01	-205.28
2070	0.00	0.00	106.18	0.00	0.01	14.22	120.41	31.06	49.02	184.06	68.53	196.80	124.01	-205.28
2071	0.00	0.00	7.81	0.00	0.00	0.00	7.81	31.06	49.02	184.06	68.53	196.80	124.01	-205.28
2072	0.00	0.00	167.41	0.00	0.00	0.00	167.41	31.06	49.02	184.06	68.53	196.80	124.01	-205.28
2073	0.00	0.00	241.85	0.00	0.00	0.00	241.85	31.06	48.13	184.06	68.53	196.80	124.01	-205.28
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2075	0.00	0.00	7.97	0.00	47.11	0.00	55.07	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2078	0.00	0.00	0.00	0.00	18.67	0.00	18.67	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	50.20	184.06	68.53	196.80	124.01	-205.28
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2082	0.00	0.00	73.50	0.00	0.00	0.00	73.50	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2083	0.00	0.00	100.38	0.00	0.00	0.00	100.38	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2084	0.00	0.00	15.23	0.00	10.82	0.17	26.22	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2087	0.00	0.00	75.36	0.00	29.50	1.50	106.35	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2088	0.00	0.00	102.92	0.00	20.99	4.50	128.41	31.06	47.24	184.06	68.53	196.80	124.01	-205.28
2089	0.00	0.00	15.61	0.00	17.12	4.50	37.23	31.06	50.20	184.06	68.53	196.80	124.01	-205.28
2090	0.00	0.00	0.00	0.00	15.70	4.66	20.37	31.06	50.20	184.06	68.53	196.80	124.01	-205.28
Salvage Value	0.00	0.00	8.21	0.00	1.97	0.47	10.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	820.85	0.00	231.19	61.74	3923.92	305.28	309.00	4888.63	1493.91	893.48	1617.31	883.93

Net Present Value -3654

K19/C31/250MW

TABLE 233
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	226.22	0.00	0.00	21.46	4.06	283.49	1.43	0.00	240.15	105.07	15.82	82.48	36.77
2015	40.08	496.39	0.00	0.00	19.33	2.78	558.57	4.22	0.00	258.65	103.32	17.61	87.24	50.48
2016	10.89	657.29	0.00	0.00	26.45	4.05	698.68	7.72	0.00	265.48	101.40	18.19	88.83	57.07
2017	10.95	796.58	0.00	0.00	38.71	6.07	852.31	11.98	0.00	276.37	99.42	19.45	90.12	67.38
2018	13.02	561.68	0.00	0.00	40.69	18.21	633.60	15.15	0.00	264.49	96.75	21.93	89.65	56.15
2019	13.09	401.73	0.00	0.00	48.21	18.21	481.24	17.55	13.29	280.07	96.33	21.71	90.58	71.46
2020	13.17	164.04	0.37	0.00	0.01	18.88	196.47	18.53	13.51	417.64	104.82	14.14	88.37	210.31
2021	16.66	56.92	0.00	0.00	0.00	0.00	73.58	18.90	13.26	497.70	105.39	14.50	90.32	287.49
2022	168.48	0.00	95.78	0.00	0.00	0.00	264.26	20.11	13.48	498.51	103.88	14.34	91.15	289.13
2023	257.00	0.00	122.67	0.00	9.48	0.00	389.14	21.95	13.31	500.91	102.70	12.12	94.16	291.92
2024	279.20	0.00	15.23	0.00	0.00	0.00	294.43	23.42	17.33	508.96	100.78	18.86	98.23	291.08
2025	284.55	0.00	0.00	0.00	3.61	0.00	288.16	24.86	17.11	373.31	98.49	14.03	94.92	165.88
2026	769.74	0.00	0.00	0.00	3.61	0.00	773.35	28.73	16.68	354.66	96.24	16.21	96.59	145.61
2027	1222.24	0.00	75.36	0.00	43.84	0.00	1341.44	35.43	16.71	318.99	94.15	17.87	97.63	109.34
2028	1097.38	0.00	102.92	0.00	32.22	0.00	1232.52	41.60	16.77	308.02	92.22	21.03	100.62	94.14
2029	783.65	0.00	15.61	0.00	38.26	0.00	837.53	45.78	23.60	301.51	90.47	28.89	102.84	79.31
2030	542.72	0.00	0.00	0.00	66.25	0.00	608.98	48.83	19.58	313.39	91.49	25.40	100.37	96.13
2031	356.48	0.00	0.00	0.00	88.77	0.00	445.24	51.05	34.19	347.83	94.66	20.53	86.82	145.81
2032	131.29	0.00	0.00	0.00	104.61	0.00	235.91	52.23	34.42	447.87	101.61	20.31	84.87	241.08
2033	41.43	0.00	0.00	0.00	0.00	0.00	41.43	52.44	34.27	466.99	101.77	21.01	89.40	254.81
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	34.50	451.00	100.00	21.54	90.17	239.29
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.65	398.35	98.29	21.80	89.30	188.95
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.60	374.96	96.68	22.27	89.38	166.63
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.42	356.66	94.78	23.16	90.97	147.75
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.05	336.47	92.81	24.11	93.39	126.17
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	36.08	321.82	90.90	26.50	102.66	101.76
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.24	311.71	89.13	30.04	105.58	86.96
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	36.02	301.10	87.47	34.22	108.47	70.95
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	52.44	33.06	297.89	86.59	34.89	109.98	66.43
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.06	290.29	85.23	34.63	114.71	55.71
2044	0.00	0.00	82.02	0.00	0.00	0.00	82.02	52.85	34.84	278.81	83.66	42.99	114.75	37.41
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	53.78	34.84	268.73	82.22	47.55	117.53	21.43
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	53.87	38.92	262.56	80.83	54.15	122.12	5.46
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	37.36	253.38	79.40	54.85	129.18	-10.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	36.47	261.56	80.82	52.19	122.94	5.61
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	53.87	39.43	261.56	80.82	52.19	122.94	5.61
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	53.87	36.48	261.56	80.82	52.19	122.94	5.61
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	53.87	39.44	261.56	80.82	52.19	122.94	5.61
2052	0.00	0.00	73.50	0.00	29.50	1.50	104.50	53.87	36.49	261.56	80.82	52.19	122.94	5.61
2053	0.00	0.00	100.38	0.00	20.99	4.50	125.87	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2054	0.00	0.00	15.23	0.00	17.12	4.50	36.85	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2055	0.00	0.00	0.00	0.00	0.00	4.66	4.66	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2057	0.00	0.00	75.36	0.00	0.00	0.00	75.36	53.87	38.27	261.56	80.82	52.19	122.94	5.61
2058	0.00	0.00	102.92	0.00	9.48	0.00	112.40	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2059	0.00	0.00	15.61	0.00	0.00	0.00	15.61	53.87	41.23	261.56	80.82	52.19	122.94	5.61
2060	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2061	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.87	39.46	261.56	80.82	52.19	122.94	5.61
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2063	0.00	0.00	0.00	0.00	14.83	2.86	17.69	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2064	0.00	0.00	0.00	0.00	19.55	3.89	23.45	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2065	0.00	0.00	0.00	0.00	23.98	2.45	26.43	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2066	0.00	0.00	0.00	0.00	22.45	3.05	25.50	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2067	0.00	0.00	0.00	0.00	35.05	4.57	39.62	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2068	0.00	0.00	0.00	0.00	19.70	13.71	33.41	53.87	68.16	261.56	80.82	52.19	122.94	5.61
2069	0.00	0.00	0.00	0.00	31.08	13.71	44.79	53.87	39.46	261.56	80.82	52.19	122.94	5.61
2070	0.00	0.00	0.00	0.00	0.01	14.22	14.23	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	41.23	261.56	80.82	52.19	122.94	5.61
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	37.38	261.56	80.82	52.19	122.94	5.61
2074	0.00	0.00	82.02	0.00	0.00	0.00	82.02	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2075	0.00	0.00	112.03	0.00	2.72	0.00	114.74	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2076	0.00	0.00	16.99	0.00	2.72	0.00	19.71	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2077	0.00	0.00	0.00	0.00	33.14	0.00	33.14	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2078	0.00	0.00	0.00	0.00	17.39	0.00	17.39	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2079	0.00	0.00	0.00	0.00	29.35	0.00	29.35	53.87	39.46	261.56	80.82	52.19	122.94	5.61
2080	0.00	0.00	0.00	0.00	107.10	0.00	107.10	53.87	52.33	261.56	80.82	52.19	122.94	5.61
2081	0.00	0.00	0.00	0.00	67.38	0.00	67.38	53.87	39.46	261.56	80.82	52.19	122.94	5.61
2082	0.00	0.00	73.50	0.00	78.77	0.00	152.27	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2083	0.00	0.00	100.38	0.00	0.00	0.00	100.38	53.87	38.27	261.56	80.82	52.19	122.94	5.61
2084	0.00	0.00	15.23	0.00	10.82	0.17	26.22	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	53.87	38.27	261.56	80.82	52.19	122.94	5.61
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	53.87	54.10	261.56	80.82	52.19	122.94	5.61
2087	0.00	0.00	75.36	0.00	29.50	1.50	106.35	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2088	0.00	0.00	102.92	0.00	20.99	4.50	128.41	53.87	36.50	261.56	80.82	52.19	122.94	5.61
2089	0.00	0.00	15.61	0.00	17.12	4.50	37.23	53.87	39.46	261.56	80.82	52.19	122.94	5.61
2090	0.00	0.00	0.00	0.00	0.00	4.66	4.66	53.87	39.46	261.56	80.82	52.19	122.94	5.61
Salvage Value	6.45	0.00	3.91	0.00	4.19	0.47	15.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2694.54	2810.14	282.66	0.00	337.44	61.74	6186.51	493.54	302.94	5459.81	1564.84	392.16	1571.02	1931.77

Net Present Value -5051

All Gas

TABLE 234
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	266.71	101.39	18.22	88.79	58.31
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	279.77	99.77	18.74	89.52	71.76
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	268.64	97.01	20.92	90.08	60.64
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	262.30	94.99	18.71	89.73	58.87
2020	0.00	0.00	95.05	0.00	0.00	0.00	95.05	0.89	0.00	268.26	94.88	13.34	91.62	68.42
2021	0.00	0.00	121.71	0.00	9.48	0.00	131.20	1.43	0.00	268.97	93.05	12.59	96.78	66.55
2022	0.00	0.00	15.08	0.00	0.00	0.00	15.08	1.51	4.07	263.07	90.80	22.33	98.31	51.63
2023	0.00	0.00	73.87	0.00	0.00	0.00	73.87	1.88	4.07	259.98	88.54	27.51	103.62	40.31
2024	0.00	0.00	103.01	0.00	74.66	0.00	177.67	2.75	4.07	265.82	86.96	32.20	109.94	36.72
2025	0.00	0.00	15.30	0.00	0.00	0.00	15.30	2.83	8.16	171.64	86.40	27.02	101.75	-43.53
2026	0.00	0.00	74.98	0.00	0.00	0.00	74.98	3.21	8.16	157.37	85.07	27.51	102.43	-57.64
2027	0.00	0.00	102.41	0.00	0.00	0.00	102.41	3.72	8.16	146.77	83.19	27.70	108.92	-73.05
2028	0.00	0.00	171.65	0.00	0.00	0.00	171.65	4.58	12.23	138.81	81.24	42.35	108.51	-93.29
2029	0.00	0.00	225.54	0.00	0.00	0.00	225.54	5.70	12.23	128.75	79.78	48.04	110.51	-109.58
2030	0.00	0.00	101.02	0.00	9.48	0.00	110.50	6.26	12.24	135.65	80.64	44.16	108.10	-97.25
2031	0.00	0.00	7.43	0.00	0.00	0.00	7.43	6.29	19.31	142.86	78.28	73.37	105.30	-114.09
2032	0.00	0.00	77.26	0.00	0.00	0.00	77.26	6.68	19.32	128.83	76.35	80.81	108.79	-137.12
2033	0.00	0.00	105.52	0.00	62.81	0.00	168.33	7.52	19.32	116.52	74.61	89.51	111.82	-159.41
2034	0.00	0.00	176.87	0.00	0.00	0.00	176.87	8.41	23.40	108.02	73.17	101.71	113.94	-180.79
2035	0.00	0.00	232.39	0.00	0.00	0.00	232.39	9.57	23.40	100.20	72.22	108.16	114.85	-195.03
2036	0.00	0.00	104.08	0.00	0.00	0.00	104.08	10.09	23.40	99.20	72.11	105.51	118.26	-196.67
2037	0.00	0.00	170.94	0.00	0.00	0.00	170.94	10.94	30.46	97.11	70.16	133.32	112.40	-218.78
2038	0.00	0.00	235.90	0.00	0.00	0.00	235.90	12.12	30.47	88.22	68.91	143.90	115.43	-240.02
2039	0.00	0.00	105.65	0.00	0.00	0.00	105.65	12.65	30.48	84.76	68.76	146.13	122.04	-252.17
2040	0.00	0.00	7.77	0.00	0.00	0.00	7.77	12.69	37.55	84.03	66.94	170.25	121.05	-274.20
2041	0.00	0.00	166.58	0.00	0.00	0.00	166.58	13.52	37.55	78.23	65.12	190.33	125.92	-303.15
2042	0.00	0.00	240.65	0.00	0.00	0.00	240.65	14.73	37.55	75.79	64.03	206.64	128.54	-323.42
2043	0.00	0.00	107.78	0.00	62.81	0.00	170.60	15.58	37.55	76.18	63.94	210.68	128.59	-327.03
2044	0.00	0.00	7.93	0.00	0.00	0.00	7.93	15.62	44.63	76.34	62.47	235.07	127.23	-348.44
2045	0.00	0.00	36.26	0.00	0.00	0.00	36.26	15.80	44.63	71.13	60.89	257.49	130.78	-378.03
2046	0.00	0.00	49.52	0.00	0.00	0.00	49.52	16.05	44.63	67.81	59.74	275.42	134.09	-401.45
2047	0.00	0.00	7.51	0.00	0.00	0.00	7.51	16.08	46.11	63.30	58.87	289.87	136.22	-421.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.11	67.41	59.84	274.26	133.70	-400.38
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	16.08	46.12	67.41	59.84	274.26	133.70	-400.38
2050	0.00	0.00	72.77	0.00	10.08	0.00	82.85	16.08	46.12	67.41	59.84	274.26	133.70	-400.38
2051	0.00	0.00	99.39	0.00	10.08	0.00	109.47	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2052	0.00	0.00	15.08	0.00	10.08	0.00	25.16	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2053	0.00	0.00	73.87	0.00	0.00	0.00	73.87	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2054	0.00	0.00	100.89	0.00	0.00	0.00	100.89	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2055	0.00	0.00	15.30	0.00	0.00	0.00	15.30	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2056	0.00	0.00	74.98	0.00	9.48	0.00	84.46	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2057	0.00	0.00	102.41	0.00	0.00	0.00	102.41	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2058	0.00	0.00	171.65	0.00	0.00	0.00	171.65	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2059	0.00	0.00	225.54	0.00	56.00	0.00	281.54	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2060	0.00	0.00	101.02	0.00	0.00	0.00	101.02	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2061	0.00	0.00	7.43	0.00	0.00	0.00	7.43	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2062	0.00	0.00	77.26	0.00	0.00	0.00	77.26	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2063	0.00	0.00	105.52	0.00	0.00	0.00	105.52	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2064	0.00	0.00	176.87	0.00	0.00	0.00	176.87	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2065	0.00	0.00	232.39	0.00	9.48	0.00	241.88	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2066	0.00	0.00	104.08	0.00	0.00	0.00	104.08	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2067	0.00	0.00	170.94	0.00	0.00	0.00	170.94	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2068	0.00	0.00	235.90	0.00	47.11	0.00	283.01	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2069	0.00	0.00	105.65	0.00	0.00	0.00	105.65	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2070	0.00	0.00	7.77	0.00	0.00	0.00	7.77	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2071	0.00	0.00	166.58	0.00	0.00	0.00	166.58	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2072	0.00	0.00	240.65	0.00	0.00	0.00	240.65	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2073	0.00	0.00	107.78	0.00	0.00	0.00	107.78	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2074	0.00	0.00	7.93	0.00	18.67	0.00	26.59	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2075	0.00	0.00	36.26	0.00	0.00	0.00	36.26	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2076	0.00	0.00	49.52	0.00	0.00	0.00	49.52	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2077	0.00	0.00	7.51	0.00	0.00	0.00	7.51	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2078	0.00	0.00	0.00	0.00	47.11	0.00	47.11	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2080	0.00	0.00	72.77	0.00	0.00	0.00	72.77	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2081	0.00	0.00	99.39	0.00	0.00	0.00	99.39	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2082	0.00	0.00	15.08	0.00	0.00	0.00	15.08	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2083	0.00	0.00	73.87	0.00	15.70	0.00	89.57	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2084	0.00	0.00	100.89	0.00	10.08	0.00	110.97	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2085	0.00	0.00	15.30	0.00	10.08	0.00	25.38	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2086	0.00	0.00	74.98	0.00	10.08	0.00	85.06	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2087	0.00	0.00	102.41	0.00	10.08	0.00	112.49	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2088	0.00	0.00	15.54	0.00	0.00	0.00	15.54	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	67.41	59.84	274.26	133.70	-400.38
Salvage Value	0.00	0.00	25.89	0.00	0.99	0.00	26.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1069.44	0.00	126.11	0.00	1259.87	87.87	224.68	3021.38	1374.15	1279.18	1705.40	-1337.35

Net Present Value: -2910

Wind/Gas

TABLE 235
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	266.71	101.39	18.22	88.79	58.31
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	279.78	99.77	18.74	89.52	71.77
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	268.64	97.01	20.92	90.08	60.64
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	262.30	94.99	18.71	89.73	58.87
2020	0.00	0.00	0.00	9.79	13.83	0.00	23.61	0.64	0.00	265.78	94.45	14.43	91.95	64.95
2021	0.00	0.00	0.37	298.83	23.04	0.00	322.24	2.25	0.00	265.98	92.61	13.95	96.71	62.70
2022	0.00	0.00	0.00	304.42	27.82	0.00	332.24	3.91	6.34	269.34	90.94	14.06	96.78	67.56
2023	0.00	0.00	170.02	294.63	14.49	0.00	479.14	6.20	12.69	273.07	88.41	16.15	100.21	68.30
2024	0.00	0.00	224.10	5.59	25.56	0.00	255.25	7.36	19.03	287.74	86.51	16.53	106.15	78.55
2025	0.00	0.00	30.61	4.89	3.97	0.00	39.48	7.56	27.18	200.86	86.49	18.85	97.03	-1.52
2026	0.00	0.00	74.98	149.41	9.99	0.00	234.39	8.73	27.18	190.05	85.48	17.90	96.89	-10.23
2027	0.00	0.00	104.53	152.21	90.53	0.00	347.27	10.46	30.35	181.03	83.13	21.80	98.79	-22.69
2028	0.00	0.00	15.54	152.21	22.00	0.00	189.74	11.40	37.60	181.02	81.34	28.19	101.21	-29.72
2029	0.00	0.00	76.11	152.21	22.08	0.00	250.40	12.66	40.78	176.25	79.73	30.40	103.01	-36.89
2030	0.00	0.00	103.95	152.21	22.08	0.00	278.24	14.05	43.95	177.50	78.81	31.86	103.51	-36.68
2031	0.00	0.00	92.64	152.21	22.08	0.00	266.93	15.38	51.19	177.81	77.58	37.72	104.29	-41.77
2032	0.00	0.00	104.99	152.21	84.89	0.00	342.09	17.09	54.37	175.32	76.44	38.04	106.17	-45.34
2033	0.00	0.00	15.93	152.21	22.08	0.00	190.22	18.04	61.63	177.64	75.77	40.15	107.15	-45.42
2034	0.00	0.00	78.03	152.21	22.08	0.00	252.32	19.31	64.81	169.53	73.95	46.46	108.18	-59.07
2035	0.00	0.00	106.58	152.21	22.08	0.00	280.87	20.71	67.99	161.56	72.28	50.52	110.11	-71.35
2036	0.00	0.00	94.98	152.21	22.08	0.00	269.27	22.06	75.23	157.95	70.91	58.25	111.46	-82.66
2037	0.00	0.00	107.64	152.21	22.08	0.00	281.93	23.47	78.41	152.02	69.61	61.82	113.60	-93.02
2038	0.00	0.00	95.94	152.21	22.08	0.00	270.22	24.82	85.66	150.60	68.56	67.99	115.94	-101.89
2039	0.00	0.00	108.72	152.21	84.89	0.00	345.82	26.55	88.84	145.27	67.41	66.97	127.72	-116.83
2040	0.00	0.00	16.49	162.00	22.08	0.00	200.57	27.55	96.10	145.84	66.58	70.63	130.79	-122.15
2041	0.00	0.00	80.81	451.04	22.08	0.00	553.92	30.32	99.28	136.32	65.07	83.18	128.87	-140.80
2042	0.00	0.00	110.36	456.63	22.08	0.00	589.07	33.26	102.45	129.00	63.70	89.21	132.12	-156.03
2043	0.00	0.00	98.36	446.84	21.91	0.00	567.11	36.10	109.69	125.41	62.52	98.95	134.32	-170.39
2044	0.00	0.00	111.47	157.80	21.42	0.00	290.69	37.55	112.87	121.80	61.57	102.63	137.12	-179.52
2045	0.00	0.00	53.17	157.10	20.09	0.00	230.37	38.70	120.12	119.63	60.48	108.79	142.34	-191.99
2046	0.00	0.00	49.52	296.73	18.10	0.00	364.36	40.53	123.30	116.41	59.44	109.24	150.16	-202.43
2047	0.00	0.00	7.51	155.01	12.09	0.00	174.61	41.40	127.95	111.77	58.37	113.19	151.66	-211.45
2048	0.00	0.00	0.00	152.21	6.21	0.00	158.42	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2049	0.00	0.00	0.00	152.21	10.16	0.00	162.37	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2050	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2051	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2052	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2053	0.00	0.00	147.74	152.21	0.00	0.00	299.95	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2054	0.00	0.00	201.77	152.21	0.00	0.00	353.98	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2055	0.00	0.00	30.61	152.21	3.46	0.00	186.28	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2056	0.00	0.00	74.98	152.21	5.76	0.00	232.95	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2057	0.00	0.00	102.41	152.21	7.00	0.00	261.61	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2058	0.00	0.00	15.54	152.21	3.87	0.00	171.62	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2059	0.00	0.00	76.11	152.21	20.86	0.00	249.18	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2060	0.00	0.00	103.95	162.00	1.74	0.00	267.69	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2061	0.00	0.00	92.64	451.04	2.79	0.00	546.47	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2062	0.00	0.00	104.99	456.63	60.03	0.00	621.65	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2063	0.00	0.00	15.93	446.84	5.52	0.00	468.29	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2064	0.00	0.00	78.03	157.80	5.52	0.00	241.36	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2065	0.00	0.00	106.58	157.10	5.52	0.00	269.20	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2066	0.00	0.00	94.98	296.73	5.52	0.00	397.23	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2067	0.00	0.00	107.64	155.01	52.63	0.00	315.28	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2068	0.00	0.00	95.94	152.21	5.52	0.00	253.67	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2069	0.00	0.00	108.72	152.21	5.52	0.00	266.45	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2070	0.00	0.00	16.49	152.21	15.89	0.00	184.59	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2071	0.00	0.00	80.81	152.21	22.80	0.00	255.82	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2072	0.00	0.00	110.36	152.21	26.34	0.00	288.92	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2073	0.00	0.00	98.36	152.21	16.14	0.00	266.71	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2074	0.00	0.00	111.47	152.21	57.33	0.00	321.01	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2075	0.00	0.00	53.17	152.21	7.76	0.00	213.14	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2076	0.00	0.00	49.52	152.21	12.72	0.00	214.46	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2077	0.00	0.00	7.51	152.21	36.03	0.00	195.75	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2078	0.00	0.00	0.00	152.21	21.91	0.00	174.12	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2079	0.00	0.00	0.00	152.21	21.66	0.00	173.87	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2080	0.00	0.00	0.00	162.00	21.33	0.00	183.33	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2081	0.00	0.00	0.00	451.04	20.34	0.00	471.38	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2082	0.00	0.00	0.00	456.63	34.99	0.00	491.62	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2083	0.00	0.00	147.74	446.84	18.05	0.00	612.63	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2084	0.00	0.00	201.77	157.80	26.56	0.00	386.13	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2085	0.00	0.00	30.61	157.10	26.39	0.00	214.10	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2086	0.00	0.00	74.98	296.73	25.40	0.00	397.11	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2087	0.00	0.00	102.41	155.01	24.40	0.00	281.82	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2088	0.00	0.00	15.54	152.21	9.36	0.00	177.10	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2089	0.00	0.00	0.00	147.32	20.42	0.00	167.74	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
2090	0.00	0.00	0.00	2.80	0.08	0.00	2.88	41.40	127.95	115.94	59.43	110.41	148.06	-201.95
Salvage Value	0.00	0.00	7.84	19.15	3.53	0.00	30.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	783.56	1927.44	302.91	0.00	3078.23	209.16	641.69	3423.27	1371.11	641.94	1715.01	-304.78

Net Present Value -4234

K22/Gas

TABLE 236
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	107.18	0.00	0.00	10.08	0.00	117.26	0.59	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	32.53	0.00	0.00	11.02	0.00	43.55	0.80	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	28.86	0.00	0.00	11.10	0.00	39.96	1.00	0.00	266.46	101.39	18.22	88.81	58.05
2017	0.00	215.40	0.00	0.00	27.74	0.00	243.14	2.22	0.00	279.18	99.78	18.74	89.55	71.12
2018	0.00	420.08	0.00	0.00	9.06	0.00	429.13	4.37	0.00	267.36	97.02	20.93	90.12	59.29
2019	0.00	685.17	0.00	0.00	15.77	0.00	700.94	7.87	0.00	260.99	95.00	18.71	89.76	57.53
2020	0.00	763.03	0.00	0.00	28.69	0.00	791.72	11.83	0.00	262.88	94.28	14.85	92.13	61.62
2021	0.00	623.77	0.00	0.00	40.71	0.00	664.48	15.15	0.00	264.39	92.56	14.25	97.41	60.17
2022	0.00	362.26	0.00	0.00	48.21	0.00	410.47	17.20	13.29	267.77	92.54	16.25	92.82	66.16
2023	0.00	168.41	0.00	0.00	0.01	0.00	168.42	18.05	13.51	357.52	98.28	16.17	90.43	152.65
2024	0.00	58.23	0.00	0.00	0.00	0.00	58.23	18.34	13.21	385.15	98.08	18.42	96.23	172.42
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	18.34	13.43	302.65	97.96	12.94	91.13	100.61
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.34	13.26	289.19	96.07	13.10	92.30	87.71
2027	0.00	0.00	97.64	0.00	0.00	0.00	97.64	18.71	13.21	249.07	94.20	12.54	91.62	50.72
2028	0.00	0.00	125.25	0.00	9.48	0.00	134.73	19.28	12.96	236.57	92.60	13.07	93.23	37.67
2029	0.00	0.00	15.61	0.00	0.00	0.00	15.61	19.35	16.59	232.70	91.71	16.16	93.30	31.52
2030	0.00	0.00	76.49	0.00	0.00	0.00	76.49	19.74	16.59	225.45	89.99	19.59	94.97	20.90
2031	0.00	0.00	265.07	0.00	74.66	0.00	339.73	21.42	16.64	217.33	88.33	22.49	97.35	9.17
2032	0.00	0.00	244.79	0.00	0.00	0.00	244.79	22.65	23.48	210.98	86.70	30.57	99.68	-5.97
2033	0.00	0.00	102.54	0.00	9.48	0.00	112.02	23.21	19.46	214.23	86.80	26.75	99.87	0.81
2034	0.00	0.00	7.54	0.00	0.00	0.00	7.54	23.25	26.52	220.53	84.42	54.16	98.25	-16.31
2035	0.00	0.00	161.67	0.00	0.00	0.00	161.67	24.05	26.52	205.84	82.33	59.46	100.86	-36.81
2036	0.00	0.00	233.56	0.00	0.00	0.00	233.56	25.22	26.53	197.36	80.81	66.06	103.02	-52.53
2037	0.00	0.00	104.61	0.00	0.00	0.00	104.61	25.74	26.53	199.02	81.20	60.03	101.87	-44.07
2038	0.00	0.00	171.80	0.00	0.00	0.00	171.80	26.60	32.93	199.01	78.82	86.10	102.77	-68.68
2039	0.00	0.00	237.08	0.00	0.00	0.00	237.08	27.79	32.94	192.67	77.43	95.02	112.20	-91.99
2040	0.00	0.00	106.18	0.00	62.81	0.00	168.99	28.63	32.94	189.70	76.91	97.29	112.53	-97.04
2041	0.00	0.00	7.81	0.00	0.00	0.00	7.81	28.67	40.02	193.04	74.99	124.39	112.37	-118.71
2042	0.00	0.00	167.41	0.00	0.00	0.00	167.41	29.51	42.97	184.02	73.18	138.43	115.92	-143.51
2043	0.00	0.00	241.85	0.00	0.00	0.00	241.85	30.72	40.02	176.40	71.81	148.49	118.58	-162.47
2044	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.26	40.02	173.69	71.35	151.87	118.94	-168.48
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	31.30	47.09	177.75	69.80	181.06	117.57	-190.68
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.09	172.15	68.56	193.07	121.00	-210.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	48.87	164.59	67.20	206.82	123.96	-233.39
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	48.88	171.50	68.52	193.65	120.84	-211.52
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	48.88	171.50	68.52	193.65	120.84	-211.52
2050	0.00	0.00	0.00	0.00	10.49	0.00	10.49	31.30	47.99	171.50	68.52	193.65	120.84	-211.52
2051	0.00	0.00	0.00	0.00	10.55	0.00	10.55	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2052	0.00	0.00	0.00	0.00	10.56	0.00	10.56	31.30	50.06	171.50	68.52	193.65	120.84	-211.52
2053	0.00	0.00	0.00	0.00	0.45	0.00	0.45	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2054	0.00	0.00	0.00	0.00	14.64	0.00	14.64	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2055	0.00	0.00	0.00	0.00	19.42	0.00	19.42	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2056	0.00	0.00	0.00	0.00	20.99	0.00	20.99	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2057	0.00	0.00	75.36	0.00	17.12	0.00	92.48	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2058	0.00	0.00	102.92	0.00	0.00	0.00	102.92	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2059	0.00	0.00	15.61	0.00	0.00	0.00	15.61	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2060	0.00	0.00	76.49	0.00	0.00	0.00	76.49	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2061	0.00	0.00	262.94	0.00	0.00	0.00	262.94	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2062	0.00	0.00	244.79	0.00	0.00	0.00	244.79	31.30	50.06	171.50	68.52	193.65	120.84	-211.52
2063	0.00	0.00	102.54	0.00	9.48	0.00	112.02	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2064	0.00	0.00	7.54	0.00	0.00	0.00	7.54	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2065	0.00	0.00	161.67	0.00	0.52	0.00	162.19	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2066	0.00	0.00	233.56	0.00	56.55	0.00	290.11	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2067	0.00	0.00	104.61	0.00	17.18	0.00	121.79	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2068	0.00	0.00	171.80	0.00	18.09	0.00	189.89	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2069	0.00	0.00	237.08	0.00	1.13	0.00	238.21	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2070	0.00	0.00	106.18	0.00	9.28	0.00	115.46	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2071	0.00	0.00	7.81	0.00	19.72	0.00	27.52	31.30	62.94	171.50	68.52	193.65	120.84	-211.52
2072	0.00	0.00	167.41	0.00	31.08	0.00	198.49	31.30	50.06	171.50	68.52	193.65	120.84	-211.52
2073	0.00	0.00	241.85	0.00	0.01	0.00	241.86	31.30	48.88	171.50	68.52	193.65	120.84	-211.52
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.30	48.88	171.50	68.52	193.65	120.84	-211.52
2075	0.00	0.00	7.97	0.00	47.12	0.00	55.08	31.30	48.88	171.50	68.52	193.65	120.84	-211.52
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.99	171.50	68.52	193.65	120.84	-211.52
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2081	0.00	0.00	0.00	0.00	18.67	0.00	18.67	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	50.06	171.50	68.52	193.65	120.84	-211.52
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2087	0.00	0.00	75.36	0.00	10.08	0.00	85.44	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2088	0.00	0.00	102.92	0.00	0.00	0.00	102.92	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2089	0.00	0.00	15.61	0.00	0.00	0.00	15.61	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
2090	0.00	0.00	0.00	0.00	15.70	0.00	15.70	31.30	47.10	171.50	68.52	193.65	120.84	-211.52
Salvage Value	0.00	0.00	7.27	0.00	1.51	0.00	8.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2437.90	742.42	0.00	206.65	0.00	3386.98	263.17	263.16	3976.67	1466.63	842.75	1586.62	80.66

Net Present Value: -3833

K22/C29

TABLE 237
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	107.18	0.00	0.00	10.08	0.00	149.01	0.75	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.61	32.53	0.00	0.00	11.02	0.00	84.16	1.17	0.00	259.79	103.30	17.62	87.22	51.64
2016	11.43	28.86	0.00	0.00	11.10	0.00	51.39	1.42	0.00	266.46	101.39	18.22	88.81	58.05
2017	12.17	215.40	0.00	0.00	27.74	0.00	255.31	2.70	0.00	279.18	99.78	18.74	89.55	71.12
2018	12.25	420.08	0.00	0.00	9.06	0.00	441.38	4.91	0.00	267.36	97.02	20.93	90.12	59.29
2019	14.64	685.17	0.00	0.00	15.77	0.00	715.58	8.48	0.00	260.99	95.00	18.71	89.76	57.53
2020	169.77	763.03	0.00	0.00	28.69	0.00	961.49	13.29	0.00	262.88	94.28	14.85	92.13	61.62
2021	257.27	623.77	0.00	0.00	40.71	0.00	921.75	17.90	0.00	264.26	92.56	14.25	97.51	59.95
2022	275.94	362.26	0.00	0.00	48.21	0.00	686.41	21.33	13.29	267.60	92.55	16.23	92.91	65.91
2023	281.23	168.41	0.00	0.00	3.62	0.00	453.26	23.60	13.51	357.01	98.28	16.21	90.48	152.04
2024	760.76	58.23	0.00	0.00	3.61	0.00	822.60	27.71	13.21	383.99	98.07	18.42	96.29	171.21
2025	1207.98	0.00	0.00	0.00	43.84	0.00	1251.81	33.97	13.43	301.22	97.98	12.97	91.22	99.04
2026	1084.57	0.00	0.00	0.00	22.74	0.00	1107.31	39.51	13.26	287.43	96.07	13.14	92.44	85.78
2027	774.50	0.00	0.00	0.00	38.26	0.00	812.77	43.57	13.21	247.84	94.42	12.01	91.54	49.87
2028	536.39	0.00	0.00	0.00	66.25	0.00	602.64	46.58	12.96	232.32	92.50	13.22	93.58	33.02
2029	352.31	0.00	0.00	0.00	88.77	0.00	441.08	48.79	27.13	297.57	96.36	15.10	84.35	101.76
2030	129.76	0.00	0.00	0.00	104.61	0.00	234.38	49.96	27.36	392.81	103.51	14.79	81.00	193.52
2031	40.95	0.00	0.00	0.00	0.00	0.00	40.95	50.17	27.26	405.75	103.43	15.16	83.25	203.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	30.24	392.76	101.73	15.01	84.13	191.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	26.04	380.29	100.08	14.92	85.75	179.54
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.99	367.97	98.46	15.18	86.86	167.47
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.82	355.07	96.89	15.24	87.54	155.40
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	50.17	25.44	340.19	95.32	15.26	88.36	141.25
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.52	324.85	93.76	15.29	89.45	126.34
2038	0.00	0.00	101.89	0.00	0.00	0.00	101.89	50.56	24.96	309.82	92.22	15.26	91.40	110.94
2039	0.00	0.00	131.00	0.00	9.48	0.00	140.49	51.16	27.74	303.07	90.85	14.82	101.53	95.87
2040	0.00	0.00	16.49	0.00	0.00	0.00	16.49	51.24	28.85	294.32	89.10	25.21	101.80	78.21
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.24	28.85	285.83	87.63	28.24	104.21	65.75
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	51.64	31.81	277.54	86.21	29.19	108.12	54.03
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	52.25	28.85	268.56	84.72	29.47	113.31	41.05
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	52.74	32.92	260.86	83.25	44.83	111.33	21.45
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	53.67	32.25	252.77	81.98	48.02	114.00	8.76
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	53.76	36.33	258.08	81.57	47.31	117.29	11.90
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.11	239.35	79.36	62.29	118.82	-21.12
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.11	250.07	80.97	52.54	116.71	-0.15
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	41.07	250.07	80.97	52.54	116.71	-0.15
2050	0.00	0.00	0.00	0.00	10.49	0.00	10.49	53.76	37.23	250.07	80.97	52.54	116.71	-0.15
2051	0.00	0.00	0.00	0.00	10.55	0.00	10.55	53.76	36.35	250.07	80.97	52.54	116.71	-0.15
2052	0.00	0.00	0.00	0.00	10.56	0.00	10.56	53.76	39.31	250.07	80.97	52.54	116.71	-0.15
2053	0.00	0.00	0.00	0.00	0.45	0.00	0.45	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2054	0.00	0.00	0.00	0.00	14.64	0.00	14.64	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2055	0.00	0.00	0.00	0.00	19.42	0.00	19.42	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2056	0.00	0.00	0.00	0.00	20.99	0.00	20.99	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2057	0.00	0.00	0.00	0.00	17.12	0.00	17.12	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2058	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2059	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.76	55.15	250.07	80.97	52.54	116.71	-0.15
2060	0.00	0.00	0.00	0.00	10.69	0.00	10.69	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2061	0.00	0.00	0.00	0.00	5.35	0.00	5.35	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2062	0.00	0.00	0.00	0.00	8.91	0.00	8.91	53.76	39.32	250.07	80.97	52.54	116.71	-0.15
2063	0.00	0.00	0.00	0.00	15.15	0.00	15.15	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2064	0.00	0.00	0.00	0.00	21.39	0.00	21.39	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2065	0.00	0.00	0.00	0.00	26.37	0.00	26.37	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2066	0.00	0.00	0.00	0.00	0.55	0.00	0.55	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2067	0.00	0.00	0.00	0.00	17.18	0.00	17.18	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2068	0.00	0.00	79.61	0.00	8.61	0.00	88.22	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2069	0.00	0.00	108.72	0.00	1.13	0.00	109.86	53.76	55.15	250.07	80.97	52.54	116.71	-0.15
2070	0.00	0.00	16.49	0.00	9.28	0.00	25.77	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2071	0.00	0.00	0.00	0.00	19.72	0.00	19.72	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2072	0.00	0.00	81.21	0.00	31.08	0.00	112.29	53.76	55.15	250.07	80.97	52.54	116.71	-0.15
2073	0.00	0.00	110.91	0.00	2.73	0.00	113.64	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2074	0.00	0.00	98.85	0.00	12.20	0.00	111.05	53.76	53.96	250.07	80.97	52.54	116.71	-0.15
2075	0.00	0.00	112.03	0.00	33.14	0.00	145.17	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2076	0.00	0.00	16.99	0.00	17.39	0.00	34.39	53.76	53.08	250.07	80.97	52.54	116.71	-0.15
2077	0.00	0.00	0.00	0.00	29.35	0.00	29.35	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2078	0.00	0.00	0.00	0.00	60.58	0.00	60.58	53.76	52.19	250.07	80.97	52.54	116.71	-0.15
2079	0.00	0.00	0.00	0.00	67.38	0.00	67.38	53.76	39.32	250.07	80.97	52.54	116.71	-0.15
2080	0.00	0.00	0.00	0.00	134.77	0.00	134.77	53.76	53.96	250.07	80.97	52.54	116.71	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	56.92	250.07	80.97	52.54	116.71	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.13	250.07	80.97	52.54	116.71	-0.15
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	53.96	250.07	80.97	52.54	116.71	-0.15
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	39.32	250.07	80.97	52.54	116.71	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	36.36	250.07	80.97	52.54	116.71	-0.15
Salvage Value	4.51	0.00	2.34	0.00	3.58	0.00	10.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2994.94	2437.90	132.14	0.00	333.71	0.00	5898.70	473.16	248.53	4679.59	1545.80	355.39	1530.27	1248.13

Net Present Value: -5372

SCGT/C26

TABLE 238
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	259.79	103.30	17.62	87.22	51.64
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	266.71	101.39	18.22	88.79	58.31
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	279.78	99.77	18.74	89.52	71.77
2018	217.91	0.00	0.37	0.00	0.00	0.00	218.28	3.36	0.00	268.38	97.01	20.93	90.09	60.35
2019	261.93	0.00	0.00	0.00	0.00	0.00	261.93	4.67	0.00	261.90	94.99	18.71	89.74	58.46
2020	268.21	0.00	95.05	0.00	0.00	0.00	363.27	6.37	0.00	267.55	94.86	13.41	91.63	67.65
2021	739.32	0.00	121.67	0.00	9.48	0.00	870.47	10.62	0.00	268.35	93.03	12.74	97.03	65.55
2022	1186.89	0.00	15.08	0.00	0.55	0.00	1202.51	16.63	4.07	262.34	90.82	22.64	98.57	50.31
2023	1065.64	0.00	0.00	0.00	1.09	0.00	1066.73	21.96	4.07	258.31	88.40	28.54	104.05	37.32
2024	760.98	0.00	0.00	0.00	2.19	0.00	763.17	25.78	4.07	265.84	87.14	31.91	110.16	36.63
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	28.44	4.07	173.90	87.54	19.50	105.35	-38.49
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	30.18	18.69	213.74	91.57	14.30	89.53	18.33
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	30.82	18.91	301.11	99.31	13.89	83.27	104.65
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	31.02	18.61	325.25	99.56	15.19	88.37	122.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.83	312.33	97.83	15.65	89.53	109.31
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.65	302.35	96.60	15.52	89.63	100.59
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.60	287.80	94.64	16.67	91.43	85.06
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.36	270.83	92.70	17.88	93.14	67.11
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.92	259.42	90.76	21.02	95.98	51.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.92	250.92	89.13	24.35	98.15	39.28
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.96	244.69	87.83	27.13	99.73	29.99
2036	0.00	0.00	78.82	0.00	0.00	0.00	78.82	31.41	20.74	239.45	86.75	27.48	102.05	23.17
2037	0.00	0.00	107.69	0.00	9.48	0.00	117.17	32.00	17.78	230.52	85.21	27.89	107.35	10.07
2038	0.00	0.00	16.33	0.00	0.00	0.00	16.33	32.08	21.85	222.93	83.71	42.55	105.97	-9.30
2039	0.00	0.00	80.00	0.00	0.00	0.00	80.00	32.48	21.85	214.47	82.45	45.29	115.34	-28.62
2040	0.00	0.00	111.39	0.00	74.66	0.00	186.05	33.40	21.85	207.82	81.09	44.88	122.67	-40.83
2041	0.00	0.00	97.38	0.00	0.00	0.00	97.38	33.89	25.94	197.70	79.43	62.51	121.03	-65.27
2042	0.00	0.00	110.36	0.00	0.00	0.00	110.36	34.44	25.27	188.71	78.06	70.25	123.74	-83.34
2043	0.00	0.00	98.36	0.00	0.00	0.00	98.36	34.93	29.34	183.41	76.73	78.89	128.78	-100.99
2044	0.00	0.00	111.47	0.00	62.81	0.00	174.28	35.80	29.34	176.50	75.41	79.52	138.44	-116.87
2045	0.00	0.00	16.91	0.00	0.00	0.00	16.91	35.89	33.43	169.56	74.04	109.25	130.82	-144.55
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.39	162.81	72.84	120.65	132.95	-163.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.44	156.34	71.51	122.31	144.38	-181.87
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.45	162.90	72.79	117.40	136.05	-163.35
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.45	162.90	72.79	117.40	136.05	-163.35
2050	0.00	0.00	72.77	0.00	10.08	0.00	82.85	35.89	33.46	162.90	72.79	117.40	136.05	-163.35
2051	0.00	0.00	99.39	0.00	10.08	0.00	109.47	35.89	35.24	162.90	72.79	117.40	136.05	-163.35
2052	0.00	0.00	15.08	0.00	10.08	0.00	25.16	35.89	35.25	162.90	72.79	117.40	136.05	-163.35
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	162.90	72.79	117.40	136.05	-163.35
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	162.90	72.79	117.40	136.05	-163.35
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	162.90	72.79	117.40	136.05	-163.35
2056	0.00	0.00	0.00	0.00	9.48	0.00	9.48	35.89	36.43	162.90	72.79	117.40	136.05	-163.35
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2066	0.00	0.00	78.82	0.00	0.00	0.00	78.82	35.89	36.43	162.90	72.79	117.40	136.05	-163.35
2067	0.00	0.00	107.64	0.00	0.00	0.00	107.64	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2068	0.00	0.00	16.33	0.00	0.00	0.00	16.33	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2069	0.00	0.00	80.00	0.00	0.00	0.00	80.00	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2070	0.00	0.00	109.27	0.00	0.00	0.00	109.27	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2071	0.00	0.00	97.38	0.00	0.00	0.00	97.38	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2072	0.00	0.00	110.36	0.00	10.03	0.00	120.39	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2073	0.00	0.00	98.36	0.00	1.09	0.00	99.45	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2074	0.00	0.00	111.47	0.00	2.19	0.00	113.66	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2075	0.00	0.00	16.91	0.00	60.92	0.00	77.83	35.89	49.30	162.90	72.79	117.40	136.05	-163.35
2076	0.00	0.00	0.00	0.00	2.19	0.00	2.19	35.89	36.43	162.90	72.79	117.40	136.05	-163.35
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	51.08	162.90	72.79	117.40	136.05	-163.35
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	162.90	72.79	117.40	136.05	-163.35
2079	0.00	0.00	0.00	0.00	47.12	0.00	47.12	35.89	51.08	162.90	72.79	117.40	136.05	-163.35
2080	0.00	0.00	72.77	0.00	0.00	0.00	72.77	35.89	35.25	162.90	72.79	117.40	136.05	-163.35
2081	0.00	0.00	99.39	0.00	0.00	0.00	99.39	35.89	51.08	162.90	72.79	117.40	136.05	-163.35
2082	0.00	0.00	15.08	0.00	0.00	0.00	15.08	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	36.43	162.90	72.79	117.40	136.05	-163.35
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
2090	0.00	0.00	0.00	0.00	18.67	0.00	18.67	35.89	33.47	162.90	72.79	117.40	136.05	-163.35
Salvage Value	1.77	0.00	3.88	0.00	1.11	0.00	6.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	352.93	0.00	81.43	0.00	4047.37	320.68	196.32	3971.96	1483.34	577.71	1640.90	270.00

Net Present Value: -4294

CCGT/C26

TABLE 239
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	259.79	103.30	17.62	87.22	51.64
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	266.71	101.39	18.22	88.79	58.31
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	279.78	99.77	18.74	89.52	71.77
2018	217.91	0.00	0.37	0.00	0.00	0.00	218.28	3.36	0.00	268.38	97.01	20.93	90.09	60.35
2019	261.93	0.00	149.27	0.00	0.00	0.00	411.20	5.42	0.00	261.90	94.99	18.71	89.74	58.46
2020	268.21	0.00	237.92	0.00	0.00	0.00	506.14	7.84	0.00	267.55	94.86	13.41	91.63	67.65
2021	739.32	0.00	118.86	0.00	9.48	0.00	867.67	12.06	0.00	272.38	93.74	11.20	96.02	71.42
2022	1186.89	0.00	7.10	0.00	0.55	0.00	1194.54	18.03	7.06	272.38	91.37	32.35	89.21	59.45
2023	1065.64	0.00	0.00	0.00	1.09	0.00	1066.73	23.37	7.06	273.44	89.26	38.85	93.65	51.67
2024	760.98	0.00	0.00	0.00	2.19	0.00	763.17	27.18	7.06	288.86	88.14	47.08	98.11	55.53
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	29.84	7.06	195.47	87.66	37.65	95.50	-25.35
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	31.59	21.68	227.74	91.47	28.82	85.45	22.01
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	32.22	21.90	309.96	99.27	20.83	81.48	108.38
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	32.42	21.60	335.34	99.65	22.26	85.88	127.55
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.82	323.77	97.94	23.56	87.07	115.20
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.65	307.03	95.81	25.28	88.88	97.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.60	307.95	95.71	22.57	87.57	102.10
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.35	285.15	92.89	26.39	90.47	75.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.91	275.86	91.14	29.47	92.69	62.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.91	265.15	89.12	33.53	95.78	46.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.95	258.07	87.64	36.12	97.79	36.52
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	23.74	248.92	85.99	41.63	99.70	21.59
2037	0.00	0.00	79.21	0.00	0.00	0.00	79.21	32.82	20.78	245.38	85.24	43.03	100.20	16.90
2038	0.00	0.00	108.23	0.00	9.48	0.00	117.71	33.41	20.78	238.93	84.04	43.78	104.14	6.97
2039	0.00	0.00	16.41	0.00	0.00	0.00	16.41	33.49	24.85	229.82	82.27	56.91	111.61	-20.97
2040	0.00	0.00	80.40	0.00	0.00	0.00	80.40	33.89	24.85	222.07	80.83	63.31	114.38	-36.45
2041	0.00	0.00	111.94	0.00	74.66	0.00	186.60	34.82	24.85	212.89	79.50	65.68	118.35	-50.64
2042	0.00	0.00	97.87	0.00	0.00	0.00	97.87	35.30	28.26	207.27	78.14	73.39	123.17	-67.44
2043	0.00	0.00	110.91	0.00	0.00	0.00	110.91	35.86	28.26	197.77	76.73	87.07	121.47	-87.50
2044	0.00	0.00	16.83	0.00	0.00	0.00	16.83	35.94	32.33	191.23	75.39	99.44	123.67	-107.27
2045	0.00	0.00	82.43	0.00	0.00	0.00	82.43	36.36	32.33	184.33	74.07	103.25	131.03	-124.02
2046	0.00	0.00	112.59	0.00	62.81	0.00	175.40	37.23	35.30	181.48	73.15	102.58	138.84	-133.08
2047	0.00	0.00	17.08	0.00	0.00	0.00	17.08	37.32	36.43	168.48	71.54	129.01	132.05	-164.13
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.43	178.10	72.92	111.61	133.98	-140.41
2049	0.00	0.00	149.27	0.00	10.08	0.00	159.35	37.32	36.44	178.10	72.92	111.61	133.98	-140.41
2050	0.00	0.00	215.64	0.00	10.08	0.00	225.72	37.32	36.44	178.10	72.92	111.61	133.98	-140.41
2051	0.00	0.00	96.58	0.00	10.08	0.00	106.66	37.32	38.22	178.10	72.92	111.61	133.98	-140.41
2052	0.00	0.00	7.10	0.00	10.08	0.00	17.18	37.32	38.23	178.10	72.92	111.61	133.98	-140.41
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.23	178.10	72.92	111.61	133.98	-140.41
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	178.10	72.92	111.61	133.98	-140.41
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	178.10	72.92	111.61	133.98	-140.41
2056	0.00	0.00	0.00	0.00	9.48	0.00	9.48	37.32	39.42	178.10	72.92	111.61	133.98	-140.41
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	39.42	178.10	72.92	111.61	133.98	-140.41
2067	0.00	0.00	79.21	0.00	0.00	0.00	79.21	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2068	0.00	0.00	108.18	0.00	0.00	0.00	108.18	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2069	0.00	0.00	16.41	0.00	0.00	0.00	16.41	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2070	0.00	0.00	80.40	0.00	0.00	0.00	80.40	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2071	0.00	0.00	109.81	0.00	0.00	0.00	109.81	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2072	0.00	0.00	97.87	0.00	0.55	0.00	98.42	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2073	0.00	0.00	110.91	0.00	10.58	0.00	121.49	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2074	0.00	0.00	16.83	0.00	2.19	0.00	19.01	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2075	0.00	0.00	82.43	0.00	4.93	0.00	87.36	37.32	52.29	178.10	72.92	111.61	133.98	-140.41
2076	0.00	0.00	112.59	0.00	58.19	0.00	170.77	37.32	39.42	178.10	72.92	111.61	133.98	-140.41
2077	0.00	0.00	17.08	0.00	0.00	0.00	17.08	37.32	54.07	178.10	72.92	111.61	133.98	-140.41
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	178.10	72.92	111.61	133.98	-140.41
2079	0.00	0.00	149.27	0.00	0.00	0.00	149.27	37.32	54.07	178.10	72.92	111.61	133.98	-140.41
2080	0.00	0.00	215.64	0.00	0.00	0.00	215.64	37.32	38.24	178.10	72.92	111.61	133.98	-140.41
2081	0.00	0.00	96.58	0.00	47.11	0.00	143.69	37.32	54.07	178.10	72.92	111.61	133.98	-140.41
2082	0.00	0.00	7.10	0.00	0.00	0.00	7.10	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	39.42	178.10	72.92	111.61	133.98	-140.41
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	178.10	72.92	111.61	133.98	-140.41
Salvage Value	1.77	0.00	6.15	0.00	1.00	0.00	8.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	573.48	0.00	79.06	0.00	4265.54	335.86	222.15	4116.41	1485.51	643.33	1594.51	393.06

Net Present Value: -4430

Wind/C26

TABLE 240
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	259.79	103.30	17.62	87.22	51.64
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	266.71	101.39	18.22	88.79	58.31
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	279.78	99.77	18.74	89.52	71.77
2018	217.91	0.00	0.00	0.00	0.00	0.00	217.91	3.36	0.00	268.38	97.01	20.93	90.09	60.35
2019	261.93	0.00	0.00	0.00	0.00	0.00	261.93	4.67	0.00	261.90	94.99	18.71	89.74	58.46
2020	268.21	0.00	0.00	9.79	13.83	0.00	291.83	6.13	0.00	265.31	94.46	14.40	91.95	64.51
2021	739.32	0.00	0.00	298.83	23.04	0.00	1061.19	11.43	0.00	265.58	92.61	14.02	96.96	61.98
2022	1186.89	0.00	0.00	304.42	28.20	0.00	1519.51	19.03	6.34	268.72	90.94	14.05	97.29	66.44
2023	1065.64	0.00	0.00	294.63	14.92	0.00	1375.19	25.91	12.69	272.42	88.42	16.12	100.74	67.14
2024	760.98	0.00	0.00	5.59	6.80	0.00	773.37	29.77	19.03	285.99	86.42	16.73	107.38	75.46
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	32.43	19.03	192.70	86.24	10.98	123.58	-28.11
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	34.18	33.65	247.48	90.37	13.06	89.00	55.06
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	34.81	33.87	335.51	98.08	11.78	83.08	142.58
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	35.02	33.57	355.94	98.13	12.92	87.49	157.40
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.79	345.06	96.44	13.14	89.43	146.05
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.62	336.81	95.35	12.85	89.41	139.20
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.57	327.63	93.91	13.18	90.57	129.97
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	35.02	33.32	314.78	92.44	13.21	91.54	117.58
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	32.88	299.48	90.88	13.10	92.72	102.77
2034	0.00	0.00	100.31	0.00	0.00	0.00	100.31	35.41	32.88	284.51	89.40	13.11	93.55	88.44
2035	0.00	0.00	128.86	0.00	9.48	0.00	138.34	35.99	32.92	278.38	88.36	11.98	94.84	83.20
2036	0.00	0.00	94.98	0.00	0.00	0.00	94.98	36.46	39.78	266.61	86.27	21.57	95.98	62.79
2037	0.00	0.00	107.69	0.00	9.48	0.00	117.17	37.05	36.82	256.87	84.79	24.35	98.21	49.52
2038	0.00	0.00	16.33	0.00	0.00	0.00	16.33	37.13	40.89	251.10	83.53	31.72	100.12	35.72
2039	0.00	0.00	80.00	0.00	0.00	0.00	80.00	37.53	40.89	243.80	82.33	30.91	110.94	19.62
2040	0.00	0.00	111.39	9.79	74.66	0.00	195.84	38.50	40.89	232.16	80.65	38.97	112.31	0.23
2041	0.00	0.00	97.38	298.83	0.00	0.00	396.21	40.48	44.97	225.04	79.22	48.07	114.85	-17.11
2042	0.00	0.00	110.36	304.42	0.00	0.00	414.78	42.55	44.30	216.91	77.93	50.23	119.72	-30.97
2043	0.00	0.00	98.36	294.63	0.00	0.00	392.99	44.52	48.37	211.65	76.61	56.20	125.76	-46.93
2044	0.00	0.00	111.47	5.59	62.81	0.00	179.87	45.42	48.37	200.34	75.24	69.64	123.55	-68.09
2045	0.00	0.00	16.91	0.00	0.00	0.00	16.91	45.50	52.46	193.26	73.94	81.38	125.95	-88.01
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	55.43	185.82	72.65	82.82	134.38	-104.02
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.47	178.87	71.38	83.63	144.58	-120.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.48	185.99	72.66	82.61	134.97	-104.25
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.49	185.99	72.66	82.61	134.97	-104.25
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.49	185.99	72.66	82.61	134.97	-104.25
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	54.27	185.99	72.66	82.61	134.97	-104.25
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	54.28	185.99	72.66	82.61	134.97	-104.25
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	185.99	72.66	82.61	134.97	-104.25
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	185.99	72.66	82.61	134.97	-104.25
2055	0.00	0.00	0.00	0.00	3.46	0.00	3.46	45.50	54.28	185.99	72.66	82.61	134.97	-104.25
2056	0.00	0.00	0.00	0.00	5.76	0.00	5.76	45.50	55.46	185.99	72.66	82.61	134.97	-104.25
2057	0.00	0.00	0.00	0.00	6.91	0.00	6.91	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2058	0.00	0.00	0.00	0.00	3.46	0.00	3.46	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2059	0.00	0.00	0.00	0.00	1.15	0.00	1.15	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2060	0.00	0.00	0.00	9.79	0.00	0.00	9.79	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2061	0.00	0.00	0.00	298.83	0.00	0.00	298.83	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2062	0.00	0.00	0.00	304.42	0.00	0.00	304.42	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2063	0.00	0.00	0.00	294.63	0.00	0.00	294.63	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2064	0.00	0.00	78.03	5.59	0.00	0.00	83.63	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2065	0.00	0.00	106.58	0.00	0.00	0.00	106.58	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2066	0.00	0.00	94.98	0.00	0.00	0.00	94.98	45.50	55.46	185.99	72.66	82.61	134.97	-104.25
2067	0.00	0.00	107.64	0.00	0.00	0.00	107.64	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2068	0.00	0.00	16.33	0.00	0.00	0.00	16.33	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2069	0.00	0.00	80.00	0.00	0.00	0.00	80.00	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2070	0.00	0.00	109.27	0.00	19.85	0.00	129.12	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2071	0.00	0.00	97.38	0.00	17.28	0.00	114.67	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2072	0.00	0.00	110.36	0.00	30.77	0.00	141.13	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2073	0.00	0.00	98.36	0.00	11.46	0.00	109.82	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2074	0.00	0.00	111.47	0.00	5.65	0.00	117.12	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2075	0.00	0.00	16.91	0.00	60.92	0.00	77.83	45.50	68.33	185.99	72.66	82.61	134.97	-104.25
2076	0.00	0.00	0.00	0.00	2.19	0.00	2.19	45.50	55.46	185.99	72.66	82.61	134.97	-104.25
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	70.11	185.99	72.66	82.61	134.97	-104.25
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	185.99	72.66	82.61	134.97	-104.25
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	45.50	70.11	185.99	72.66	82.61	134.97	-104.25
2080	0.00	0.00	0.00	9.79	0.00	0.00	9.79	45.50	54.28	185.99	72.66	82.61	134.97	-104.25
2081	0.00	0.00	0.00	298.83	0.00	0.00	298.83	45.50	70.11	185.99	72.66	82.61	134.97	-104.25
2082	0.00	0.00	0.00	304.42	0.00	0.00	304.42	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2083	0.00	0.00	0.00	294.63	0.00	0.00	294.63	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2084	0.00	0.00	0.00	5.59	10.08	0.00	15.67	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	55.46	185.99	72.66	82.61	134.97	-104.25
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
2090	0.00	0.00	0.00	0.00	18.67	0.00	18.67	45.50	52.50	185.99	72.66	82.61	134.97	-104.25
Salvage Value	1.77	0.00	3.00	4.87	1.51	0.00	11.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	254.81	762.36	131.44	0.00	4761.62	375.93	347.44	4226.82	1478.29	441.48	1625.99	681.06

Net Present Value -4804

K19/C25/750MW (WPS Sale &Inv)

TABLE 241
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	4.96	320.64	1.60	0.00	247.47	105.06	15.82	82.63	43.96
2015	90.00	558.63	0.00	0.00	22.21	8.93	679.78	5.00	0.00	265.75	103.33	17.62	87.25	57.55
2016	203.55	742.67	0.00	0.00	31.55	23.00	1000.77	10.01	0.00	273.81	101.41	18.21	88.86	65.34
2017	240.87	900.50	0.00	0.00	47.62	33.55	1222.53	16.12	0.00	285.75	99.44	19.45	90.14	76.72
2018	289.99	641.80	0.00	0.00	53.35	135.56	1120.71	21.72	0.00	278.52	97.31	20.36	90.00	70.84
2019	297.44	450.39	0.00	0.00	67.54	113.27	928.64	26.37	13.29	294.51	97.23	19.20	88.76	89.31
2020	821.32	186.45	0.00	0.00	4.34	202.72	1214.83	32.44	45.83	459.15	104.52	13.69	96.43	244.51
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	39.63	43.92	536.54	105.08	15.10	101.11	315.24
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	45.71	42.55	537.63	103.83	15.16	102.16	316.47
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	50.19	40.67	527.93	101.45	15.02	104.83	306.63
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	53.54	39.07	527.33	99.15	16.69	110.33	301.15
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	56.02	52.00	469.60	103.74	14.93	92.98	257.95
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	57.36	50.42	613.85	111.92	14.85	92.51	394.56
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	57.59	48.96	644.44	112.15	14.57	97.70	420.03
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	47.93	645.16	110.45	15.09	99.39	420.23
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	49.25	634.27	108.50	15.09	101.21	409.48
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	43.96	627.96	107.12	14.76	102.24	403.85
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	42.61	619.92	105.44	15.11	103.89	395.48
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	41.09	608.10	103.70	15.13	105.56	383.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	40.06	593.84	101.88	15.10	107.34	369.52
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	39.10	579.51	100.12	15.16	108.94	355.29
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	40.40	526.83	98.41	14.99	106.87	306.55
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	36.88	446.49	96.72	15.25	99.75	234.77
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	57.59	36.35	420.30	95.07	15.34	100.48	209.42
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	35.83	403.99	93.39	15.29	103.08	192.23
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	58.16	38.28	388.75	91.74	15.25	112.30	169.46
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	59.01	34.83	367.48	90.45	14.48	116.96	145.58
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	59.13	37.76	349.03	88.41	24.89	117.02	118.70
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	59.71	37.30	338.68	86.85	27.88	119.67	104.27
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	60.57	36.85	330.64	85.46	29.51	123.18	92.49
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	61.29	42.27	327.55	84.22	34.02	127.54	81.77
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.59	44.81	309.81	82.35	42.92	127.30	57.24
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.71	45.53	301.60	80.89	52.53	129.71	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	44.25	293.13	79.59	54.99	134.22	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	42.98	301.51	80.94	50.15	130.41	40.02
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	62.71	45.58	301.51	80.94	50.15	130.41	40.02
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	62.71	44.04	301.51	80.94	50.15	130.41	40.02
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	62.71	43.70	301.51	80.94	50.15	130.41	40.02
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	62.71	43.38	301.51	80.94	50.15	130.41	40.02
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	62.71	43.06	301.51	80.94	50.15	130.41	40.02
2054	0.00	0.00	0.00	0.00	23.52	24.86	48.38	62.71	42.75	301.51	80.94	50.15	130.41	40.02
2055	0.00	0.00	0.00	0.00	1.07	25.78	26.85	62.71	43.63	301.51	80.94	50.15	130.41	40.02
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.71	56.21	301.51	80.94	50.15	130.41	40.02
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	62.71	40.10	301.51	80.94	50.15	130.41	40.02
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.71	55.66	301.51	80.94	50.15	130.41	40.02
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	62.71	42.53	301.51	80.94	50.15	130.41	40.02
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	62.71	52.37	301.51	80.94	50.15	130.41	40.02
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	68.20	301.51	80.94	50.15	130.41	40.02
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	62.71	68.20	301.51	80.94	50.15	130.41	40.02
2065	0.00	0.00	0.00	0.00	11.58	5.61	17.20	62.71	39.50	301.51	80.94	50.15	130.41	40.02
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	62.71	68.20	301.51	80.94	50.15	130.41	40.02
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	62.71	68.20	301.51	80.94	50.15	130.41	40.02
2069	0.00	0.00	114.57	0.00	44.02	75.78	234.37	62.71	39.50	301.51	80.94	50.15	130.41	40.02
2070	0.00	0.00	156.79	0.00	3.27	78.59	238.65	62.71	54.15	301.51	80.94	50.15	130.41	40.02
2071	0.00	0.00	23.83	0.00	39.94	0.00	63.77	62.71	38.32	301.51	80.94	50.15	130.41	40.02
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	62.71	54.15	301.51	80.94	50.15	130.41	40.02
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	62.71	37.43	301.51	80.94	50.15	130.41	40.02
2074	0.00	0.00	142.97	0.00	62.80	0.00	205.78	62.71	52.37	301.51	80.94	50.15	130.41	40.02
2075	0.00	0.00	162.36	0.00	93.85	0.00	256.21	62.71	39.50	301.51	80.94	50.15	130.41	40.02
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	62.71	54.15	301.51	80.94	50.15	130.41	40.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	38.32	301.51	80.94	50.15	130.41	40.02
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	62.71	54.15	301.51	80.94	50.15	130.41	40.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	41.28	301.51	80.94	50.15	130.41	40.02
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	62.71	54.15	301.51	80.94	50.15	130.41	40.02
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	62.71	39.50	301.51	80.94	50.15	130.41	40.02
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	62.71	36.54	301.51	80.94	50.15	130.41	40.02
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	62.71	39.50	301.51	80.94	50.15	130.41	40.02
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	62.71	39.50	301.51	80.94	50.15	130.41	40.02
Salvage Value	0.97	0.00	3.46	0.00	4.67	2.32	11.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	181.29	0.00	486.59	403.67	8397.11	673.97	494.22	6753.60	1607.87	347.40	1660.56	3137.77

Net Present Value -6428

K19/C25/750MW

TABLE 242
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	6.80	322.48	1.61	0.00	240.15	105.07	15.82	82.48	36.77
2015	90.00	558.63	0.00	0.00	22.21	11.15	681.99	5.02	0.00	258.65	103.32	17.61	87.24	50.48
2016	203.55	742.67	0.00	0.00	31.55	23.95	1001.73	10.03	0.00	265.48	101.40	18.19	88.83	57.07
2017	240.87	900.50	0.00	0.00	47.62	33.55	1222.53	16.14	0.00	276.12	99.43	19.45	90.12	67.13
2018	289.99	641.80	0.00	0.00	53.35	187.94	1173.09	22.01	0.00	267.60	97.30	20.33	90.04	59.94
2019	297.44	450.39	0.00	0.00	67.54	132.21	947.59	26.75	13.29	282.27	97.22	19.17	88.78	77.09
2020	821.32	186.45	0.00	0.00	4.34	350.24	1362.36	33.56	49.02	436.47	104.52	13.67	96.34	221.95
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	40.75	47.22	523.56	105.08	15.20	101.19	302.09
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	46.83	45.88	527.23	103.82	15.16	102.18	306.07
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	51.31	43.85	518.22	101.44	15.02	104.86	296.90
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	54.66	42.12	518.93	99.13	16.73	110.39	292.69
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	57.14	54.92	460.33	103.74	14.95	92.96	248.68
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	58.48	53.22	566.47	111.91	14.91	90.62	349.03
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	58.71	51.65	562.46	112.16	14.48	93.01	342.81
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	50.50	560.12	110.45	15.07	94.34	340.26
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	51.71	550.91	108.49	15.08	96.25	331.09
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	46.31	546.06	107.10	14.79	97.45	326.72
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	44.86	539.76	105.42	15.18	99.19	319.96
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	43.24	529.76	103.69	15.19	101.13	309.74
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	42.11	517.40	101.88	15.08	103.12	297.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	41.06	505.01	100.13	15.13	105.01	284.75
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	42.27	436.57	98.44	15.16	98.07	224.90
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	38.67	411.55	96.73	15.31	98.50	201.01
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	58.71	38.06	396.93	95.04	15.30	100.51	186.08
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	37.47	381.45	93.39	15.27	103.07	169.73
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	59.28	39.86	367.00	91.74	15.28	112.24	147.73
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	60.13	36.34	363.13	90.45	14.49	116.93	141.25
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	60.25	39.20	349.03	88.41	24.89	117.01	118.71
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	60.83	38.68	338.68	86.85	27.88	119.66	104.29
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	61.69	38.18	330.65	85.46	29.51	123.18	92.50
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	62.41	43.53	327.56	84.22	34.02	127.53	81.79
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	63.71	46.02	309.79	82.35	42.92	127.27	57.25
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	63.83	46.69	301.55	80.89	52.53	129.65	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	45.35	293.09	79.59	54.99	134.17	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	44.04	301.48	80.94	50.15	130.36	40.02
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	63.83	46.58	301.48	80.94	50.15	130.36	40.02
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	63.83	45.00	301.48	80.94	50.15	130.36	40.02
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	63.83	44.62	301.48	80.94	50.15	130.36	40.02
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	63.83	44.24	301.48	80.94	50.15	130.36	40.02
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	63.83	43.89	301.48	80.94	50.15	130.36	40.02
2054	0.00	0.00	0.00	0.00	23.52	24.86	48.38	63.83	43.53	301.48	80.94	50.15	130.36	40.02
2055	0.00	0.00	0.00	0.00	1.07	25.78	26.85	63.83	44.38	301.48	80.94	50.15	130.36	40.02
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	63.83	56.92	301.48	80.94	50.15	130.36	40.02
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	63.83	40.77	301.48	80.94	50.15	130.36	40.02
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	63.83	56.29	301.48	80.94	50.15	130.36	40.02
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	63.83	43.13	301.48	80.94	50.15	130.36	40.02
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	63.83	52.37	301.48	80.94	50.15	130.36	40.02
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	68.20	301.48	80.94	50.15	130.36	40.02
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	63.83	68.20	301.48	80.94	50.15	130.36	40.02
2065	0.00	0.00	0.00	0.00	11.58	5.61	17.20	63.83	39.50	301.48	80.94	50.15	130.36	40.02
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	63.83	68.20	301.48	80.94	50.15	130.36	40.02
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	63.83	68.20	301.48	80.94	50.15	130.36	40.02
2069	0.00	0.00	114.57	0.00	44.02	75.78	234.37	63.83	39.50	301.48	80.94	50.15	130.36	40.02
2070	0.00	0.00	156.79	0.00	3.27	78.59	238.65	63.83	54.15	301.48	80.94	50.15	130.36	40.02
2071	0.00	0.00	23.83	0.00	39.94	0.00	63.77	63.83	38.32	301.48	80.94	50.15	130.36	40.02
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	63.83	54.15	301.48	80.94	50.15	130.36	40.02
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	63.83	37.43	301.48	80.94	50.15	130.36	40.02
2074	0.00	0.00	142.97	0.00	62.80	0.00	205.78	63.83	52.37	301.48	80.94	50.15	130.36	40.02
2075	0.00	0.00	162.36	0.00	93.85	0.00	256.21	63.83	39.50	301.48	80.94	50.15	130.36	40.02
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	63.83	54.15	301.48	80.94	50.15	130.36	40.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	38.32	301.48	80.94	50.15	130.36	40.02
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	63.83	54.15	301.48	80.94	50.15	130.36	40.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	41.28	301.48	80.94	50.15	130.36	40.02
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	63.83	54.15	301.48	80.94	50.15	130.36	40.02
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	63.83	39.50	301.48	80.94	50.15	130.36	40.02
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	63.83	36.54	301.48	80.94	50.15	130.36	40.02
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	63.83	39.50	301.48	80.94	50.15	130.36	40.02
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	63.83	39.50	301.48	80.94	50.15	130.36	40.02
Salvage Value	0.97	0.00	3.46	0.00	4.67	2.32	11.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	181.29	0.00	486.59	564.08	8557.52	686.96	518.00	6360.52	1607.80	347.48	1643.51	2761.73

Net Present Value -7001

K19/Gas25/750MW (WPS Sale & INV)

TABLE 243
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	4.96	288.02	1.44	0.00	247.47	105.06	15.82	82.63	43.96
2015	0.00	558.63	0.00	0.00	22.21	8.93	589.77	4.39	0.00	265.76	103.33	17.62	87.25	57.56
2016	0.00	742.67	0.00	0.00	31.55	23.00	797.22	8.38	0.00	273.84	101.41	18.20	88.86	65.38
2017	0.00	900.50	0.00	0.00	47.62	33.55	981.66	13.28	0.00	285.95	99.43	19.44	90.12	76.96
2018	0.00	641.80	0.00	0.00	53.35	135.56	830.72	17.44	0.00	278.83	97.31	20.32	89.97	71.22
2019	0.00	450.39	0.00	0.00	63.21	113.27	626.87	20.57	13.29	295.03	97.23	19.19	88.75	89.86
2020	0.00	186.45	0.00	0.00	0.01	202.72	389.18	22.52	45.83	459.89	104.52	13.68	96.39	245.30
2021	0.00	64.80	0.37	0.00	0.00	0.00	65.17	22.84	43.92	537.84	105.08	15.09	101.04	316.63
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	22.84	42.55	539.08	103.82	15.13	102.07	318.07
2023	0.00	0.00	124.75	0.00	0.00	0.00	124.75	23.35	40.67	528.19	100.98	16.03	105.35	305.83
2024	0.00	0.00	265.70	0.00	12.34	0.00	278.04	24.63	39.07	529.70	98.82	17.63	110.67	302.58
2025	0.00	0.00	164.65	0.00	97.19	0.00	261.84	25.93	41.46	416.56	98.47	17.02	102.08	198.99
2026	0.00	0.00	126.10	0.00	0.00	0.00	126.10	26.56	43.74	445.55	97.12	20.17	105.05	223.21
2027	0.00	0.00	143.20	0.00	0.00	0.00	143.20	27.28	42.42	444.80	95.12	19.79	109.58	220.32
2028	0.00	0.00	21.77	0.00	0.00	0.00	21.77	27.39	45.24	437.01	92.74	29.07	112.29	202.92
2029	0.00	0.00	106.85	0.00	0.00	0.00	106.85	27.92	46.73	427.54	90.94	32.54	115.40	188.66
2030	0.00	0.00	146.23	0.00	81.76	0.00	227.99	29.06	41.50	425.82	89.82	35.73	117.95	182.31
2031	0.00	0.00	130.58	0.00	0.00	0.00	130.58	29.71	44.41	429.59	89.42	38.84	118.87	182.45
2032	0.00	0.00	148.28	0.00	0.00	0.00	148.28	30.45	43.28	416.19	87.03	46.33	123.54	159.28
2033	0.00	0.00	22.54	0.00	0.00	0.00	22.54	30.57	46.25	410.00	85.46	55.54	126.67	142.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	45.18	406.40	84.68	58.03	128.66	135.04
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	43.70	334.97	82.51	56.17	123.99	72.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	43.15	240.05	81.03	57.21	111.88	-10.07
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	42.62	214.65	79.59	62.77	112.44	-40.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	42.10	211.40	78.81	61.35	117.99	-46.75
2039	0.00	0.00	240.03	0.00	0.00	0.00	240.03	31.77	44.56	191.59	76.86	73.40	124.75	-83.42
2040	0.00	0.00	347.45	0.00	0.00	0.00	347.45	33.50	41.11	171.87	75.49	81.25	127.78	-112.65
2041	0.00	0.00	155.93	0.00	12.34	0.00	168.27	34.35	40.64	174.35	75.70	79.55	127.50	-108.40
2042	0.00	0.00	11.49	0.00	0.00	0.00	11.49	34.40	47.24	191.45	73.47	114.28	129.21	-125.52
2043	0.00	0.00	117.81	0.00	0.00	0.00	117.81	34.99	46.80	177.64	71.70	125.06	133.25	-152.37
2044	0.00	0.00	161.23	0.00	81.76	0.00	242.99	36.21	48.14	161.62	70.07	133.72	137.28	-179.45
2045	0.00	0.00	77.06	0.00	0.00	0.00	77.06	36.59	51.81	154.40	68.71	149.23	140.43	-203.98
2046	0.00	0.00	71.92	0.00	0.00	0.00	71.92	36.95	51.40	146.07	67.48	161.90	143.55	-226.86
2047	0.00	0.00	10.93	0.00	0.00	0.00	10.93	37.01	51.60	142.66	66.64	167.12	149.35	-240.44
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	50.33	147.71	67.61	159.41	144.44	-223.76
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	37.01	52.93	147.71	67.61	159.41	144.44	-223.76
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	37.01	49.62	147.71	67.61	159.41	144.44	-223.76
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	37.01	49.28	147.71	67.61	159.41	144.44	-223.76
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	37.01	48.95	147.71	67.61	159.41	144.44	-223.76
2053	0.00	0.00	102.47	0.00	27.52	24.86	154.86	37.01	48.63	147.71	67.61	159.41	144.44	-223.76
2054	0.00	0.00	243.42	0.00	22.45	24.86	290.74	37.01	48.32	147.71	67.61	159.41	144.44	-223.76
2055	0.00	0.00	162.53	0.00	0.00	25.78	188.31	37.01	48.02	147.71	67.61	159.41	144.44	-223.76
2056	0.00	0.00	126.10	0.00	0.00	0.00	126.10	37.01	63.56	147.71	67.61	159.41	144.44	-223.76
2057	0.00	0.00	143.20	0.00	0.00	0.00	143.20	37.01	47.45	147.71	67.61	159.41	144.44	-223.76
2058	0.00	0.00	21.77	0.00	0.00	0.00	21.77	37.01	63.01	147.71	67.61	159.41	144.44	-223.76
2059	0.00	0.00	106.85	0.00	12.34	0.00	119.19	37.01	49.87	147.71	67.61	159.41	144.44	-223.76
2060	0.00	0.00	146.23	0.00	72.89	0.00	219.12	37.01	59.72	147.71	67.61	159.41	144.44	-223.76
2061	0.00	0.00	130.58	0.00	0.00	0.00	130.58	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2062	0.00	0.00	148.28	0.00	0.00	0.00	148.28	37.01	59.72	147.71	67.61	159.41	144.44	-223.76
2063	0.00	0.00	22.54	0.00	0.00	0.00	22.54	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	37.01	59.72	147.71	67.61	159.41	144.44	-223.76
2065	0.00	0.00	0.00	0.00	72.90	5.61	78.52	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	37.01	59.72	147.71	67.61	159.41	144.44	-223.76
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	37.01	59.72	147.71	67.61	159.41	144.44	-223.76
2069	0.00	0.00	240.03	0.00	40.76	75.78	356.56	37.01	46.85	147.71	67.61	159.41	144.44	-223.76
2070	0.00	0.00	347.45	0.00	0.01	78.59	426.05	37.01	45.66	147.71	67.61	159.41	144.44	-223.76
2071	0.00	0.00	155.93	0.00	0.00	0.00	155.93	37.01	45.66	147.71	67.61	159.41	144.44	-223.76
2072	0.00	0.00	11.49	0.00	0.00	0.00	11.49	37.01	45.66	147.71	67.61	159.41	144.44	-223.76
2073	0.00	0.00	117.81	0.00	0.00	0.00	117.81	37.01	44.77	147.71	67.61	159.41	144.44	-223.76
2074	0.00	0.00	161.23	0.00	0.00	0.00	161.23	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2075	0.00	0.00	77.06	0.00	24.30	0.00	101.36	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2076	0.00	0.00	71.92	0.00	12.34	0.00	84.26	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2077	0.00	0.00	10.93	0.00	0.00	0.00	10.93	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	37.01	46.85	147.71	67.61	159.41	144.44	-223.76
2080	0.00	0.00	0.00	0.00	20.44	0.00	20.44	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2083	0.00	0.00	102.47	0.00	0.00	0.00	102.47	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2084	0.00	0.00	243.42	0.00	11.05	0.92	255.40	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2085	0.00	0.00	162.53	0.00	10.63	1.84	175.00	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2086	0.00	0.00	126.10	0.00	30.15	5.52	161.78	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2087	0.00	0.00	143.20	0.00	35.54	8.29	187.02	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2088	0.00	0.00	21.77	0.00	27.52	24.86	74.15	37.01	43.89	147.71	67.61	159.41	144.44	-223.76
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	37.01	46.85	147.71	67.61	159.41	144.44	-223.76
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	37.01	46.85	147.71	67.61	159.41	144.44	-223.76
Salvage Value	0.00	0.00	10.87	0.00	2.61	2.32	15.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	953.97	0.00	324.85	403.67	4862.43	378.36	507.22	5374.98	1490.35	780.17	1771.35	1333.12

Net Present Value -4415

K19/C31/750MW

TABLE 244
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	258.05	0.00	0.00	25.01	6.80	321.81	1.61	0.00	240.15	105.07	15.82	82.48	36.77
2015	40.34	558.63	0.00	0.00	22.21	11.15	632.33	4.77	0.00	258.65	103.32	17.61	87.24	50.48
2016	10.98	742.67	0.00	0.00	31.55	23.95	809.16	8.82	0.00	265.48	101.40	18.19	88.83	57.07
2017	11.07	900.50	0.00	0.00	47.62	33.55	992.73	13.78	0.00	276.37	99.42	19.45	90.12	67.38
2018	13.18	641.80	0.00	0.00	53.35	187.94	896.27	18.26	0.00	267.90	97.29	20.32	90.00	60.29
2019	13.28	450.39	0.00	0.00	63.21	132.21	659.09	21.56	13.29	282.73	97.21	19.21	88.77	77.54
2020	13.38	186.45	0.00	0.00	0.01	350.24	550.09	24.31	49.02	437.27	104.51	13.70	96.33	222.74
2021	16.96	64.80	0.00	0.00	0.00	0.00	81.76	24.72	47.22	524.67	105.07	15.17	101.08	303.35
2022	188.48	0.00	0.00	0.00	0.00	0.00	188.48	25.66	45.88	528.81	103.84	15.14	102.08	307.75
2023	285.89	0.00	0.00	0.00	0.00	0.00	285.89	27.09	43.85	518.06	100.87	16.22	105.64	295.33
2024	313.80	0.00	0.00	0.00	0.00	0.00	313.80	28.66	42.12	520.04	98.64	18.05	111.33	292.02
2025	320.45	0.00	0.00	0.00	4.33	0.00	324.78	30.28	40.31	405.09	98.49	13.09	107.92	185.58
2026	869.95	0.00	0.00	0.00	4.33	0.00	874.28	34.65	38.38	389.32	96.56	13.51	116.87	162.39
2027	1385.33	0.00	0.00	0.00	52.77	0.00	1438.09	41.84	36.95	347.54	94.60	12.69	115.25	125.01
2028	1246.13	0.00	0.00	0.00	27.62	0.00	1273.74	48.21	35.58	334.47	92.96	13.18	124.79	103.53
2029	891.53	0.00	0.00	0.00	46.57	0.00	938.11	52.90	36.97	324.96	91.32	13.57	135.90	84.17
2030	618.59	0.00	0.00	0.00	80.98	0.00	699.57	56.40	31.62	322.43	89.97	13.89	144.73	73.83
2031	407.07	0.00	0.00	0.00	107.18	0.00	514.25	58.97	44.95	369.95	94.07	16.10	95.49	164.30
2032	150.21	0.00	0.00	0.00	125.54	0.00	275.74	60.35	43.93	483.78	101.24	15.83	95.03	271.68
2033	47.49	0.00	0.00	0.00	0.00	0.00	47.49	60.59	42.59	519.27	101.97	15.47	103.12	298.71
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	41.65	505.06	100.14	15.12	104.99	284.81
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	39.90	435.98	98.44	15.08	98.00	224.46
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	39.21	411.45	96.73	15.40	98.44	200.89
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	60.59	38.42	397.10	95.05	15.33	100.48	186.24
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	37.46	381.48	93.39	15.26	103.04	169.79
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	61.16	39.92	367.04	91.74	15.27	112.22	147.81
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	62.01	36.52	363.13	90.45	14.49	116.93	141.25
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	62.12	42.83	349.03	88.41	24.89	117.01	118.71
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	62.71	39.35	338.68	86.85	27.88	119.66	104.29
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	63.57	38.85	330.65	85.46	29.51	123.18	92.50
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	64.29	44.21	327.56	84.22	34.02	127.53	81.79
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	65.58	43.73	309.79	82.35	42.92	127.27	57.25
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	65.71	47.36	301.55	80.89	52.53	129.65	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	45.35	293.09	79.59	54.99	134.17	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	44.04	301.48	80.94	50.15	130.36	40.02
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	65.71	46.58	301.48	80.94	50.15	130.36	40.02
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	65.71	43.22	301.48	80.94	50.15	130.36	40.02
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	65.71	45.80	301.48	80.94	50.15	130.36	40.02
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	65.71	42.47	301.48	80.94	50.15	130.36	40.02
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	65.71	42.11	301.48	80.94	50.15	130.36	40.02
2054	0.00	0.00	0.00	0.00	22.45	24.86	47.31	65.71	41.76	301.48	80.94	50.15	130.36	40.02
2055	0.00	0.00	0.00	0.00	0.00	25.78	25.78	65.71	41.42	301.48	80.94	50.15	130.36	40.02
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	58.69	301.48	80.94	50.15	130.36	40.02
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	42.55	301.48	80.94	50.15	130.36	40.02
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	58.07	301.48	80.94	50.15	130.36	40.02
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	44.90	301.48	80.94	50.15	130.36	40.02
2060	0.00	0.00	0.00	0.00	1.07	0.00	1.07	65.71	54.15	301.48	80.94	50.15	130.36	40.02
2061	0.00	0.00	0.00	0.00	1.07	0.00	1.07	65.71	39.50	301.48	80.94	50.15	130.36	40.02
2062	0.00	0.00	0.00	0.00	12.83	0.00	12.83	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2063	0.00	0.00	0.00	0.00	6.42	0.00	6.42	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2064	0.00	0.00	0.00	0.00	24.65	2.81	27.45	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2065	0.00	0.00	0.00	0.00	29.76	5.61	35.37	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2066	0.00	0.00	0.00	0.00	27.06	16.84	43.90	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2067	0.00	0.00	0.00	0.00	43.09	25.26	68.35	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	65.71	68.20	301.48	80.94	50.15	130.36	40.02
2069	0.00	0.00	114.57	0.00	40.76	75.78	231.11	65.71	39.50	301.48	80.94	50.15	130.36	40.02
2070	0.00	0.00	156.79	0.00	0.01	78.59	235.39	65.71	54.15	301.48	80.94	50.15	130.36	40.02
2071	0.00	0.00	23.83	0.00	0.00	0.00	23.83	65.71	41.28	301.48	80.94	50.15	130.36	40.02
2072	0.00	0.00	116.99	0.00	0.00	0.00	116.99	65.71	54.15	301.48	80.94	50.15	130.36	40.02
2073	0.00	0.00	160.11	0.00	0.00	0.00	160.11	65.71	37.43	301.48	80.94	50.15	130.36	40.02
2074	0.00	0.00	142.97	0.00	0.00	0.00	142.97	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2075	0.00	0.00	162.36	0.00	15.60	0.00	177.96	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2076	0.00	0.00	24.68	0.00	3.26	0.00	27.94	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2077	0.00	0.00	0.00	0.00	39.94	0.00	39.94	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2078	0.00	0.00	0.00	0.00	33.54	0.00	33.54	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2079	0.00	0.00	0.00	0.00	35.88	0.00	35.88	65.71	39.50	301.48	80.94	50.15	130.36	40.02
2080	0.00	0.00	0.00	0.00	135.69	0.00	135.69	65.71	52.37	301.48	80.94	50.15	130.36	40.02
2081	0.00	0.00	0.00	0.00	81.51	0.00	81.51	65.71	39.50	301.48	80.94	50.15	130.36	40.02
2082	0.00	0.00	0.00	0.00	94.53	0.00	94.53	65.71	54.15	301.48	80.94	50.15	130.36	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	38.32	301.48	80.94	50.15	130.36	40.02
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	65.71	54.15	301.48	80.94	50.15	130.36	40.02
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	65.71	38.32	301.48	80.94	50.15	130.36	40.02
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	65.71	54.15	301.48	80.94	50.15	130.36	40.02
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	65.71	36.54	301.48	80.94	50.15	130.36	40.02
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	65.71	39.50	301.48	80.94	50.15	130.36	40.02
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	65.71	39.50	301.48	80.94	50.15	130.36	40.02
Salvage Value	7.27	0.00	3.46	0.00	5.23	2.32	18.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3035.28	3179.95	181.29	0.00	406.42	564.08	7367.03	590.12	479.28	5822.89	1564.79	345.44	1715.91	2196.76

Net Present Value -6240

K19/Gas31/750MW

TABLE 245
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**Low**
Discount Rate	**High**
Capital Cost	**High**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	6.80	289.87	1.45	0.00	240.15	105.07	15.82	82.48	36.77
2015	0.00	558.63	0.00	0.00	22.21	11.15	591.99	4.41	0.00	258.65	103.32	17.61	87.24	50.48
2016	0.00	742.67	0.00	0.00	31.55	23.95	798.17	8.40	0.00	265.48	101.40	18.19	88.83	57.07
2017	0.00	900.50	0.00	0.00	47.62	33.55	981.66	13.31	0.00	276.37	99.42	19.45	90.12	67.38
2018	0.00	641.80	0.00	0.00	53.35	187.94	883.10	17.72	0.00	267.90	97.29	20.32	90.00	60.29
2019	0.00	450.39	0.00	0.00	63.21	132.21	645.81	20.95	13.29	282.73	97.21	19.21	88.77	77.54
2020	0.00	186.45	0.00	0.00	0.01	350.24	536.70	23.64	49.02	437.27	104.51	13.70	96.33	222.74
2021	0.00	64.80	0.00	0.00	0.00	0.00	64.80	23.96	47.22	524.67	105.07	15.17	101.08	303.35
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	45.88	528.77	103.83	15.16	102.09	307.69
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	43.85	518.34	100.87	16.22	105.62	295.63
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	42.12	520.58	98.64	18.06	111.31	292.57
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	40.31	406.40	98.49	13.10	108.13	186.68
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	38.38	391.75	96.55	13.60	117.28	164.32
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	23.96	36.95	350.66	94.59	12.73	115.60	127.74
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	23.96	35.58	339.19	92.95	13.19	125.61	107.44
2029	0.00	0.00	235.99	0.00	0.00	0.00	235.99	25.03	36.97	328.99	91.37	13.37	135.89	88.36
2030	0.00	0.00	422.33	0.00	24.68	0.00	447.02	27.15	31.62	330.11	90.76	11.85	142.34	85.16
2031	0.00	0.00	193.82	0.00	97.19	0.00	291.01	28.60	38.48	322.29	88.58	26.43	112.42	94.85
2032	0.00	0.00	131.49	0.00	0.00	0.00	131.49	29.25	41.32	315.33	86.97	33.68	114.73	79.96
2033	0.00	0.00	149.32	0.00	0.00	0.00	149.32	30.00	40.12	306.43	85.50	37.16	117.45	66.32
2034	0.00	0.00	22.70	0.00	0.00	0.00	22.70	30.11	43.03	305.91	84.68	40.19	120.31	60.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.11	41.46	230.64	82.53	48.07	109.63	-9.60
2036	0.00	0.00	235.06	0.00	0.00	0.00	235.06	31.29	40.82	208.48	81.08	52.69	110.12	-35.42
2037	0.00	0.00	340.26	0.00	0.00	0.00	340.26	32.99	40.22	198.75	79.73	57.76	112.50	-51.25
2038	0.00	0.00	152.70	0.00	81.76	0.00	234.46	34.16	39.63	202.05	79.57	52.84	117.75	-48.12
2039	0.00	0.00	11.25	0.00	0.00	0.00	11.25	34.22	49.10	215.31	77.31	88.59	122.19	-72.79
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.22	45.59	201.24	75.41	97.45	126.11	-97.73
2041	0.00	0.00	116.18	0.00	0.00	0.00	116.18	34.80	45.05	191.02	73.91	106.27	129.35	-118.50
2042	0.00	0.00	404.09	0.00	0.00	0.00	404.09	36.82	44.53	181.23	72.53	115.89	132.45	-139.65
2043	0.00	0.00	378.97	0.00	0.00	0.00	378.97	38.72	48.10	177.88	71.65	123.86	135.68	-153.31
2044	0.00	0.00	159.22	0.00	81.76	0.00	240.99	39.92	49.39	175.13	71.28	115.83	142.10	-154.08
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.98	56.01	185.83	69.33	156.40	137.22	-177.11
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	55.55	176.79	68.09	165.53	140.25	-197.08
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	54.22	165.80	66.81	175.53	143.37	-219.91
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	52.90	176.14	68.08	165.82	140.28	-198.04
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	39.98	55.45	176.14	68.08	165.82	140.28	-198.04
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	39.98	52.10	176.14	68.08	165.82	140.28	-198.04
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	39.98	51.71	176.14	68.08	165.82	140.28	-198.04
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	39.98	51.34	176.14	68.08	165.82	140.28	-198.04
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	39.98	50.98	176.14	68.08	165.82	140.28	-198.04
2054	0.00	0.00	0.00	0.00	22.45	24.86	47.31	39.98	50.63	176.14	68.08	165.82	140.28	-198.04
2055	0.00	0.00	0.00	0.00	0.00	25.78	25.78	39.98	50.28	176.14	68.08	165.82	140.28	-198.04
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	65.79	176.14	68.08	165.82	140.28	-198.04
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	49.64	176.14	68.08	165.82	140.28	-198.04
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	65.16	176.14	68.08	165.82	140.28	-198.04
2059	0.00	0.00	213.70	0.00	0.00	0.00	213.70	39.98	51.99	176.14	68.08	165.82	140.28	-198.04
2060	0.00	0.00	400.05	0.00	0.00	0.00	400.05	39.98	61.24	176.14	68.08	165.82	140.28	-198.04
2061	0.00	0.00	191.70	0.00	0.00	0.00	191.70	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2062	0.00	0.00	131.49	0.00	0.00	0.00	131.49	39.98	61.24	176.14	68.08	165.82	140.28	-198.04
2063	0.00	0.00	149.32	0.00	0.00	0.00	149.32	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2064	0.00	0.00	22.70	0.00	13.95	2.81	39.46	39.98	61.24	176.14	68.08	165.82	140.28	-198.04
2065	0.00	0.00	0.00	0.00	36.27	5.61	41.88	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2066	0.00	0.00	235.06	0.00	74.29	16.84	326.18	39.98	61.24	176.14	68.08	165.82	140.28	-198.04
2067	0.00	0.00	340.26	0.00	12.08	25.26	377.59	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2068	0.00	0.00	152.70	0.00	25.83	75.78	254.31	39.98	61.24	176.14	68.08	165.82	140.28	-198.04
2069	0.00	0.00	11.25	0.00	40.76	75.78	127.79	39.98	48.37	176.14	68.08	165.82	140.28	-198.04
2070	0.00	0.00	0.00	0.00	0.01	78.59	78.60	39.98	47.18	176.14	68.08	165.82	140.28	-198.04
2071	0.00	0.00	116.18	0.00	0.00	0.00	116.18	39.98	47.18	176.14	68.08	165.82	140.28	-198.04
2072	0.00	0.00	404.09	0.00	0.00	0.00	404.09	39.98	47.18	176.14	68.08	165.82	140.28	-198.04
2073	0.00	0.00	378.97	0.00	61.32	0.00	440.29	39.98	46.30	176.14	68.08	165.82	140.28	-198.04
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2075	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	39.98	48.37	176.14	68.08	165.82	140.28	-198.04
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2081	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2088	0.00	0.00	0.00	0.00	47.96	24.86	72.82	39.98	45.41	176.14	68.08	165.82	140.28	-198.04
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	39.98	48.37	176.14	68.08	165.82	140.28	-198.04
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	39.98	48.37	176.14	68.08	165.82	140.28	-198.04
Salvage Value	0.00	0.00	6.73	0.00	2.86	2.32	11.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	863.78	0.00	295.15	564.08	4902.96	383.43	500.27	5007.90	1490.95	747.02	1783.03	986.89

Net Present Value -4800

K19/C25/250MW

TABLE 246
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**Low**
Discount Rate	**High**
Capital Cost	**High**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	4.27	319.95	1.61	0.00	240.15	105.07	15.82	82.48	36.77
2015	90.00	558.63	0.00	0.00	22.21	3.20	674.05	4.98	0.00	258.65	103.32	17.61	87.24	50.48
2016	203.55	742.67	0.00	0.00	31.55	5.31	983.08	9.90	0.00	265.48	101.40	18.19	88.83	57.07
2017	240.87	900.50	0.00	0.00	47.62	7.97	1196.94	15.88	0.00	276.12	99.43	19.45	90.12	67.13
2018	289.99	641.80	0.00	0.00	53.35	23.90	1009.05	20.93	0.00	264.15	96.75	21.96	89.69	55.74
2019	297.44	450.39	0.00	0.00	67.54	23.90	839.27	25.13	13.29	279.54	96.33	21.71	90.60	70.91
2020	821.32	186.45	0.00	0.00	4.34	24.78	1036.89	30.31	13.51	416.85	104.82	14.14	88.38	209.52
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	37.50	13.26	496.45	105.41	14.49	90.37	286.18
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	43.58	13.48	495.08	103.48	15.16	91.86	284.58
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	48.06	13.31	492.23	101.22	15.15	97.88	277.98
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	51.41	13.26	497.26	98.81	16.84	106.88	274.72
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	53.89	27.65	430.74	103.59	15.04	85.74	226.37
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	55.23	27.45	523.03	111.23	14.66	83.34	313.79
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	55.46	27.33	508.09	110.81	13.91	84.95	298.42
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	27.62	503.03	109.05	14.47	86.17	293.33
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	30.20	494.21	107.21	14.65	87.94	284.41
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	26.13	487.91	105.93	14.45	88.16	279.37
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.96	479.32	104.30	14.80	89.14	271.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.58	468.08	102.63	14.89	90.35	260.21
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.65	455.45	100.91	14.93	92.01	247.60
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.77	441.95	99.25	15.03	93.19	234.48
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	27.88	389.98	97.58	15.09	92.16	185.15
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	55.46	24.92	365.43	95.98	15.37	92.22	161.86
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	24.92	349.29	94.38	15.31	93.19	146.42
2038	0.00	0.00	136.06	0.00	0.00	0.00	136.06	56.03	24.92	332.34	92.78	15.29	94.74	129.53
2039	0.00	0.00	177.98	0.00	12.34	0.00	190.32	56.87	27.88	325.16	91.57	14.31	103.82	115.46
2040	0.00	0.00	23.67	0.00	0.00	0.00	23.67	56.99	28.99	313.46	89.54	24.29	105.26	94.38
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.99	28.32	303.94	88.01	27.39	107.75	80.78
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	57.57	28.32	296.10	86.65	29.24	110.56	69.65
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	58.43	28.32	288.00	85.24	28.97	115.68	58.11
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	59.15	34.16	278.71	83.65	43.00	114.74	37.33
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	60.45	37.12	268.69	82.22	47.58	117.53	21.37
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	60.57	38.25	262.52	80.82	54.17	122.13	5.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	37.36	253.38	79.40	54.85	129.18	-10.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.47	261.53	80.81	52.20	122.94	5.57
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	60.57	39.43	261.53	80.81	52.20	122.94	5.57
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	60.57	38.25	261.53	80.81	52.20	122.94	5.57
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	60.57	38.26	261.53	80.81	52.20	122.94	5.57
2052	0.00	0.00	0.00	0.00	35.54	1.97	37.51	60.57	38.27	261.53	80.81	52.20	122.94	5.57
2053	0.00	0.00	0.00	0.00	27.52	5.90	33.43	60.57	38.27	261.53	80.81	52.20	122.94	5.57
2054	0.00	0.00	0.00	0.00	23.52	5.90	29.42	60.57	38.27	261.53	80.81	52.20	122.94	5.57
2055	0.00	0.00	0.00	0.00	1.07	6.12	7.19	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	60.57	52.33	261.53	80.81	52.20	122.94	5.57
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	60.57	52.33	261.53	80.81	52.20	122.94	5.57
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	60.57	52.33	261.53	80.81	52.20	122.94	5.57
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	68.16	261.53	80.81	52.20	122.94	5.57
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2064	0.00	0.00	0.00	0.00	13.95	4.05	18.00	60.57	68.16	261.53	80.81	52.20	122.94	5.57
2065	0.00	0.00	0.00	0.00	11.58	2.77	14.35	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2066	0.00	0.00	0.00	0.00	1.39	4.00	5.39	60.57	68.16	261.53	80.81	52.20	122.94	5.57
2067	0.00	0.00	0.00	0.00	12.08	6.00	18.07	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2068	0.00	0.00	113.78	0.00	25.83	17.99	157.60	60.57	68.16	261.53	80.81	52.20	122.94	5.57
2069	0.00	0.00	155.70	0.00	44.02	17.99	217.71	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2070	0.00	0.00	23.67	0.00	3.27	18.66	45.60	60.57	54.10	261.53	80.81	52.20	122.94	5.57
2071	0.00	0.00	0.00	0.00	39.94	0.00	39.94	60.57	38.27	261.53	80.81	52.20	122.94	5.57
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	60.57	54.10	261.53	80.81	52.20	122.94	5.57
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	60.57	37.38	261.53	80.81	52.20	122.94	5.57
2074	0.00	0.00	142.97	0.00	75.14	0.00	218.12	60.57	52.33	261.53	80.81	52.20	122.94	5.57
2075	0.00	0.00	162.36	0.00	81.51	0.00	243.87	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	60.57	54.10	261.53	80.81	52.20	122.94	5.57
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	38.27	261.53	80.81	52.20	122.94	5.57
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	60.57	54.10	261.53	80.81	52.20	122.94	5.57
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	41.23	261.53	80.81	52.20	122.94	5.57
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	60.57	54.10	261.53	80.81	52.20	122.94	5.57
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2084	0.00	0.00	0.00	0.00	11.05	0.22	11.27	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2087	0.00	0.00	0.00	0.00	35.54	1.97	37.51	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2088	0.00	0.00	0.00	0.00	27.52	5.90	33.43	60.57	36.50	261.53	80.81	52.20	122.94	5.57
2089	0.00	0.00	0.00	0.00	22.45	5.90	28.36	60.57	39.46	261.53	80.81	52.20	122.94	5.57
2090	0.00	0.00	0.00	0.00	0.00	6.12	6.12	60.57	39.46	261.53	80.81	52.20	122.94	5.57
Salvage Value	0.97	0.00	3.37	0.00	4.67	0.61	9.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	185.86	0.00	486.76	78.51	8076.70	648.82	303.25	5894.05	1601.43	357.67	1552.41	2382.55

Net Present Value -6646

K19/Gas24/250MW

TABLE 247
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	4.27	287.33	1.45	0.00	240.15	105.07	15.82	82.48	36.77
2015	0.00	558.63	0.00	0.00	22.21	3.20	584.04	4.37	0.00	258.65	103.32	17.61	87.24	50.48
2016	0.00	742.67	0.00	0.00	31.55	5.31	779.53	8.27	0.00	265.48	101.40	18.19	88.83	57.07
2017	0.00	900.50	0.00	0.00	47.62	7.97	956.08	13.05	0.00	276.37	99.42	19.45	90.12	67.38
2018	0.00	641.80	0.00	0.00	53.35	23.90	719.05	16.64	0.00	264.49	96.75	21.93	89.65	56.15
2019	0.00	450.39	0.00	0.00	63.21	23.90	537.50	19.33	13.29	280.07	96.33	21.71	90.58	71.46
2020	0.00	186.45	0.37	0.00	0.01	24.78	211.61	20.39	13.51	417.64	104.82	14.14	88.37	210.31
2021	0.00	64.80	0.00	0.00	0.00	0.00	64.80	20.71	13.26	497.70	105.39	14.50	90.32	287.49
2022	0.00	0.00	124.04	0.00	0.00	0.00	124.04	21.22	13.48	498.58	103.89	14.32	91.14	289.23
2023	0.00	0.00	161.54	0.00	12.34	0.00	173.88	21.98	13.31	501.21	102.74	12.02	94.04	292.42
2024	0.00	0.00	21.17	0.00	0.00	0.00	21.17	22.08	17.33	509.37	100.82	18.75	98.05	291.76
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	22.08	17.11	374.00	98.52	13.92	94.73	166.83
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.08	16.68	355.31	96.25	16.06	96.37	146.62
2027	0.00	0.00	105.37	0.00	0.00	0.00	105.37	22.61	16.71	320.07	94.16	17.59	97.45	110.86
2028	0.00	0.00	146.32	0.00	97.19	0.00	243.51	23.82	16.77	309.59	92.30	20.54	100.23	96.52
2029	0.00	0.00	245.77	0.00	0.00	0.00	245.77	25.05	23.61	303.50	90.50	28.26	102.44	82.29
2030	0.00	0.00	324.04	0.00	0.00	0.00	324.04	26.67	19.59	302.65	89.58	30.85	103.78	78.44
2031	0.00	0.00	145.42	0.00	12.34	0.00	157.76	27.46	19.59	310.24	90.07	26.31	103.27	90.59
2032	0.00	0.00	10.72	0.00	0.00	0.00	10.72	27.51	26.66	319.15	87.59	54.74	101.87	74.96
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51	26.66	311.52	86.02	59.39	104.46	61.65
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51	26.67	304.20	84.51	64.98	106.92	47.80
2035	0.00	0.00	233.42	0.00	0.00	0.00	233.42	28.68	26.00	231.88	82.47	62.17	104.72	-17.49
2036	0.00	0.00	337.89	0.00	0.00	0.00	337.89	30.37	26.01	209.76	80.96	67.05	105.44	-43.70
2037	0.00	0.00	151.64	0.00	0.00	0.00	151.64	31.12	26.01	211.64	81.35	61.45	104.22	-35.38
2038	0.00	0.00	249.53	0.00	0.00	0.00	249.53	32.37	33.08	213.00	78.94	89.44	105.08	-60.47
2039	0.00	0.00	345.04	0.00	0.00	0.00	345.04	34.10	36.03	206.79	77.53	98.63	114.60	-83.97
2040	0.00	0.00	154.84	0.00	81.76	0.00	236.61	35.28	33.08	202.20	76.87	101.37	115.37	-91.40
2041	0.00	0.00	11.41	0.00	0.00	0.00	11.41	35.34	40.15	206.87	75.05	128.66	114.95	-111.79
2042	0.00	0.00	245.10	0.00	0.00	0.00	245.10	36.56	40.15	198.06	73.27	141.87	118.56	-135.64
2043	0.00	0.00	354.80	0.00	0.00	0.00	354.80	38.34	40.15	189.88	71.90	151.23	121.23	-154.49
2044	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.13	41.93	184.28	71.32	154.66	121.94	-163.64
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.19	49.00	186.11	69.11	191.49	122.47	-196.96
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	49.01	189.47	69.17	190.40	122.86	-192.95
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	48.12	176.60	67.30	208.52	126.70	-225.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	39.19	50.20	184.06	68.53	196.80	124.01	-205.28
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2052	0.00	0.00	101.76	0.00	35.54	1.97	139.27	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2053	0.00	0.00	139.26	0.00	27.52	5.90	172.68	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2054	0.00	0.00	21.17	0.00	22.45	5.90	49.52	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2055	0.00	0.00	0.00	0.00	0.00	6.12	6.12	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2057	0.00	0.00	105.37	0.00	0.00	0.00	105.37	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2058	0.00	0.00	144.20	0.00	12.34	0.00	156.54	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2059	0.00	0.00	245.77	0.00	0.00	0.00	245.77	39.19	50.20	184.06	68.53	196.80	124.01	-205.28
2060	0.00	0.00	324.04	0.00	0.00	0.00	324.04	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2061	0.00	0.00	145.42	0.00	0.00	0.00	145.42	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2062	0.00	0.00	10.72	0.00	0.00	0.00	10.72	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2063	0.00	0.00	0.00	0.00	72.89	2.86	75.76	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2064	0.00	0.00	0.00	0.00	13.95	4.05	18.00	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2065	0.00	0.00	233.42	0.00	11.58	2.77	247.77	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2066	0.00	0.00	337.89	0.00	13.73	4.00	355.62	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2067	0.00	0.00	151.64	0.00	12.08	6.00	169.71	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2068	0.00	0.00	249.53	0.00	25.83	17.99	293.35	39.19	63.07	184.06	68.53	196.80	124.01	-205.28
2069	0.00	0.00	345.04	0.00	40.76	17.99	403.79	39.19	50.20	184.06	68.53	196.80	124.01	-205.28
2070	0.00	0.00	154.84	0.00	0.01	18.66	173.51	39.19	49.02	184.06	68.53	196.80	124.01	-205.28
2071	0.00	0.00	11.41	0.00	0.00	0.00	11.41	39.19	49.02	184.06	68.53	196.80	124.01	-205.28
2072	0.00	0.00	245.10	0.00	0.00	0.00	245.10	39.19	49.02	184.06	68.53	196.80	124.01	-205.28
2073	0.00	0.00	354.80	0.00	0.00	0.00	354.80	39.19	48.13	184.06	68.53	196.80	124.01	-205.28
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2075	0.00	0.00	11.73	0.00	61.32	0.00	73.05	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2078	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	50.20	184.06	68.53	196.80	124.01	-205.28
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2082	0.00	0.00	101.76	0.00	0.00	0.00	101.76	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2083	0.00	0.00	139.26	0.00	0.00	0.00	139.26	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2084	0.00	0.00	21.17	0.00	11.05	0.22	32.44	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2087	0.00	0.00	105.37	0.00	35.54	1.97	142.88	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2088	0.00	0.00	144.20	0.00	27.52	5.90	177.63	39.19	47.24	184.06	68.53	196.80	124.01	-205.28
2089	0.00	0.00	21.92	0.00	22.45	5.90	50.27	39.19	50.20	184.06	68.53	196.80	124.01	-205.28
2090	0.00	0.00	0.00	0.00	20.44	6.12	26.56	39.19	50.20	184.06	68.53	196.80	124.01	-205.28
Salvage Value	0.00	0.00	11.78	0.00	2.47	0.61	14.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	1162.52	0.00	289.86	78.51	4710.84	364.75	309.00	4888.63	1493.91	893.48	1617.31	883.93

Net Present Value -4501

K19/C31/250MW

TABLE 248
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	258.05	0.00	0.00	25.01	4.27	319.28	1.61	0.00	240.15	105.07	15.82	82.48	36.77
2015	40.34	558.63	0.00	0.00	22.21	3.20	624.38	4.73	0.00	258.65	103.32	17.61	87.24	50.48
2016	10.98	742.67	0.00	0.00	31.55	5.31	790.51	8.69	0.00	265.48	101.40	18.19	88.83	57.07
2017	11.07	900.50	0.00	0.00	47.62	7.97	967.14	13.52	0.00	276.37	99.42	19.45	90.12	67.38
2018	13.18	641.80	0.00	0.00	53.35	23.90	732.23	17.18	0.00	264.49	96.75	21.93	89.65	56.15
2019	13.28	450.39	0.00	0.00	63.21	23.90	550.78	19.94	13.29	280.07	96.33	21.71	90.58	71.46
2020	13.38	186.45	0.37	0.00	0.01	24.78	224.99	21.06	13.51	417.64	104.82	14.14	88.37	210.31
2021	16.96	64.80	0.00	0.00	0.00	0.00	81.76	21.47	13.26	497.70	105.39	14.50	90.32	287.49
2022	188.48	0.00	124.04	0.00	0.00	0.00	312.52	22.92	13.48	498.51	103.88	14.34	91.15	289.13
2023	285.89	0.00	161.54	0.00	12.34	0.00	459.77	25.11	13.31	500.91	102.70	12.12	94.16	291.92
2024	313.80	0.00	21.17	0.00	0.00	0.00	334.97	26.78	17.33	508.96	100.78	18.86	98.23	291.08
2025	320.45	0.00	0.00	0.00	4.33	0.00	324.78	28.41	17.11	373.31	98.49	14.03	94.92	165.88
2026	869.95	0.00	0.00	0.00	4.33	0.00	874.28	32.78	16.68	354.66	96.24	16.21	96.59	145.61
2027	1385.33	0.00	105.37	0.00	52.77	0.00	1543.46	40.49	16.71	318.99	94.15	17.87	97.63	109.34
2028	1246.13	0.00	144.20	0.00	39.96	0.00	1430.29	47.65	16.77	308.02	92.22	21.03	100.62	94.14
2029	891.53	0.00	21.92	0.00	46.57	0.00	960.02	52.45	23.60	301.51	90.47	28.89	102.84	79.31
2030	618.59	0.00	0.00	0.00	80.98	0.00	699.57	55.94	19.58	313.39	91.49	25.40	100.37	96.13
2031	407.07	0.00	0.00	0.00	107.18	0.00	514.25	58.51	34.19	347.83	94.66	20.53	86.82	145.81
2032	150.21	0.00	0.00	0.00	125.54	0.00	275.74	59.89	34.42	447.87	101.61	20.31	84.87	241.08
2033	47.49	0.00	0.00	0.00	0.00	0.00	47.49	60.13	34.27	466.99	101.77	21.01	89.40	254.81
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	34.50	451.00	100.00	21.54	90.17	239.29
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.65	398.35	98.29	21.80	89.30	188.95
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.60	374.96	96.68	22.27	89.38	166.63
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.42	356.66	94.78	23.16	90.97	147.75
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.05	336.47	92.81	24.11	93.39	126.17
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	36.08	321.82	90.90	26.50	102.66	101.76
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.24	311.71	89.13	30.04	105.58	86.96
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	36.02	301.10	87.47	34.22	108.47	70.95
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	60.13	33.06	297.89	86.59	34.89	109.98	66.43
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.06	290.29	85.23	34.63	114.71	55.71
2044	0.00	0.00	118.64	0.00	0.00	0.00	118.64	60.72	34.84	278.81	83.66	42.99	114.75	37.41
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.02	34.84	268.73	82.22	47.55	117.53	21.43
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.15	38.92	262.56	80.83	54.15	122.12	5.46
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	37.36	253.38	79.40	54.85	129.18	-10.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	36.47	261.56	80.82	52.19	122.94	5.61
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	62.15	39.43	261.56	80.82	52.19	122.94	5.61
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	62.15	36.48	261.56	80.82	52.19	122.94	5.61
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	62.15	39.44	261.56	80.82	52.19	122.94	5.61
2052	0.00	0.00	101.76	0.00	35.54	1.97	139.27	62.15	36.49	261.56	80.82	52.19	122.94	5.61
2053	0.00	0.00	139.26	0.00	27.52	5.90	172.68	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2054	0.00	0.00	21.17	0.00	22.45	5.90	49.52	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2055	0.00	0.00	0.00	0.00	0.00	6.12	6.12	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2057	0.00	0.00	105.37	0.00	0.00	0.00	105.37	62.15	38.27	261.56	80.82	52.19	122.94	5.61
2058	0.00	0.00	144.20	0.00	12.34	0.00	156.54	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2059	0.00	0.00	21.92	0.00	0.00	0.00	21.92	62.15	41.23	261.56	80.82	52.19	122.94	5.61
2060	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2061	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.15	39.46	261.56	80.82	52.19	122.94	5.61
2062	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2063	0.00	0.00	0.00	0.00	18.76	2.86	21.62	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2064	0.00	0.00	0.00	0.00	24.65	4.05	28.70	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2065	0.00	0.00	0.00	0.00	29.76	2.77	32.53	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2066	0.00	0.00	0.00	0.00	27.06	4.00	31.06	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2067	0.00	0.00	0.00	0.00	43.09	6.00	49.09	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2068	0.00	0.00	0.00	0.00	25.83	17.99	43.82	62.15	68.16	261.56	80.82	52.19	122.94	5.61
2069	0.00	0.00	0.00	0.00	40.76	17.99	58.75	62.15	39.46	261.56	80.82	52.19	122.94	5.61
2070	0.00	0.00	0.00	0.00	0.01	18.66	18.67	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	41.23	261.56	80.82	52.19	122.94	5.61
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	37.38	261.56	80.82	52.19	122.94	5.61
2074	0.00	0.00	118.64	0.00	0.00	0.00	118.64	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2075	0.00	0.00	162.36	0.00	3.26	0.00	165.61	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2076	0.00	0.00	24.68	0.00	3.26	0.00	27.94	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2077	0.00	0.00	0.00	0.00	39.94	0.00	39.94	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2078	0.00	0.00	0.00	0.00	21.20	0.00	21.20	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2079	0.00	0.00	0.00	0.00	35.88	0.00	35.88	62.15	39.46	261.56	80.82	52.19	122.94	5.61
2080	0.00	0.00	0.00	0.00	135.69	0.00	135.69	62.15	52.33	261.56	80.82	52.19	122.94	5.61
2081	0.00	0.00	0.00	0.00	81.51	0.00	81.51	62.15	39.46	261.56	80.82	52.19	122.94	5.61
2082	0.00	0.00	101.76	0.00	94.53	0.00	196.29	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2083	0.00	0.00	139.26	0.00	0.00	0.00	139.26	62.15	38.27	261.56	80.82	52.19	122.94	5.61
2084	0.00	0.00	21.17	0.00	11.05	0.22	32.44	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	62.15	38.27	261.56	80.82	52.19	122.94	5.61
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	62.15	54.10	261.56	80.82	52.19	122.94	5.61
2087	0.00	0.00	105.37	0.00	35.54	1.97	142.88	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2088	0.00	0.00	144.20	0.00	27.52	5.90	177.63	62.15	36.50	261.56	80.82	52.19	122.94	5.61
2089	0.00	0.00	21.92	0.00	22.45	5.90	50.27	62.15	39.46	261.56	80.82	52.19	122.94	5.61
2090	0.00	0.00	0.00	0.00	0.00	6.12	6.12	62.15	39.46	261.56	80.82	52.19	122.94	5.61
Salvage Value	7.27	0.00	5.51	0.00	5.14	0.61	18.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3035.28	3179.95	384.98	0.00	415.09	78.51	7093.82	565.34	302.94	5459.81	1564.84	392.16	1571.02	1931.77

Net Present Value -6030

All Gas

TABLE 249
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	266.71	101.39	18.22	88.79	58.31
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	279.77	99.77	18.74	89.52	71.76
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	268.64	97.01	20.92	90.08	60.64
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	262.30	94.99	18.71	89.73	58.87
2020	0.00	0.00	122.63	0.00	0.00	0.00	122.63	1.02	0.00	268.26	94.88	13.34	91.62	68.42
2021	0.00	0.00	159.65	0.00	12.34	0.00	172.00	1.77	0.00	268.97	93.05	12.59	96.78	66.55
2022	0.00	0.00	20.87	0.00	0.00	0.00	20.87	1.88	4.07	263.07	90.80	22.33	98.31	51.63
2023	0.00	0.00	102.47	0.00	0.00	0.00	102.47	2.39	4.07	259.98	88.54	27.51	103.62	40.31
2024	0.00	0.00	142.35	0.00	97.19	0.00	239.54	3.58	4.07	265.82	86.96	32.20	109.94	36.72
2025	0.00	0.00	21.32	0.00	0.00	0.00	21.32	3.68	8.16	171.64	86.40	27.02	101.75	-43.53
2026	0.00	0.00	104.64	0.00	0.00	0.00	104.64	4.21	8.16	157.37	85.07	27.51	102.43	-57.64
2027	0.00	0.00	143.20	0.00	0.00	0.00	143.20	4.92	8.16	146.77	83.19	27.70	108.92	-73.05
2028	0.00	0.00	244.06	0.00	0.00	0.00	244.06	6.14	12.23	138.81	81.24	42.35	108.51	-93.29
2029	0.00	0.00	321.79	0.00	0.00	0.00	321.79	7.75	12.23	128.75	79.78	48.04	110.51	-109.58
2030	0.00	0.00	144.41	0.00	12.34	0.00	156.75	8.54	12.24	135.65	80.64	44.16	108.10	-97.25
2031	0.00	0.00	10.64	0.00	0.00	0.00	10.64	8.59	19.31	142.86	78.28	73.37	105.30	-114.09
2032	0.00	0.00	109.11	0.00	0.00	0.00	109.11	9.13	19.32	128.83	76.35	80.81	108.79	-137.12
2033	0.00	0.00	149.32	0.00	81.76	0.00	231.08	10.29	19.32	116.52	74.61	89.51	111.82	-159.41
2034	0.00	0.00	254.50	0.00	0.00	0.00	254.50	11.56	23.40	108.02	73.17	101.71	113.94	-180.79
2035	0.00	0.00	335.54	0.00	0.00	0.00	335.54	13.24	23.40	100.20	72.22	108.16	114.85	-195.03
2036	0.00	0.00	150.58	0.00	0.00	0.00	150.58	13.99	23.40	99.20	72.11	105.51	118.26	-196.67
2037	0.00	0.00	247.80	0.00	0.00	0.00	247.80	15.23	30.46	97.11	70.16	133.32	112.40	-218.78
2038	0.00	0.00	342.64	0.00	0.00	0.00	342.64	16.95	30.47	88.22	68.91	143.90	115.43	-240.02
2039	0.00	0.00	153.77	0.00	0.00	0.00	153.77	17.71	30.48	84.76	68.76	146.13	122.04	-252.17
2040	0.00	0.00	11.33	0.00	0.00	0.00	11.33	17.77	37.55	84.03	66.94	170.25	121.05	-274.20
2041	0.00	0.00	243.40	0.00	0.00	0.00	243.40	18.99	37.55	78.23	65.12	190.33	125.92	-303.15
2042	0.00	0.00	352.33	0.00	0.00	0.00	352.33	20.75	37.55	75.79	64.03	206.64	128.54	-323.42
2043	0.00	0.00	158.12	0.00	81.76	0.00	239.88	21.95	37.55	76.18	63.94	210.68	128.59	-327.03
2044	0.00	0.00	11.65	0.00	0.00	0.00	11.65	22.01	44.63	76.34	62.47	235.07	127.23	-348.44
2045	0.00	0.00	52.55	0.00	0.00	0.00	52.55	22.27	44.63	71.13	60.89	257.49	130.78	-378.03
2046	0.00	0.00	71.92	0.00	0.00	0.00	71.92	22.63	44.63	67.81	59.74	275.42	134.09	-401.45
2047	0.00	0.00	10.93	0.00	0.00	0.00	10.93	22.68	46.11	63.30	58.87	289.87	136.22	-421.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.11	67.41	59.84	274.26	133.70	-400.38
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	22.68	46.12	67.41	59.84	274.26	133.70	-400.38
2050	0.00	0.00	100.35	0.00	10.08	0.00	110.43	22.68	46.12	67.41	59.84	274.26	133.70	-400.38
2051	0.00	0.00	137.33	0.00	10.08	0.00	147.41	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2052	0.00	0.00	20.87	0.00	10.08	0.00	30.95	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2053	0.00	0.00	102.47	0.00	0.00	0.00	102.47	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2054	0.00	0.00	140.23	0.00	0.00	0.00	140.23	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2055	0.00	0.00	21.32	0.00	0.00	0.00	21.32	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2056	0.00	0.00	104.64	0.00	12.34	0.00	116.98	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2057	0.00	0.00	143.20	0.00	0.00	0.00	143.20	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2058	0.00	0.00	244.06	0.00	0.00	0.00	244.06	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2059	0.00	0.00	321.79	0.00	72.89	0.00	394.68	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2060	0.00	0.00	144.41	0.00	0.00	0.00	144.41	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2061	0.00	0.00	10.64	0.00	0.00	0.00	10.64	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2062	0.00	0.00	109.11	0.00	0.00	0.00	109.11	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2063	0.00	0.00	149.32	0.00	0.00	0.00	149.32	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2064	0.00	0.00	254.50	0.00	0.00	0.00	254.50	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2065	0.00	0.00	335.54	0.00	12.34	0.00	347.88	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2066	0.00	0.00	150.58	0.00	0.00	0.00	150.58	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2067	0.00	0.00	247.80	0.00	0.00	0.00	247.80	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2068	0.00	0.00	342.64	0.00	61.32	0.00	403.96	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2069	0.00	0.00	153.77	0.00	0.00	0.00	153.77	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2070	0.00	0.00	11.33	0.00	0.00	0.00	11.33	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2071	0.00	0.00	243.40	0.00	0.00	0.00	243.40	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2072	0.00	0.00	352.33	0.00	0.00	0.00	352.33	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2073	0.00	0.00	158.12	0.00	0.00	0.00	158.12	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2074	0.00	0.00	11.65	0.00	24.30	0.00	35.95	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2075	0.00	0.00	52.55	0.00	0.00	0.00	52.55	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2076	0.00	0.00	71.92	0.00	0.00	0.00	71.92	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2077	0.00	0.00	10.93	0.00	0.00	0.00	10.93	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2078	0.00	0.00	0.00	0.00	61.32	0.00	61.32	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2080	0.00	0.00	100.35	0.00	0.00	0.00	100.35	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2081	0.00	0.00	137.33	0.00	0.00	0.00	137.33	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2082	0.00	0.00	20.87	0.00	0.00	0.00	20.87	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2083	0.00	0.00	102.47	0.00	20.44	0.00	122.91	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2084	0.00	0.00	140.23	0.00	10.08	0.00	150.31	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2085	0.00	0.00	21.32	0.00	10.08	0.00	31.39	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2086	0.00	0.00	104.64	0.00	10.08	0.00	114.72	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2087	0.00	0.00	143.20	0.00	10.08	0.00	153.28	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2088	0.00	0.00	21.77	0.00	0.00	0.00	21.77	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	67.41	59.84	274.26	133.70	-400.38
Salvage Value	0.00	0.00	29.88	0.00	1.19	0.00	31.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1514.62	0.00	151.81	0.00	1730.75	120.73	224.68	3021.38	1374.15	1279.18	1705.40	-1337.35

Net Present Value -3414

Wind/Gas

TABLE 250
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	266.71	101.39	18.22	88.79	58.31
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	279.78	99.77	18.74	89.52	71.77
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	268.64	97.01	20.92	90.08	60.64
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	262.30	94.99	18.71	89.73	58.87
2020	0.00	0.00	0.00	13.09	21.21	0.00	34.30	0.69	0.00	265.78	94.45	14.43	91.95	64.95
2021	0.00	0.00	0.37	399.71	35.35	0.00	435.43	2.87	0.00	265.98	92.61	13.95	96.71	62.70
2022	0.00	0.00	0.00	407.19	42.70	0.00	449.89	5.12	6.34	269.34	90.94	14.06	96.78	67.56
2023	0.00	0.00	227.23	394.10	22.34	0.00	643.67	8.23	12.69	273.07	88.41	16.15	100.21	68.30
2024	0.00	0.00	302.79	7.48	35.16	0.00	345.43	9.84	19.03	287.74	86.51	16.53	106.15	78.55
2025	0.00	0.00	42.63	6.55	6.81	0.00	55.99	10.12	27.18	200.86	86.49	18.85	97.03	-1.52
2026	0.00	0.00	104.64	199.85	17.12	0.00	321.61	11.73	27.18	190.05	85.48	17.90	96.89	-10.23
2027	0.00	0.00	145.32	203.59	124.38	0.00	473.30	14.09	30.35	181.03	83.13	21.80	98.79	-22.69
2028	0.00	0.00	21.77	203.59	37.69	0.00	263.05	15.40	37.60	181.02	81.34	28.19	101.21	-29.72
2029	0.00	0.00	106.85	203.59	37.83	0.00	348.28	17.14	40.78	176.25	79.73	30.40	103.01	-36.89
2030	0.00	0.00	146.23	203.59	37.83	0.00	387.65	19.08	43.95	177.50	78.81	31.86	103.51	-36.68
2031	0.00	0.00	130.58	203.59	37.83	0.00	372.01	20.94	51.19	177.81	77.58	37.72	104.29	-41.77
2032	0.00	0.00	148.28	203.59	119.59	0.00	471.47	23.30	54.37	175.32	76.44	38.04	106.17	-45.34
2033	0.00	0.00	22.54	203.59	37.83	0.00	263.97	24.62	61.63	177.64	75.77	40.15	107.15	-45.42
2034	0.00	0.00	110.64	203.59	37.83	0.00	352.07	26.38	64.81	169.53	73.95	46.46	108.18	-59.07
2035	0.00	0.00	151.42	203.59	37.83	0.00	392.84	28.34	67.99	161.56	72.28	50.52	110.11	-71.35
2036	0.00	0.00	135.21	203.59	37.83	0.00	376.64	30.23	75.23	157.95	70.91	58.25	111.46	-82.66
2037	0.00	0.00	153.54	203.59	37.83	0.00	394.97	32.20	78.41	152.02	69.61	61.82	113.60	-93.02
2038	0.00	0.00	137.11	203.59	37.83	0.00	378.54	34.09	85.66	150.60	68.56	67.99	115.94	-101.89
2039	0.00	0.00	155.70	203.59	119.59	0.00	478.89	36.49	88.84	145.27	67.41	66.97	127.72	-116.83
2040	0.00	0.00	23.67	216.69	37.83	0.00	278.19	37.88	96.10	145.84	66.58	70.63	130.79	-122.15
2041	0.00	0.00	116.18	603.30	37.83	0.00	757.32	41.67	99.28	136.32	65.07	83.18	128.87	-140.80
2042	0.00	0.00	158.99	610.78	37.83	0.00	807.61	45.70	102.45	129.00	63.70	89.21	132.12	-156.03
2043	0.00	0.00	141.98	597.69	37.55	0.00	777.22	49.59	109.69	125.41	62.52	98.95	134.32	-170.39
2044	0.00	0.00	161.23	211.08	36.70	0.00	409.00	51.63	112.87	121.80	61.57	102.63	137.12	-179.52
2045	0.00	0.00	77.06	210.14	34.43	0.00	321.63	53.24	120.12	119.63	60.48	108.79	142.34	-191.99
2046	0.00	0.00	71.92	396.90	31.02	0.00	499.84	55.74	123.30	116.41	59.44	109.24	150.16	-202.43
2047	0.00	0.00	10.93	207.34	20.71	0.00	238.98	56.94	127.95	111.77	58.37	113.19	151.66	-211.45
2048	0.00	0.00	0.00	203.59	10.64	0.00	214.24	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2049	0.00	0.00	0.00	203.59	10.22	0.00	213.82	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2050	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2051	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2052	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2053	0.00	0.00	204.94	203.59	0.00	0.00	408.54	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2054	0.00	0.00	280.46	203.59	0.00	0.00	484.06	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2055	0.00	0.00	42.63	203.59	5.30	0.00	251.53	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2056	0.00	0.00	104.64	203.59	8.84	0.00	317.07	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2057	0.00	0.00	143.20	203.59	10.75	0.00	357.54	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2058	0.00	0.00	21.77	203.59	6.01	0.00	231.37	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2059	0.00	0.00	106.85	203.59	27.73	0.00	338.17	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2060	0.00	0.00	146.23	216.69	2.98	0.00	365.89	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2061	0.00	0.00	130.58	603.30	4.78	0.00	738.66	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2062	0.00	0.00	148.28	610.78	79.80	0.00	838.86	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2063	0.00	0.00	22.54	597.69	9.46	0.00	629.69	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2064	0.00	0.00	110.64	211.08	9.46	0.00	331.18	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2065	0.00	0.00	151.42	210.14	9.46	0.00	371.02	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2066	0.00	0.00	135.21	396.90	9.46	0.00	541.57	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2067	0.00	0.00	153.54	207.34	70.78	0.00	431.66	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2068	0.00	0.00	137.11	203.59	9.46	0.00	350.17	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2069	0.00	0.00	155.70	203.59	9.46	0.00	368.75	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2070	0.00	0.00	23.67	203.59	25.37	0.00	252.63	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2071	0.00	0.00	116.18	203.59	35.97	0.00	355.75	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2072	0.00	0.00	158.99	203.59	41.41	0.00	404.00	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2073	0.00	0.00	141.98	203.59	25.79	0.00	371.37	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2074	0.00	0.00	161.23	203.59	78.21	0.00	443.03	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2075	0.00	0.00	77.06	203.59	13.29	0.00	293.94	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2076	0.00	0.00	71.92	203.59	21.80	0.00	297.31	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2077	0.00	0.00	10.93	203.59	54.04	0.00	268.57	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2078	0.00	0.00	0.00	203.59	37.55	0.00	241.14	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2079	0.00	0.00	0.00	203.59	37.12	0.00	240.72	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2080	0.00	0.00	0.00	216.69	36.55	0.00	253.24	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2081	0.00	0.00	0.00	603.30	34.85	0.00	638.16	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2082	0.00	0.00	0.00	610.78	53.50	0.00	664.28	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2083	0.00	0.00	204.94	597.69	30.93	0.00	833.56	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2084	0.00	0.00	280.46	211.08	38.31	0.00	529.85	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2085	0.00	0.00	42.63	210.14	38.03	0.00	290.80	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2086	0.00	0.00	104.64	396.90	36.33	0.00	537.87	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2087	0.00	0.00	143.20	207.34	34.62	0.00	385.16	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2088	0.00	0.00	21.77	203.59	16.03	0.00	241.39	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2089	0.00	0.00	0.00	197.05	28.53	0.00	225.58	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
2090	0.00	0.00	0.00	3.74	0.14	0.00	3.88	56.94	127.95	115.94	59.43	110.41	148.06	-201.95
Salvage Value	0.00	0.00	11.06	25.62	5.43	0.00	42.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1093.35	2578.12	446.03	0.00	4181.82	284.93	641.69	3423.27	1371.11	641.94	1715.01	-304.78

Net Present Value -5413

K22/Gas

TABLE 251
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	107.68	0.00	0.00	10.08	0.00	117.76	0.59	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	35.49	0.00	0.00	11.31	0.00	46.80	0.82	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	38.11	0.00	0.00	11.42	0.00	49.53	1.07	0.00	266.46	101.39	18.22	88.81	58.05
2017	0.00	248.88	0.00	0.00	33.24	0.00	282.12	2.48	0.00	279.18	99.78	18.74	89.55	71.12
2018	0.00	486.04	0.00	0.00	11.88	0.00	497.92	4.97	0.00	267.36	97.02	20.93	90.12	59.29
2019	0.00	777.34	0.00	0.00	20.68	0.00	798.02	8.96	0.00	260.99	95.00	18.71	89.76	57.53
2020	0.00	874.32	0.00	0.00	37.63	0.00	911.94	13.52	0.00	262.88	94.28	14.85	92.13	61.62
2021	0.00	711.17	0.00	0.00	53.38	0.00	764.54	17.34	0.00	264.39	92.56	14.25	97.41	60.17
2022	0.00	413.91	0.00	0.00	63.21	0.00	477.12	19.73	13.29	267.77	92.54	16.25	92.82	66.16
2023	0.00	192.68	0.00	0.00	0.01	0.00	192.69	20.69	13.51	357.52	98.28	16.17	90.43	152.65
2024	0.00	66.77	0.00	0.00	0.00	0.00	66.77	21.03	13.21	385.15	98.08	18.42	96.23	172.42
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	21.03	13.43	302.65	97.96	12.94	91.13	100.61
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.03	13.26	289.19	96.07	13.10	92.30	87.71
2027	0.00	0.00	127.65	0.00	0.00	0.00	127.65	21.55	13.21	249.07	94.20	12.54	91.62	50.72
2028	0.00	0.00	166.53	0.00	12.34	0.00	178.87	22.34	12.96	236.57	92.60	13.07	93.23	37.67
2029	0.00	0.00	21.92	0.00	0.00	0.00	21.92	22.45	16.59	232.70	91.71	16.16	93.30	31.52
2030	0.00	0.00	107.60	0.00	0.00	0.00	107.60	22.98	16.59	225.45	89.99	19.59	94.97	20.90
2031	0.00	0.00	376.37	0.00	97.19	0.00	473.56	25.34	16.64	217.33	88.33	22.49	97.35	9.17
2032	0.00	0.00	350.98	0.00	0.00	0.00	350.98	27.10	23.48	210.98	86.70	30.57	99.68	-5.97
2033	0.00	0.00	147.46	0.00	12.34	0.00	159.81	27.89	19.46	214.23	86.80	26.75	99.87	0.81
2034	0.00	0.00	10.87	0.00	0.00	0.00	10.87	27.95	26.52	220.53	84.42	54.16	98.25	-16.31
2035	0.00	0.00	233.42	0.00	0.00	0.00	233.42	29.12	26.52	205.84	82.33	59.46	100.86	-36.81
2036	0.00	0.00	337.89	0.00	0.00	0.00	337.89	30.81	26.53	197.36	80.81	66.06	103.02	-52.53
2037	0.00	0.00	151.64	0.00	0.00	0.00	151.64	31.56	26.53	199.02	81.20	60.03	101.87	-44.07
2038	0.00	0.00	249.53	0.00	0.00	0.00	249.53	32.81	32.93	199.01	78.82	86.10	102.77	-68.68
2039	0.00	0.00	345.04	0.00	0.00	0.00	345.04	34.54	32.94	192.67	77.43	95.02	112.20	-91.99
2040	0.00	0.00	154.84	0.00	81.76	0.00	236.61	35.72	32.94	189.70	76.91	97.29	112.53	-97.04
2041	0.00	0.00	11.41	0.00	0.00	0.00	11.41	35.78	40.02	193.04	74.99	124.39	112.37	-118.71
2042	0.00	0.00	245.10	0.00	0.00	0.00	245.10	37.00	42.97	184.02	73.18	138.43	115.92	-143.51
2043	0.00	0.00	354.80	0.00	0.00	0.00	354.80	38.78	40.02	176.40	71.81	148.49	118.58	-162.47
2044	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.57	40.02	173.69	71.35	151.87	118.94	-168.48
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.63	47.09	177.75	69.80	181.06	117.57	-190.68
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.09	172.15	68.56	193.07	121.00	-210.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	48.87	164.59	67.20	206.82	123.96	-233.39
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	48.88	171.50	68.52	193.65	120.84	-211.52
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	48.88	171.50	68.52	193.65	120.84	-211.52
2050	0.00	0.00	0.00	0.00	10.62	0.00	10.62	39.63	47.99	171.50	68.52	193.65	120.84	-211.52
2051	0.00	0.00	0.00	0.00	10.69	0.00	10.69	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2052	0.00	0.00	0.00	0.00	10.71	0.00	10.71	39.63	50.06	171.50	68.52	193.65	120.84	-211.52
2053	0.00	0.00	0.00	0.00	0.58	0.00	0.58	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2054	0.00	0.00	0.00	0.00	19.19	0.00	19.19	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2055	0.00	0.00	0.00	0.00	25.46	0.00	25.46	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2056	0.00	0.00	0.00	0.00	27.52	0.00	27.52	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2057	0.00	0.00	105.37	0.00	22.45	0.00	127.82	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2058	0.00	0.00	144.20	0.00	0.00	0.00	144.20	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2059	0.00	0.00	21.92	0.00	0.00	0.00	21.92	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2060	0.00	0.00	107.60	0.00	0.00	0.00	107.60	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2061	0.00	0.00	374.25	0.00	0.00	0.00	374.25	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2062	0.00	0.00	350.98	0.00	0.00	0.00	350.98	39.63	50.06	171.50	68.52	193.65	120.84	-211.52
2063	0.00	0.00	147.46	0.00	12.34	0.00	159.81	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2064	0.00	0.00	10.87	0.00	0.00	0.00	10.87	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2065	0.00	0.00	233.42	0.00	0.69	0.00	234.11	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2066	0.00	0.00	337.89	0.00	73.62	0.00	411.51	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2067	0.00	0.00	151.64	0.00	22.53	0.00	174.16	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2068	0.00	0.00	249.53	0.00	23.63	0.00	273.16	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2069	0.00	0.00	345.04	0.00	1.48	0.00	346.52	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2070	0.00	0.00	154.84	0.00	12.17	0.00	167.01	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2071	0.00	0.00	11.41	0.00	25.85	0.00	37.26	39.63	62.94	171.50	68.52	193.65	120.84	-211.52
2072	0.00	0.00	245.10	0.00	40.76	0.00	285.86	39.63	50.06	171.50	68.52	193.65	120.84	-211.52
2073	0.00	0.00	354.80	0.00	0.01	0.00	354.81	39.63	48.88	171.50	68.52	193.65	120.84	-211.52
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.63	48.88	171.50	68.52	193.65	120.84	-211.52
2075	0.00	0.00	11.73	0.00	61.32	0.00	73.05	39.63	48.88	171.50	68.52	193.65	120.84	-211.52
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.99	171.50	68.52	193.65	120.84	-211.52
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2081	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	50.06	171.50	68.52	193.65	120.84	-211.52
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2087	0.00	0.00	105.37	0.00	10.08	0.00	115.45	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2088	0.00	0.00	144.20	0.00	0.00	0.00	144.20	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2089	0.00	0.00	21.92	0.00	0.00	0.00	21.92	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
2090	0.00	0.00	0.00	0.00	20.44	0.00	20.44	39.63	47.10	171.50	68.52	193.65	120.84	-211.52
Salvage Value	0.00	0.00	10.50	0.00	1.87	0.00	12.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2777.64	1058.42	0.00	257.77	0.00	4093.83	316.50	263.16	3976.67	1466.63	842.75	1586.62	80.66

Net Present Value: -4593

K22/C29

TABLE 252
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	High
Capital Cost	High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	107.68	0.00	0.00	10.08	0.00	149.70	0.75	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.87	35.49	0.00	0.00	11.31	0.00	87.67	1.19	0.00	259.79	103.30	17.62	87.22	51.64
2016	11.52	38.11	0.00	0.00	11.42	0.00	61.05	1.49	0.00	266.46	101.39	18.22	88.81	58.05
2017	12.30	248.88	0.00	0.00	33.24	0.00	294.42	2.96	0.00	279.18	99.78	18.74	89.55	71.12
2018	12.39	486.04	0.00	0.00	11.88	0.00	510.31	5.52	0.00	267.36	97.02	20.93	90.12	59.29
2019	14.85	777.34	0.00	0.00	20.68	0.00	812.87	9.58	0.00	260.99	95.00	18.71	89.76	57.53
2020	188.90	874.32	0.00	0.00	37.63	0.00	1100.84	15.08	0.00	262.88	94.28	14.85	92.13	61.62
2021	284.83	711.17	0.00	0.00	53.38	0.00	1049.37	20.33	0.00	264.26	92.56	14.25	97.51	59.95
2022	308.98	413.91	0.00	0.00	63.21	0.00	786.10	24.26	13.29	267.60	92.55	16.23	92.91	65.91
2023	315.53	192.68	0.00	0.00	4.34	0.00	512.55	26.82	13.51	357.01	98.28	16.21	90.48	152.04
2024	856.59	66.77	0.00	0.00	4.33	0.00	927.69	31.46	13.21	383.99	98.07	18.42	96.29	171.21
2025	1364.05	0.00	0.00	0.00	52.77	0.00	1416.82	38.55	13.43	301.22	97.98	12.97	91.22	99.04
2026	1226.99	0.00	0.00	0.00	27.62	0.00	1254.61	44.82	13.26	287.43	96.07	13.14	92.44	85.78
2027	877.84	0.00	0.00	0.00	46.57	0.00	924.42	49.44	13.21	247.84	94.42	12.01	91.54	49.87
2028	609.09	0.00	0.00	0.00	80.98	0.00	690.07	52.89	12.96	232.32	92.50	13.22	93.58	33.02
2029	400.82	0.00	0.00	0.00	107.18	0.00	508.00	55.43	27.13	297.57	96.36	15.10	84.35	101.76
2030	147.90	0.00	0.00	0.00	125.54	0.00	273.44	56.80	27.36	392.81	103.51	14.79	81.00	193.52
2031	46.76	0.00	0.00	0.00	0.00	0.00	46.76	57.03	27.26	405.75	103.43	15.16	83.25	203.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	30.24	392.76	101.73	15.01	84.13	191.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	26.04	380.29	100.08	14.92	85.75	179.54
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.99	367.97	98.46	15.18	86.86	167.47
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.82	355.07	96.89	15.24	87.54	155.40
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	57.03	25.44	340.19	95.32	15.26	88.36	141.25
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.52	324.85	93.76	15.29	89.45	126.34
2038	0.00	0.00	136.06	0.00	0.00	0.00	136.06	57.60	24.96	309.82	92.22	15.26	91.40	110.94
2039	0.00	0.00	177.98	0.00	12.34	0.00	190.32	58.44	27.74	303.07	90.85	14.82	101.53	95.87
2040	0.00	0.00	23.67	0.00	0.00	0.00	23.67	58.56	28.85	294.32	89.10	25.21	101.80	78.21
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.56	28.85	285.83	87.63	28.24	104.21	65.75
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	59.15	31.81	277.54	86.21	29.19	108.12	54.03
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	60.01	28.85	268.56	84.72	29.47	113.31	41.05
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	60.72	32.92	260.86	83.25	44.83	111.33	21.45
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.02	32.25	252.77	81.98	48.02	114.00	8.76
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.14	36.33	258.08	81.57	47.31	117.29	11.90
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.11	239.35	79.36	62.29	118.82	-21.12
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.11	250.07	80.97	52.54	116.71	-0.15
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	41.07	250.07	80.97	52.54	116.71	-0.15
2050	0.00	0.00	0.00	0.00	10.62	0.00	10.62	62.14	37.23	250.07	80.97	52.54	116.71	-0.15
2051	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.14	36.35	250.07	80.97	52.54	116.71	-0.15
2052	0.00	0.00	0.00	0.00	10.71	0.00	10.71	62.14	39.31	250.07	80.97	52.54	116.71	-0.15
2053	0.00	0.00	0.00	0.00	0.58	0.00	0.58	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2054	0.00	0.00	0.00	0.00	19.19	0.00	19.19	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2055	0.00	0.00	0.00	0.00	25.46	0.00	25.46	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2056	0.00	0.00	0.00	0.00	27.52	0.00	27.52	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2057	0.00	0.00	0.00	0.00	22.45	0.00	22.45	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2058	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2059	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.14	55.15	250.07	80.97	52.54	116.71	-0.15
2060	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2061	0.00	0.00	0.00	0.00	6.42	0.00	6.42	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.14	39.32	250.07	80.97	52.54	116.71	-0.15
2063	0.00	0.00	0.00	0.00	18.18	0.00	18.18	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2064	0.00	0.00	0.00	0.00	25.66	0.00	25.66	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2065	0.00	0.00	0.00	0.00	31.70	0.00	31.70	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2066	0.00	0.00	0.00	0.00	0.73	0.00	0.73	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2067	0.00	0.00	0.00	0.00	22.53	0.00	22.53	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2068	0.00	0.00	113.78	0.00	11.29	0.00	125.07	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2069	0.00	0.00	155.70	0.00	1.48	0.00	157.18	62.14	55.15	250.07	80.97	52.54	116.71	-0.15
2070	0.00	0.00	23.67	0.00	12.17	0.00	35.83	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2071	0.00	0.00	0.00	0.00	25.85	0.00	25.85	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2072	0.00	0.00	116.99	0.00	40.76	0.00	157.75	62.14	55.15	250.07	80.97	52.54	116.71	-0.15
2073	0.00	0.00	160.11	0.00	3.27	0.00	163.38	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2074	0.00	0.00	142.97	0.00	15.60	0.00	158.58	62.14	53.96	250.07	80.97	52.54	116.71	-0.15
2075	0.00	0.00	162.36	0.00	39.94	0.00	202.29	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2076	0.00	0.00	24.68	0.00	21.20	0.00	45.88	62.14	53.08	250.07	80.97	52.54	116.71	-0.15
2077	0.00	0.00	0.00	0.00	35.88	0.00	35.88	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2078	0.00	0.00	0.00	0.00	75.14	0.00	75.14	62.14	52.19	250.07	80.97	52.54	116.71	-0.15
2079	0.00	0.00	0.00	0.00	81.51	0.00	81.51	62.14	39.32	250.07	80.97	52.54	116.71	-0.15
2080	0.00	0.00	0.00	0.00	167.42	0.00	167.42	62.14	53.96	250.07	80.97	52.54	116.71	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	56.92	250.07	80.97	52.54	116.71	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.13	250.07	80.97	52.54	116.71	-0.15
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	53.96	250.07	80.97	52.54	116.71	-0.15
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	39.32	250.07	80.97	52.54	116.71	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	36.36	250.07	80.97	52.54	116.71	-0.15
Salvage Value	5.07	0.00	3.37	0.00	4.36	0.00	12.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3364.72	2777.64	185.86	0.00	408.28	0.00	6736.50	539.94	248.53	4679.59	1545.80	355.39	1530.27	1248.13

Net Present Value -6277

SCGT/C26

TABLE 253
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	259.79	103.30	17.62	87.22	51.64
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	266.71	101.39	18.22	88.79	58.31
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	279.78	99.77	18.74	89.52	71.77
2018	243.00	0.00	0.37	0.00	0.00	0.00	243.37	3.58	0.00	268.38	97.01	20.93	90.09	60.35
2019	292.57	0.00	0.00	0.00	0.00	0.00	292.57	5.04	0.00	261.90	94.99	18.71	89.74	58.46
2020	300.06	0.00	122.63	0.00	0.00	0.00	422.69	7.05	0.00	267.55	94.86	13.41	91.63	67.65
2021	828.64	0.00	159.61	0.00	12.34	0.00	1000.59	11.94	0.00	268.35	93.03	12.74	97.03	65.55
2022	1332.76	0.00	20.87	0.00	0.82	0.00	1354.45	18.71	4.07	262.34	90.82	22.64	98.57	50.31
2023	1198.84	0.00	0.00	0.00	1.64	0.00	1200.49	24.71	4.07	258.31	88.40	28.54	104.05	37.32
2024	857.70	0.00	0.00	0.00	3.28	0.00	860.99	29.02	4.07	265.84	87.14	31.91	110.16	36.63
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	32.03	4.07	173.90	87.54	19.50	105.35	-38.49
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	34.00	18.69	213.74	91.57	14.30	89.53	18.33
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	34.73	18.91	301.11	99.31	13.89	83.27	104.65
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	34.96	18.61	325.25	99.56	15.19	88.37	122.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.83	312.33	97.83	15.65	89.53	109.31
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.65	302.35	96.60	15.52	89.63	100.59
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.60	287.80	94.64	16.67	91.43	85.06
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.36	270.83	92.70	17.88	93.14	67.11
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.92	259.42	90.76	21.02	95.98	51.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.92	250.92	89.13	24.35	98.15	39.28
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.96	244.69	87.83	27.13	99.73	29.99
2036	0.00	0.00	112.20	0.00	0.00	0.00	112.20	35.52	20.74	239.45	86.75	27.48	102.05	23.17
2037	0.00	0.00	153.59	0.00	12.34	0.00	165.93	36.35	17.78	230.52	85.21	27.89	107.35	10.07
2038	0.00	0.00	23.34	0.00	0.00	0.00	23.34	36.46	21.85	222.93	83.71	42.55	105.97	-9.30
2039	0.00	0.00	114.57	0.00	0.00	0.00	114.57	37.04	21.85	214.47	82.45	45.29	115.34	-28.62
2040	0.00	0.00	158.91	0.00	97.19	0.00	256.10	38.31	21.85	207.82	81.09	44.88	122.67	-40.83
2041	0.00	0.00	140.01	0.00	0.00	0.00	140.01	39.01	25.94	197.70	79.43	62.51	121.03	-65.27
2042	0.00	0.00	158.99	0.00	0.00	0.00	158.99	39.80	25.27	188.71	78.06	70.25	123.74	-83.34
2043	0.00	0.00	141.98	0.00	0.00	0.00	141.98	40.51	29.34	183.41	76.73	78.89	128.78	-100.99
2044	0.00	0.00	161.23	0.00	81.76	0.00	242.99	41.72	29.34	176.50	75.41	79.52	138.44	-116.87
2045	0.00	0.00	24.51	0.00	0.00	0.00	24.51	41.85	33.43	169.56	74.04	109.25	130.82	-144.55
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	36.39	162.81	72.84	120.65	132.95	-163.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.44	156.34	71.51	122.31	144.38	-181.87
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.45	162.90	72.79	117.40	136.05	-163.35
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.45	162.90	72.79	117.40	136.05	-163.35
2050	0.00	0.00	100.35	0.00	10.08	0.00	110.43	41.85	33.46	162.90	72.79	117.40	136.05	-163.35
2051	0.00	0.00	137.33	0.00	10.08	0.00	147.41	41.85	35.24	162.90	72.79	117.40	136.05	-163.35
2052	0.00	0.00	20.87	0.00	10.08	0.00	30.95	41.85	35.25	162.90	72.79	117.40	136.05	-163.35
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	162.90	72.79	117.40	136.05	-163.35
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	162.90	72.79	117.40	136.05	-163.35
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	162.90	72.79	117.40	136.05	-163.35
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	41.85	36.43	162.90	72.79	117.40	136.05	-163.35
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2066	0.00	0.00	112.20	0.00	0.00	0.00	112.20	41.85	36.43	162.90	72.79	117.40	136.05	-163.35
2067	0.00	0.00	153.54	0.00	0.00	0.00	153.54	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2068	0.00	0.00	23.34	0.00	0.00	0.00	23.34	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2069	0.00	0.00	114.57	0.00	0.00	0.00	114.57	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2070	0.00	0.00	156.79	0.00	0.00	0.00	156.79	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2071	0.00	0.00	140.01	0.00	0.00	0.00	140.01	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2072	0.00	0.00	158.99	0.00	13.16	0.00	172.16	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2073	0.00	0.00	141.98	0.00	1.64	0.00	143.62	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2074	0.00	0.00	161.23	0.00	3.28	0.00	164.51	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2075	0.00	0.00	24.51	0.00	80.28	0.00	104.79	41.85	49.30	162.90	72.79	117.40	136.05	-163.35
2076	0.00	0.00	0.00	0.00	3.28	0.00	3.28	41.85	36.43	162.90	72.79	117.40	136.05	-163.35
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	51.08	162.90	72.79	117.40	136.05	-163.35
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	162.90	72.79	117.40	136.05	-163.35
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	41.85	51.08	162.90	72.79	117.40	136.05	-163.35
2080	0.00	0.00	100.35	0.00	0.00	0.00	100.35	41.85	35.25	162.90	72.79	117.40	136.05	-163.35
2081	0.00	0.00	137.33	0.00	0.00	0.00	137.33	41.85	51.08	162.90	72.79	117.40	136.05	-163.35
2082	0.00	0.00	20.87	0.00	0.00	0.00	20.87	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	36.43	162.90	72.79	117.40	136.05	-163.35
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
2090	0.00	0.00	0.00	0.00	24.30	0.00	24.30	41.85	33.47	162.90	72.79	117.40	136.05	-163.35
Salvage Value	1.98	0.00	5.52	0.00	1.36	0.00	8.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	485.51	0.00	94.79	0.00	4610.65	364.63	196.32	3971.96	1483.34	577.71	1640.90	270.00

Net Present Value -4902

CCGT/C26

TABLE 254
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	High
Capital Cost	High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	259.79	103.30	17.62	87.22	51.64
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	266.71	101.39	18.22	88.79	58.31
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	279.78	99.77	18.74	89.52	71.77
2018	243.00	0.00	0.37	0.00	0.00	0.00	243.37	3.58	0.00	268.38	97.01	20.93	90.09	60.35
2019	292.57	0.00	208.77	0.00	0.00	0.00	501.34	6.09	0.00	261.90	94.99	18.71	89.74	58.46
2020	300.06	0.00	324.49	0.00	0.00	0.00	624.54	9.10	0.00	267.55	94.86	13.41	91.63	67.65
2021	828.64	0.00	157.90	0.00	12.34	0.00	998.88	13.98	0.00	272.38	93.74	11.20	96.02	71.42
2022	1332.76	0.00	9.99	0.00	0.82	0.00	1343.57	20.70	7.06	272.38	91.37	32.35	89.21	59.45
2023	1198.84	0.00	0.00	0.00	1.64	0.00	1200.49	26.70	7.06	273.44	89.26	38.85	93.65	51.67
2024	857.70	0.00	0.00	0.00	3.28	0.00	860.99	31.01	7.06	288.86	88.14	47.08	98.11	55.53
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	34.02	7.06	195.47	87.66	37.65	95.50	-25.35
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	35.99	21.68	227.74	91.47	28.82	85.45	22.01
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	36.72	21.90	309.96	99.27	20.83	81.48	108.38
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	36.95	21.60	335.34	99.65	22.26	85.88	127.55
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.82	323.77	97.94	23.56	87.07	115.20
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.65	307.03	95.81	25.28	88.88	97.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.60	307.95	95.71	22.57	87.57	102.10
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.35	285.15	92.89	26.39	90.47	75.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.91	275.86	91.14	29.47	92.69	62.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.91	265.15	89.12	33.53	95.78	46.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.95	258.07	87.64	36.12	97.79	36.52
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	23.74	248.92	85.99	41.63	99.70	21.59
2037	0.00	0.00	112.98	0.00	0.00	0.00	112.98	37.51	20.78	245.38	85.24	43.03	100.20	16.90
2038	0.00	0.00	154.66	0.00	12.34	0.00	167.01	38.35	20.78	238.93	84.04	43.78	104.14	6.97
2039	0.00	0.00	23.50	0.00	0.00	0.00	23.50	38.46	24.85	229.82	82.27	56.91	111.61	-20.97
2040	0.00	0.00	115.37	0.00	0.00	0.00	115.37	39.04	24.85	222.07	80.83	63.31	114.38	-36.45
2041	0.00	0.00	160.01	0.00	97.19	0.00	257.20	40.31	24.85	212.89	79.50	65.68	118.35	-50.64
2042	0.00	0.00	140.99	0.00	0.00	0.00	140.99	41.02	28.26	207.27	78.14	73.39	123.17	-67.44
2043	0.00	0.00	160.11	0.00	0.00	0.00	160.11	41.82	28.26	197.77	76.73	87.07	121.47	-87.50
2044	0.00	0.00	24.34	0.00	0.00	0.00	24.34	41.94	32.33	191.23	75.39	99.44	123.67	-107.27
2045	0.00	0.00	119.47	0.00	0.00	0.00	119.47	42.54	32.33	184.33	74.07	103.25	131.03	-124.02
2046	0.00	0.00	163.49	0.00	81.76	0.00	245.25	43.77	35.30	181.48	73.15	102.58	138.84	-133.08
2047	0.00	0.00	24.85	0.00	0.00	0.00	24.85	43.89	36.43	168.48	71.54	129.01	132.05	-164.13
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.43	178.10	72.92	111.61	133.98	-140.41
2049	0.00	0.00	208.77	0.00	10.08	0.00	218.85	43.89	36.44	178.10	72.92	111.61	133.98	-140.41
2050	0.00	0.00	302.21	0.00	10.08	0.00	312.29	43.89	36.44	178.10	72.92	111.61	133.98	-140.41
2051	0.00	0.00	135.62	0.00	10.08	0.00	145.70	43.89	38.22	178.10	72.92	111.61	133.98	-140.41
2052	0.00	0.00	9.99	0.00	10.08	0.00	20.07	43.89	38.23	178.10	72.92	111.61	133.98	-140.41
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.23	178.10	72.92	111.61	133.98	-140.41
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	178.10	72.92	111.61	133.98	-140.41
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	178.10	72.92	111.61	133.98	-140.41
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	43.89	39.42	178.10	72.92	111.61	133.98	-140.41
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	39.42	178.10	72.92	111.61	133.98	-140.41
2067	0.00	0.00	112.98	0.00	0.00	0.00	112.98	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2068	0.00	0.00	154.62	0.00	0.00	0.00	154.62	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2069	0.00	0.00	23.50	0.00	0.00	0.00	23.50	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2070	0.00	0.00	115.37	0.00	0.00	0.00	115.37	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2071	0.00	0.00	157.89	0.00	0.00	0.00	157.89	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2072	0.00	0.00	140.99	0.00	0.82	0.00	141.81	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2073	0.00	0.00	160.11	0.00	13.98	0.00	174.09	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2074	0.00	0.00	24.34	0.00	3.28	0.00	27.62	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2075	0.00	0.00	119.47	0.00	7.39	0.00	126.86	43.89	52.29	178.10	72.92	111.61	133.98	-140.41
2076	0.00	0.00	163.49	0.00	76.18	0.00	239.67	43.89	39.42	178.10	72.92	111.61	133.98	-140.41
2077	0.00	0.00	24.85	0.00	0.00	0.00	24.85	43.89	54.07	178.10	72.92	111.61	133.98	-140.41
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	178.10	72.92	111.61	133.98	-140.41
2079	0.00	0.00	208.77	0.00	0.00	0.00	208.77	43.89	54.07	178.10	72.92	111.61	133.98	-140.41
2080	0.00	0.00	302.21	0.00	0.00	0.00	302.21	43.89	38.24	178.10	72.92	111.61	133.98	-140.41
2081	0.00	0.00	135.62	0.00	61.32	0.00	196.94	43.89	54.07	178.10	72.92	111.61	133.98	-140.41
2082	0.00	0.00	9.99	0.00	0.00	0.00	9.99	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	39.42	178.10	72.92	111.61	133.98	-140.41
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	178.10	72.92	111.61	133.98	-140.41
Salvage Value	1.98	0.00	8.74	0.00	1.21	0.00	11.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	797.55	0.00	91.70	0.00	4919.61	386.12	222.15	4116.41	1485.51	643.33	1594.51	393.06

Net Present Value -5135

Wind/C26

TABLE 255
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	240.54	105.06	15.80	82.47	37.21
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	259.79	103.30	17.62	87.22	51.64
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	266.71	101.39	18.22	88.79	58.31
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	279.78	99.77	18.74	89.52	71.77
2018	243.00	0.00	0.00	0.00	0.00	0.00	243.00	3.58	0.00	268.38	97.01	20.93	90.09	60.35
2019	292.57	0.00	0.00	0.00	0.00	0.00	292.57	5.04	0.00	261.90	94.99	18.71	89.74	58.46
2020	300.06	0.00	0.00	13.09	21.21	0.00	334.36	6.72	0.00	265.31	94.46	14.40	91.95	64.51
2021	828.64	0.00	0.00	399.71	35.35	0.00	1263.70	13.03	0.00	265.58	92.61	14.02	96.96	61.98
2022	1332.76	0.00	0.00	407.19	43.24	0.00	1783.19	21.95	6.34	268.72	90.94	14.05	97.29	66.44
2023	1198.84	0.00	0.00	394.10	22.85	0.00	1615.79	30.03	12.69	272.42	88.42	16.12	100.74	67.14
2024	857.70	0.00	0.00	7.48	10.35	0.00	875.54	34.41	19.03	285.99	86.42	16.73	107.38	75.46
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	37.42	19.03	192.70	86.24	10.98	123.58	-28.11
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	39.39	33.65	247.48	90.37	13.06	89.00	55.06
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	40.12	33.87	335.51	98.08	11.78	83.08	142.58
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	40.34	33.57	355.94	98.13	12.92	87.49	157.40
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.79	345.06	96.44	13.14	89.43	146.05
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.62	336.81	95.35	12.85	89.41	139.20
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.57	327.63	93.91	13.18	90.57	129.97
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	40.34	33.32	314.78	92.44	13.21	91.54	117.58
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	32.88	299.48	90.88	13.10	92.72	102.77
2034	0.00	0.00	132.93	0.00	0.00	0.00	132.93	40.90	32.88	284.51	89.40	13.11	93.55	88.44
2035	0.00	0.00	173.70	0.00	12.34	0.00	186.04	41.72	32.92	278.38	88.36	11.98	94.84	83.20
2036	0.00	0.00	135.21	0.00	0.00	0.00	135.21	42.39	39.78	266.61	86.27	21.57	95.98	62.79
2037	0.00	0.00	153.59	0.00	12.34	0.00	165.93	43.22	36.82	256.87	84.79	24.35	98.21	49.52
2038	0.00	0.00	23.34	0.00	0.00	0.00	23.34	43.34	40.89	251.10	83.53	31.72	100.12	35.72
2039	0.00	0.00	114.57	0.00	0.00	0.00	114.57	43.91	40.89	243.80	82.33	30.91	110.94	19.62
2040	0.00	0.00	158.91	13.09	97.19	0.00	269.19	45.25	40.89	232.16	80.65	38.97	112.31	0.23
2041	0.00	0.00	140.01	399.71	0.00	0.00	539.72	47.95	44.97	225.04	79.22	48.07	114.85	-17.11
2042	0.00	0.00	158.99	407.19	0.00	0.00	566.18	50.78	44.30	216.91	77.93	50.23	119.72	-30.97
2043	0.00	0.00	141.98	394.10	0.00	0.00	536.08	53.46	48.37	211.65	76.61	56.20	125.76	-46.93
2044	0.00	0.00	161.23	7.48	81.76	0.00	250.47	54.71	48.37	200.34	75.24	69.64	123.55	-68.09
2045	0.00	0.00	24.51	0.00	0.00	0.00	24.51	54.83	52.46	193.26	73.94	81.38	125.95	-88.01
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	55.43	185.82	72.65	82.82	134.38	-104.02
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.47	178.87	71.38	83.63	144.58	-120.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.48	185.99	72.66	82.61	134.97	-104.25
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.49	185.99	72.66	82.61	134.97	-104.25
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.49	185.99	72.66	82.61	134.97	-104.25
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	54.27	185.99	72.66	82.61	134.97	-104.25
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	54.28	185.99	72.66	82.61	134.97	-104.25
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	185.99	72.66	82.61	134.97	-104.25
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	185.99	72.66	82.61	134.97	-104.25
2055	0.00	0.00	0.00	0.00	5.30	0.00	5.30	54.83	54.28	185.99	72.66	82.61	134.97	-104.25
2056	0.00	0.00	0.00	0.00	8.84	0.00	8.84	54.83	55.46	185.99	72.66	82.61	134.97	-104.25
2057	0.00	0.00	0.00	0.00	10.60	0.00	10.60	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2058	0.00	0.00	0.00	0.00	5.30	0.00	5.30	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2059	0.00	0.00	0.00	0.00	1.77	0.00	1.77	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2060	0.00	0.00	0.00	13.09	0.00	0.00	13.09	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2061	0.00	0.00	0.00	399.71	0.00	0.00	399.71	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2062	0.00	0.00	0.00	407.19	0.00	0.00	407.19	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2063	0.00	0.00	0.00	394.10	0.00	0.00	394.10	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2064	0.00	0.00	110.64	7.48	0.00	0.00	118.13	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2065	0.00	0.00	151.42	0.00	0.00	0.00	151.42	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2066	0.00	0.00	135.21	0.00	0.00	0.00	135.21	54.83	55.46	185.99	72.66	82.61	134.97	-104.25
2067	0.00	0.00	153.54	0.00	0.00	0.00	153.54	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2068	0.00	0.00	23.34	0.00	0.00	0.00	23.34	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2069	0.00	0.00	114.57	0.00	0.00	0.00	114.57	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2070	0.00	0.00	156.79	0.00	28.25	0.00	185.04	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2071	0.00	0.00	140.01	0.00	26.51	0.00	166.53	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2072	0.00	0.00	158.99	0.00	44.98	0.00	203.97	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2073	0.00	0.00	141.98	0.00	17.55	0.00	159.53	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2074	0.00	0.00	161.23	0.00	8.59	0.00	169.81	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2075	0.00	0.00	24.51	0.00	80.28	0.00	104.79	54.83	68.33	185.99	72.66	82.61	134.97	-104.25
2076	0.00	0.00	0.00	0.00	3.28	0.00	3.28	54.83	55.46	185.99	72.66	82.61	134.97	-104.25
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	70.11	185.99	72.66	82.61	134.97	-104.25
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	185.99	72.66	82.61	134.97	-104.25
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	54.83	70.11	185.99	72.66	82.61	134.97	-104.25
2080	0.00	0.00	0.00	13.09	0.00	0.00	13.09	54.83	54.28	185.99	72.66	82.61	134.97	-104.25
2081	0.00	0.00	0.00	399.71	0.00	0.00	399.71	54.83	70.11	185.99	72.66	82.61	134.97	-104.25
2082	0.00	0.00	0.00	407.19	0.00	0.00	407.19	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2083	0.00	0.00	0.00	394.10	0.00	0.00	394.10	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2084	0.00	0.00	0.00	7.48	10.08	0.00	17.56	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	55.46	185.99	72.66	82.61	134.97	-104.25
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
2090	0.00	0.00	0.00	0.00	24.30	0.00	24.30	54.83	52.50	185.99	72.66	82.61	134.97	-104.25
Salvage Value	1.98	0.00	4.31	6.52	1.97	0.00	14.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	359.13	1019.73	172.43	0.00	5581.64	439.28	347.44	4226.82	1478.29	441.48	1625.99	681.06

Net Present Value -5687

K19/C25/750MW (WPS Sale &Inv)

TABLE 256
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	3.09	259.35	1.30	0.00	247.47	105.06	15.82	82.63	43.96
2015	87.06	457.15	0.00	0.00	17.36	5.50	567.07	4.13	0.00	265.75	103.33	17.62	87.25	57.55
2016	173.05	602.85	0.00	0.00	22.96	13.86	812.72	8.20	0.00	273.81	101.41	18.21	88.86	65.34
2017	199.14	728.47	0.00	0.00	32.60	20.13	980.34	13.10	0.00	285.75	99.44	19.45	90.14	76.72
2018	237.78	512.16	0.00	0.00	32.01	84.64	866.59	17.43	0.00	278.52	97.31	20.36	90.00	70.84
2019	241.61	365.25	0.00	0.00	40.52	69.15	716.54	21.01	13.29	294.51	97.23	19.20	88.76	89.31
2020	664.05	148.71	0.00	0.00	2.60	130.92	946.29	25.74	45.83	459.15	104.52	13.69	96.43	244.51
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	31.47	43.92	536.54	105.08	15.10	101.11	315.24
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	36.32	42.55	537.63	103.83	15.16	102.16	316.47
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	39.84	40.67	527.93	101.45	15.02	104.83	306.63
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	42.43	39.07	527.33	99.15	16.69	110.33	301.15
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	44.28	52.00	469.60	103.74	14.93	92.98	257.95
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	45.22	50.42	613.85	111.92	14.85	92.51	394.56
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	45.40	48.96	644.44	112.15	14.57	97.70	420.03
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	47.93	645.16	110.45	15.09	99.39	420.23
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	49.25	634.27	108.50	15.09	101.21	409.48
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	43.96	627.96	107.12	14.76	102.24	403.85
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	42.61	619.92	105.44	15.11	103.89	395.48
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	41.09	608.10	103.70	15.13	105.56	383.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.06	593.84	101.88	15.10	107.34	369.52
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	39.10	579.51	100.12	15.16	108.94	355.29
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.40	526.83	98.41	14.99	106.87	306.55
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	36.88	446.49	96.72	15.25	99.75	234.77
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	45.40	36.35	420.30	95.07	15.34	100.48	209.42
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.83	403.99	93.39	15.29	103.08	192.23
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	45.66	38.28	388.75	91.74	15.25	112.30	169.46
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	46.04	34.83	367.48	90.45	14.48	116.96	145.58
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	46.10	37.76	349.03	88.41	24.89	117.02	118.70
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	46.36	37.30	338.68	86.85	27.88	119.67	104.27
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	46.75	36.85	330.64	85.46	29.51	123.18	92.49
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	47.06	42.27	327.55	84.22	34.02	127.54	81.77
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	47.69	44.81	309.81	82.35	42.92	127.30	57.24
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.74	45.53	301.60	80.89	52.53	129.71	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	44.25	293.13	79.59	54.99	134.22	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	42.98	301.51	80.94	50.15	130.41	40.02
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	47.74	45.58	301.51	80.94	50.15	130.41	40.02
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	47.74	44.04	301.51	80.94	50.15	130.41	40.02
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	47.74	43.70	301.51	80.94	50.15	130.41	40.02
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	47.74	43.38	301.51	80.94	50.15	130.41	40.02
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	47.74	43.06	301.51	80.94	50.15	130.41	40.02
2054	0.00	0.00	0.00	0.00	14.11	14.92	29.03	47.74	42.75	301.51	80.94	50.15	130.41	40.02
2055	0.00	0.00	0.00	0.00	0.64	15.47	16.11	47.74	43.63	301.51	80.94	50.15	130.41	40.02
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.74	56.21	301.51	80.94	50.15	130.41	40.02
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	47.74	40.10	301.51	80.94	50.15	130.41	40.02
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	47.74	55.66	301.51	80.94	50.15	130.41	40.02
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	47.74	42.53	301.51	80.94	50.15	130.41	40.02
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	47.74	52.37	301.51	80.94	50.15	130.41	40.02
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	68.20	301.51	80.94	50.15	130.41	40.02
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	47.74	68.20	301.51	80.94	50.15	130.41	40.02
2065	0.00	0.00	0.00	0.00	6.95	3.37	10.32	47.74	39.50	301.51	80.94	50.15	130.41	40.02
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	47.74	68.20	301.51	80.94	50.15	130.41	40.02
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	47.74	68.20	301.51	80.94	50.15	130.41	40.02
2069	0.00	0.00	51.92	0.00	26.41	45.47	123.80	47.74	39.50	301.51	80.94	50.15	130.41	40.02
2070	0.00	0.00	70.63	0.00	1.96	47.15	119.74	47.74	54.15	301.51	80.94	50.15	130.41	40.02
2071	0.00	0.00	10.67	0.00	23.96	0.00	34.63	47.74	38.32	301.51	80.94	50.15	130.41	40.02
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	47.74	54.15	301.51	80.94	50.15	130.41	40.02
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	47.74	37.43	301.51	80.94	50.15	130.41	40.02
2074	0.00	0.00	62.88	0.00	37.68	0.00	100.56	47.74	52.37	301.51	80.94	50.15	130.41	40.02
2075	0.00	0.00	70.98	0.00	55.81	0.00	126.79	47.74	39.50	301.51	80.94	50.15	130.41	40.02
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	47.74	54.15	301.51	80.94	50.15	130.41	40.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	38.32	301.51	80.94	50.15	130.41	40.02
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	47.74	54.15	301.51	80.94	50.15	130.41	40.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	41.28	301.51	80.94	50.15	130.41	40.02
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	47.74	54.15	301.51	80.94	50.15	130.41	40.02
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	47.74	39.50	301.51	80.94	50.15	130.41	40.02
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	47.74	36.54	301.51	80.94	50.15	130.41	40.02
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	47.74	39.50	301.51	80.94	50.15	130.41	40.02
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	47.74	39.50	301.51	80.94	50.15	130.41	40.02
Salvage Value	0.79	0.00	1.53	0.00	2.91	1.39	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	85.85	0.00	307.55	252.30	6575.59	528.85	494.22	6753.60	1607.87	347.40	1660.56	3137.77

Net Present Value -4461

K19/C25/750MW

TABLE 257
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	4.37	260.63	1.30	0.00	240.15	105.07	15.82	82.48	36.77
2015	87.06	457.15	0.00	0.00	17.36	7.04	568.61	4.15	0.00	258.65	103.32	17.61	87.24	50.48
2016	173.05	602.85	0.00	0.00	22.96	14.52	813.38	8.21	0.00	265.48	101.40	18.19	88.83	57.07
2017	199.14	728.47	0.00	0.00	32.60	20.13	980.34	13.11	0.00	276.12	99.43	19.45	90.12	67.13
2018	237.78	512.16	0.00	0.00	32.01	121.01	902.97	17.63	0.00	267.60	97.30	20.33	90.04	59.94
2019	241.61	365.25	0.00	0.00	40.52	82.31	729.69	21.28	13.29	282.27	97.22	19.17	88.78	77.09
2020	664.05	148.71	0.00	0.00	2.60	233.37	1048.74	26.52	49.02	436.47	104.52	13.67	96.34	221.95
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	32.25	47.22	523.56	105.08	15.20	101.19	302.09
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	37.09	45.88	527.23	103.82	15.16	102.18	306.07
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	40.62	43.85	518.22	101.44	15.02	104.86	296.90
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	43.20	42.12	518.93	99.13	16.73	110.39	292.69
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	45.06	54.92	460.33	103.74	14.95	92.96	248.68
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	46.00	53.22	566.47	111.91	14.91	90.62	349.03
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	46.17	51.65	562.46	112.16	14.48	93.01	342.81
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	50.50	560.12	110.45	15.07	94.34	340.26
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	51.71	550.91	108.49	15.08	96.25	331.09
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	46.31	546.06	107.10	14.79	97.45	326.72
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	44.86	539.76	105.42	15.18	99.19	319.96
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	43.24	529.76	103.69	15.19	101.13	309.74
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	42.11	517.40	101.88	15.08	103.12	297.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	41.06	505.01	100.13	15.13	105.01	284.75
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	42.27	436.57	98.44	15.16	98.07	224.90
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	38.67	411.55	96.73	15.31	98.50	201.01
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	46.17	38.06	396.93	95.04	15.30	100.51	186.08
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	37.47	381.45	93.39	15.27	103.07	169.73
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	46.43	39.86	367.00	91.74	15.28	112.24	147.73
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	46.82	36.34	363.13	90.45	14.49	116.93	141.25
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	46.87	39.20	349.03	88.41	24.89	117.01	118.71
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	47.13	38.68	338.68	86.85	27.88	119.66	104.29
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	47.52	38.18	330.65	85.46	29.51	123.18	92.50
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	47.84	43.53	327.56	84.22	34.02	127.53	81.79
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	48.46	46.02	309.79	82.35	42.92	127.27	57.25
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	48.52	46.69	301.55	80.89	52.53	129.65	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	45.35	293.09	79.59	54.99	134.17	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	44.04	301.48	80.94	50.15	130.36	40.02
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	48.52	46.58	301.48	80.94	50.15	130.36	40.02
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	48.52	45.00	301.48	80.94	50.15	130.36	40.02
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	48.52	44.62	301.48	80.94	50.15	130.36	40.02
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	48.52	44.24	301.48	80.94	50.15	130.36	40.02
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	48.52	43.89	301.48	80.94	50.15	130.36	40.02
2054	0.00	0.00	0.00	0.00	14.11	14.92	29.03	48.52	43.53	301.48	80.94	50.15	130.36	40.02
2055	0.00	0.00	0.00	0.00	0.64	15.47	16.11	48.52	44.38	301.48	80.94	50.15	130.36	40.02
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	48.52	56.92	301.48	80.94	50.15	130.36	40.02
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	48.52	40.77	301.48	80.94	50.15	130.36	40.02
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	48.52	56.29	301.48	80.94	50.15	130.36	40.02
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	48.52	43.13	301.48	80.94	50.15	130.36	40.02
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	48.52	52.37	301.48	80.94	50.15	130.36	40.02
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	68.20	301.48	80.94	50.15	130.36	40.02
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	48.52	68.20	301.48	80.94	50.15	130.36	40.02
2065	0.00	0.00	0.00	0.00	6.95	3.37	10.32	48.52	39.50	301.48	80.94	50.15	130.36	40.02
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	48.52	68.20	301.48	80.94	50.15	130.36	40.02
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	48.52	68.20	301.48	80.94	50.15	130.36	40.02
2069	0.00	0.00	51.92	0.00	26.41	45.47	123.80	48.52	39.50	301.48	80.94	50.15	130.36	40.02
2070	0.00	0.00	70.63	0.00	1.96	47.15	119.74	48.52	54.15	301.48	80.94	50.15	130.36	40.02
2071	0.00	0.00	10.67	0.00	23.96	0.00	34.63	48.52	38.32	301.48	80.94	50.15	130.36	40.02
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	48.52	54.15	301.48	80.94	50.15	130.36	40.02
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	48.52	37.43	301.48	80.94	50.15	130.36	40.02
2074	0.00	0.00	62.88	0.00	37.68	0.00	100.56	48.52	52.37	301.48	80.94	50.15	130.36	40.02
2075	0.00	0.00	70.98	0.00	55.81	0.00	126.79	48.52	39.50	301.48	80.94	50.15	130.36	40.02
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	48.52	54.15	301.48	80.94	50.15	130.36	40.02
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	38.32	301.48	80.94	50.15	130.36	40.02
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	48.52	54.15	301.48	80.94	50.15	130.36	40.02
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	41.28	301.48	80.94	50.15	130.36	40.02
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	48.52	54.15	301.48	80.94	50.15	130.36	40.02
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	48.52	39.50	301.48	80.94	50.15	130.36	40.02
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	48.52	36.54	301.48	80.94	50.15	130.36	40.02
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	48.52	39.50	301.48	80.94	50.15	130.36	40.02
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	48.52	39.50	301.48	80.94	50.15	130.36	40.02
Salvage Value	0.79	0.00	1.53	0.00	2.91	1.39	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	85.85	0.00	307.55	363.70	6686.99	537.88	518.00	6360.52	1607.80	347.48	1643.51	2761.73

Net Present Value -4981

K19/Gas25/750MW (WPS Sale & INV)

TABLE 258
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	3.09	228.33	1.14	0.00	247.47	105.06	15.82	82.63	43.96
2015	0.00	457.15	0.00	0.00	17.36	5.50	480.00	3.54	0.00	265.76	103.33	17.62	87.25	57.56
2016	0.00	602.85	0.00	0.00	22.96	13.86	639.67	6.74	0.00	273.84	101.41	18.20	88.86	65.38
2017	0.00	728.47	0.00	0.00	32.60	20.13	781.20	10.65	0.00	285.95	99.43	19.44	90.12	76.96
2018	0.00	512.16	0.00	0.00	32.01	84.64	628.81	13.79	0.00	278.83	97.31	20.32	89.97	71.22
2019	0.00	365.25	0.00	0.00	37.93	69.15	472.33	16.15	13.29	295.03	97.23	19.19	88.75	89.86
2020	0.00	148.71	0.00	0.00	0.01	130.92	279.64	17.55	45.83	459.89	104.52	13.68	96.39	245.30
2021	0.00	51.45	0.37	0.00	0.00	0.00	51.82	17.81	43.92	537.84	105.08	15.09	101.04	316.63
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	17.81	42.55	539.08	103.82	15.13	102.07	318.07
2023	0.00	0.00	73.38	0.00	0.00	0.00	73.38	18.06	40.67	528.19	100.98	16.03	105.35	305.83
2024	0.00	0.00	142.93	0.00	6.90	0.00	149.83	18.70	39.07	529.70	98.82	17.63	110.67	302.58
2025	0.00	0.00	82.20	0.00	54.34	0.00	136.54	19.37	41.46	416.56	98.47	17.02	102.08	198.99
2026	0.00	0.00	61.76	0.00	0.00	0.00	61.76	19.68	43.74	445.55	97.12	20.17	105.05	223.21
2027	0.00	0.00	69.72	0.00	0.00	0.00	69.72	20.03	42.42	444.80	95.12	19.79	109.58	220.32
2028	0.00	0.00	10.53	0.00	0.00	0.00	10.53	20.08	45.24	437.01	92.74	29.07	112.29	202.92
2029	0.00	0.00	51.40	0.00	0.00	0.00	51.40	20.34	46.73	427.54	90.94	32.54	115.40	188.66
2030	0.00	0.00	69.92	0.00	45.72	0.00	115.64	20.92	41.50	425.82	89.82	35.73	117.95	182.31
2031	0.00	0.00	62.07	0.00	0.00	0.00	62.07	21.23	44.41	429.59	89.42	38.84	118.87	182.45
2032	0.00	0.00	70.06	0.00	0.00	0.00	70.06	21.58	43.28	416.19	87.03	46.33	123.54	159.28
2033	0.00	0.00	10.59	0.00	0.00	0.00	10.59	21.63	46.25	410.00	85.46	55.54	126.67	142.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	45.18	406.40	84.68	58.03	128.66	135.04
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	43.70	334.97	82.51	56.17	123.99	72.30
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	43.15	240.05	81.03	57.21	111.88	-10.07
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	42.62	214.65	79.59	62.77	112.44	-40.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	42.10	211.40	78.81	61.35	117.99	-46.75
2039	0.00	0.00	104.41	0.00	0.00	0.00	104.41	22.15	44.56	191.59	76.86	73.40	124.75	-83.42
2040	0.00	0.00	150.24	0.00	0.00	0.00	150.24	22.90	41.11	171.87	75.49	81.25	127.78	-112.65
2041	0.00	0.00	67.02	0.00	6.90	0.00	73.92	23.27	40.64	174.35	75.70	79.55	127.50	-108.40
2042	0.00	0.00	4.91	0.00	0.00	0.00	4.91	23.30	47.24	191.45	73.47	114.28	129.21	-125.52
2043	0.00	0.00	52.13	0.00	0.00	0.00	52.13	23.56	46.80	177.64	71.70	125.06	133.25	-152.37
2044	0.00	0.00	70.91	0.00	45.72	0.00	116.63	24.14	48.14	161.62	70.07	133.72	137.28	-179.45
2045	0.00	0.00	33.69	0.00	0.00	0.00	33.69	24.31	51.81	154.40	68.71	149.23	140.43	-203.98
2046	0.00	0.00	31.25	0.00	0.00	0.00	31.25	24.47	51.40	146.07	67.48	161.90	143.55	-226.86
2047	0.00	0.00	4.72	0.00	0.00	0.00	4.72	24.49	51.60	142.66	66.64	167.12	149.35	-240.44
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	50.33	147.71	67.61	159.41	144.44	-223.76
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	24.49	52.93	147.71	67.61	159.41	144.44	-223.76
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	24.49	49.62	147.71	67.61	159.41	144.44	-223.76
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	24.49	49.28	147.71	67.61	159.41	144.44	-223.76
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	24.49	48.95	147.71	67.61	159.41	144.44	-223.76
2053	0.00	0.00	51.10	0.00	16.51	14.92	82.53	24.49	48.63	147.71	67.61	159.41	144.44	-223.76
2054	0.00	0.00	120.65	0.00	13.47	14.92	149.04	24.49	48.32	147.71	67.61	159.41	144.44	-223.76
2055	0.00	0.00	80.08	0.00	0.00	15.47	95.55	24.49	48.02	147.71	67.61	159.41	144.44	-223.76
2056	0.00	0.00	61.76	0.00	0.00	0.00	61.76	24.49	63.56	147.71	67.61	159.41	144.44	-223.76
2057	0.00	0.00	69.72	0.00	0.00	0.00	69.72	24.49	47.45	147.71	67.61	159.41	144.44	-223.76
2058	0.00	0.00	10.53	0.00	0.00	0.00	10.53	24.49	63.01	147.71	67.61	159.41	144.44	-223.76
2059	0.00	0.00	51.40	0.00	6.90	0.00	58.30	24.49	49.87	147.71	67.61	159.41	144.44	-223.76
2060	0.00	0.00	69.92	0.00	40.76	0.00	110.68	24.49	59.72	147.71	67.61	159.41	144.44	-223.76
2061	0.00	0.00	62.07	0.00	0.00	0.00	62.07	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2062	0.00	0.00	70.06	0.00	0.00	0.00	70.06	24.49	59.72	147.71	67.61	159.41	144.44	-223.76
2063	0.00	0.00	10.59	0.00	0.00	0.00	10.59	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	24.49	59.72	147.71	67.61	159.41	144.44	-223.76
2065	0.00	0.00	0.00	0.00	41.24	3.37	44.61	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	24.49	59.72	147.71	67.61	159.41	144.44	-223.76
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	24.49	59.72	147.71	67.61	159.41	144.44	-223.76
2069	0.00	0.00	104.41	0.00	24.45	45.47	174.33	24.49	46.85	147.71	67.61	159.41	144.44	-223.76
2070	0.00	0.00	150.24	0.00	0.01	47.15	197.40	24.49	45.66	147.71	67.61	159.41	144.44	-223.76
2071	0.00	0.00	67.02	0.00	0.00	0.00	67.02	24.49	45.66	147.71	67.61	159.41	144.44	-223.76
2072	0.00	0.00	4.91	0.00	0.00	0.00	4.91	24.49	45.66	147.71	67.61	159.41	144.44	-223.76
2073	0.00	0.00	52.13	0.00	0.00	0.00	52.13	24.49	44.77	147.71	67.61	159.41	144.44	-223.76
2074	0.00	0.00	70.91	0.00	0.00	0.00	70.91	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2075	0.00	0.00	33.69	0.00	13.59	0.00	47.28	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2076	0.00	0.00	31.25	0.00	6.90	0.00	38.16	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2077	0.00	0.00	4.72	0.00	0.00	0.00	4.72	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	24.49	46.85	147.71	67.61	159.41	144.44	-223.76
2080	0.00	0.00	0.00	0.00	11.43	0.00	11.43	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2083	0.00	0.00	51.10	0.00	0.00	0.00	51.10	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2084	0.00	0.00	120.65	0.00	10.66	0.55	131.87	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2085	0.00	0.00	80.08	0.00	10.41	1.10	91.59	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2086	0.00	0.00	61.76	0.00	22.12	3.31	87.20	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2087	0.00	0.00	69.72	0.00	25.36	4.97	100.04	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2088	0.00	0.00	10.53	0.00	16.51	14.92	41.96	24.49	43.89	147.71	67.61	159.41	144.44	-223.76
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	24.49	46.85	147.71	67.61	159.41	144.44	-223.76
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	24.49	46.85	147.71	67.61	159.41	144.44	-223.76
Salvage Value	0.00	0.00	5.09	0.00	1.66	1.39	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	465.67	0.00	206.87	252.30	3494.59	274.27	507.22	5374.98	1490.35	780.17	1771.35	1333.12

Net Present Value -2943

K19/C31/750MW

TABLE 259
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	206.20	0.00	0.00	19.04	4.37	259.99	1.30	0.00	240.15	105.07	15.82	82.48	36.77
2015	38.25	457.15	0.00	0.00	17.36	7.04	519.79	3.90	0.00	258.65	103.32	17.61	87.24	50.48
2016	10.75	602.85	0.00	0.00	22.96	14.52	651.08	7.15	0.00	265.48	101.40	18.19	88.83	57.07
2017	10.78	728.47	0.00	0.00	32.60	20.13	791.98	11.11	0.00	276.37	99.42	19.45	90.12	67.38
2018	12.78	512.16	0.00	0.00	32.01	121.01	677.96	14.50	0.00	267.90	97.29	20.32	90.00	60.29
2019	12.81	365.25	0.00	0.00	37.93	82.31	498.30	17.00	13.29	282.73	97.21	19.21	88.77	77.54
2020	12.85	148.71	0.00	0.00	0.01	233.37	394.94	18.97	49.02	437.27	104.51	13.70	96.33	222.74
2021	16.21	51.45	0.00	0.00	0.00	0.00	67.66	19.31	47.22	524.67	105.07	15.17	101.08	303.35
2022	152.49	0.00	0.00	0.00	0.00	0.00	152.49	20.07	45.88	528.81	103.84	15.14	102.08	307.75
2023	234.24	0.00	0.00	0.00	0.00	0.00	234.24	21.24	43.85	518.06	100.87	16.22	105.64	295.33
2024	251.18	0.00	0.00	0.00	0.00	0.00	251.18	22.50	42.12	520.04	98.64	18.05	111.33	292.02
2025	253.97	0.00	0.00	0.00	2.60	0.00	256.57	23.78	40.31	405.09	98.49	13.09	107.92	185.58
2026	684.03	0.00	0.00	0.00	2.60	0.00	686.63	27.21	38.38	389.32	96.56	13.51	116.87	162.39
2027	1082.05	0.00	0.00	0.00	31.66	0.00	1113.71	32.78	36.95	347.54	94.60	12.69	115.25	125.01
2028	968.69	0.00	0.00	0.00	16.57	0.00	985.26	37.71	35.58	334.47	92.96	13.18	124.79	103.53
2029	689.74	0.00	0.00	0.00	27.94	0.00	717.69	41.30	36.97	324.96	91.32	13.57	135.90	84.17
2030	476.30	0.00	0.00	0.00	48.59	0.00	524.89	43.92	31.62	322.43	89.97	13.89	144.73	73.83
2031	311.94	0.00	0.00	0.00	64.31	0.00	376.25	45.80	44.95	369.95	94.07	16.10	95.49	164.30
2032	114.56	0.00	0.00	0.00	75.32	0.00	189.88	46.75	43.93	483.78	101.24	15.83	95.03	271.68
2033	36.05	0.00	0.00	0.00	0.00	0.00	36.05	46.93	42.59	519.27	101.97	15.47	103.12	298.71
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	41.65	505.06	100.14	15.12	104.99	284.81
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	39.90	435.98	98.44	15.08	98.00	224.46
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	39.21	411.45	96.73	15.40	98.44	200.89
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	46.93	38.42	397.10	95.05	15.33	100.48	186.24
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	37.46	381.48	93.39	15.26	103.04	169.79
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	47.19	39.92	367.04	91.74	15.27	112.22	147.81
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	47.58	36.52	363.13	90.45	14.49	116.93	141.25
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	47.63	42.83	349.03	88.41	24.89	117.01	118.71
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	47.89	39.35	338.68	86.85	27.88	119.66	104.29
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	48.28	38.85	330.65	85.46	29.51	123.18	92.50
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	48.60	44.21	327.56	84.22	34.02	127.53	81.79
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	49.22	43.73	309.79	82.35	42.92	127.27	57.25
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	49.28	47.36	301.55	80.89	52.53	129.65	38.47
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	45.35	293.09	79.59	54.99	134.17	24.34
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	44.04	301.48	80.94	50.15	130.36	40.02
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	49.28	46.58	301.48	80.94	50.15	130.36	40.02
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	49.28	43.22	301.48	80.94	50.15	130.36	40.02
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	49.28	45.80	301.48	80.94	50.15	130.36	40.02
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	49.28	42.47	301.48	80.94	50.15	130.36	40.02
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	49.28	42.11	301.48	80.94	50.15	130.36	40.02
2054	0.00	0.00	0.00	0.00	13.47	14.92	28.39	49.28	41.76	301.48	80.94	50.15	130.36	40.02
2055	0.00	0.00	0.00	0.00	0.00	15.47	15.47	49.28	41.42	301.48	80.94	50.15	130.36	40.02
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	58.69	301.48	80.94	50.15	130.36	40.02
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	42.55	301.48	80.94	50.15	130.36	40.02
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	58.07	301.48	80.94	50.15	130.36	40.02
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	44.90	301.48	80.94	50.15	130.36	40.02
2060	0.00	0.00	0.00	0.00	0.64	0.00	0.64	49.28	54.15	301.48	80.94	50.15	130.36	40.02
2061	0.00	0.00	0.00	0.00	0.64	0.00	0.64	49.28	39.50	301.48	80.94	50.15	130.36	40.02
2062	0.00	0.00	0.00	0.00	7.70	0.00	7.70	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2063	0.00	0.00	0.00	0.00	3.85	0.00	3.85	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2064	0.00	0.00	0.00	0.00	14.79	1.68	16.47	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2065	0.00	0.00	0.00	0.00	17.86	3.37	21.22	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2066	0.00	0.00	0.00	0.00	16.23	10.10	26.34	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2067	0.00	0.00	0.00	0.00	25.85	15.16	41.01	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	49.28	68.20	301.48	80.94	50.15	130.36	40.02
2069	0.00	0.00	51.92	0.00	24.45	45.47	121.84	49.28	39.50	301.48	80.94	50.15	130.36	40.02
2070	0.00	0.00	70.63	0.00	0.01	47.15	117.79	49.28	54.15	301.48	80.94	50.15	130.36	40.02
2071	0.00	0.00	10.67	0.00	0.00	0.00	10.67	49.28	41.28	301.48	80.94	50.15	130.36	40.02
2072	0.00	0.00	52.07	0.00	0.00	0.00	52.07	49.28	54.15	301.48	80.94	50.15	130.36	40.02
2073	0.00	0.00	70.84	0.00	0.00	0.00	70.84	49.28	37.43	301.48	80.94	50.15	130.36	40.02
2074	0.00	0.00	62.88	0.00	0.00	0.00	62.88	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2075	0.00	0.00	70.98	0.00	8.86	0.00	79.84	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2076	0.00	0.00	10.72	0.00	1.96	0.00	12.68	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2077	0.00	0.00	0.00	0.00	23.96	0.00	23.96	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2078	0.00	0.00	0.00	0.00	19.62	0.00	19.62	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2079	0.00	0.00	0.00	0.00	21.53	0.00	21.53	49.28	39.50	301.48	80.94	50.15	130.36	40.02
2080	0.00	0.00	0.00	0.00	78.44	0.00	78.44	49.28	52.37	301.48	80.94	50.15	130.36	40.02
2081	0.00	0.00	0.00	0.00	48.91	0.00	48.91	49.28	39.50	301.48	80.94	50.15	130.36	40.02
2082	0.00	0.00	0.00	0.00	56.72	0.00	56.72	49.28	54.15	301.48	80.94	50.15	130.36	40.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	38.32	301.48	80.94	50.15	130.36	40.02
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	49.28	54.15	301.48	80.94	50.15	130.36	40.02
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	49.28	38.32	301.48	80.94	50.15	130.36	40.02
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	49.28	54.15	301.48	80.94	50.15	130.36	40.02
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	49.28	36.54	301.48	80.94	50.15	130.36	40.02
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	49.28	39.50	301.48	80.94	50.15	130.36	40.02
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	49.28	39.50	301.48	80.94	50.15	130.36	40.02
Salvage Value	5.74	0.00	1.53	0.00	3.25	1.39	11.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2399.77	2569.75	85.85	0.00	259.45	363.70	5678.51	455.81	479.28	5822.89	1564.79	345.44	1715.91	2196.76

Net Present Value -4417

K19/Gas31/750MW

TABLE 260
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	4.37	229.61	1.15	0.00	240.15	105.07	15.82	82.48	36.77
2015	0.00	457.15	0.00	0.00	17.36	7.04	481.54	3.56	0.00	258.65	103.32	17.61	87.24	50.48
2016	0.00	602.85	0.00	0.00	22.96	14.52	640.33	6.76	0.00	265.48	101.40	18.19	88.83	57.07
2017	0.00	728.47	0.00	0.00	32.60	20.13	781.20	10.66	0.00	276.37	99.42	19.45	90.12	67.38
2018	0.00	512.16	0.00	0.00	32.01	121.01	665.19	13.99	0.00	267.90	97.29	20.32	90.00	60.29
2019	0.00	365.25	0.00	0.00	37.93	82.31	485.49	16.42	13.29	282.73	97.21	19.21	88.77	77.54
2020	0.00	148.71	0.00	0.00	0.01	233.37	382.09	18.33	49.02	437.27	104.51	13.70	96.33	222.74
2021	0.00	51.45	0.00	0.00	0.00	0.00	51.45	18.58	47.22	524.67	105.07	15.17	101.08	303.35
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	45.88	528.77	103.83	15.16	102.09	307.69
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	43.85	518.34	100.87	16.22	105.62	295.63
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	42.12	520.58	98.64	18.06	111.31	292.57
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	40.31	406.40	98.49	13.10	108.13	186.68
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	38.38	391.75	96.55	13.60	117.28	164.32
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	18.58	36.95	350.66	94.59	12.73	115.60	127.74
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	18.58	35.58	339.19	92.95	13.19	125.61	107.44
2029	0.00	0.00	125.09	0.00	0.00	0.00	125.09	19.10	36.97	328.99	91.37	13.37	135.89	88.36
2030	0.00	0.00	213.58	0.00	13.80	0.00	227.39	20.12	31.62	330.11	90.76	11.85	142.34	85.16
2031	0.00	0.00	93.25	0.00	54.34	0.00	147.59	20.85	38.48	322.29	88.58	26.43	112.42	94.85
2032	0.00	0.00	62.13	0.00	0.00	0.00	62.13	21.16	41.32	315.33	86.97	33.68	114.73	79.96
2033	0.00	0.00	70.13	0.00	0.00	0.00	70.13	21.51	40.12	306.43	85.50	37.16	117.45	66.32
2034	0.00	0.00	10.60	0.00	0.00	0.00	10.60	21.57	43.03	305.91	84.68	40.19	120.31	60.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.57	41.46	230.64	82.53	48.07	109.63	-9.60
2036	0.00	0.00	104.10	0.00	0.00	0.00	104.10	22.09	40.82	208.48	81.08	52.69	110.12	-35.42
2037	0.00	0.00	149.79	0.00	0.00	0.00	149.79	22.84	40.22	198.75	79.73	57.76	112.50	-51.25
2038	0.00	0.00	66.82	0.00	45.72	0.00	112.54	23.40	39.63	202.05	79.57	52.84	117.75	-48.12
2039	0.00	0.00	4.89	0.00	0.00	0.00	4.89	23.42	49.10	215.31	77.31	88.59	122.19	-72.79
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.42	45.59	201.24	75.41	97.45	126.11	-97.73
2041	0.00	0.00	52.02	0.00	0.00	0.00	52.02	23.68	45.05	191.02	73.91	106.27	129.35	-118.50
2042	0.00	0.00	175.49	0.00	0.00	0.00	175.49	24.56	44.53	181.23	72.53	115.89	132.45	-139.65
2043	0.00	0.00	161.38	0.00	0.00	0.00	161.38	25.37	48.10	177.88	71.65	123.86	135.68	-153.31
2044	0.00	0.00	67.22	0.00	45.72	0.00	112.94	25.93	49.39	175.13	71.28	115.83	142.10	-154.08
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	25.96	56.01	185.83	69.33	156.40	137.22	-177.11
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	55.55	176.79	68.09	165.53	140.25	-197.08
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	54.22	165.80	66.81	175.53	143.37	-219.91
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	52.90	176.14	68.08	165.82	140.28	-198.04
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	25.96	55.45	176.14	68.08	165.82	140.28	-198.04
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	25.96	52.10	176.14	68.08	165.82	140.28	-198.04
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	25.96	51.71	176.14	68.08	165.82	140.28	-198.04
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	25.96	51.34	176.14	68.08	165.82	140.28	-198.04
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	25.96	50.98	176.14	68.08	165.82	140.28	-198.04
2054	0.00	0.00	0.00	0.00	13.47	14.92	28.39	25.96	50.63	176.14	68.08	165.82	140.28	-198.04
2055	0.00	0.00	0.00	0.00	0.00	15.47	15.47	25.96	50.28	176.14	68.08	165.82	140.28	-198.04
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	65.79	176.14	68.08	165.82	140.28	-198.04
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	49.64	176.14	68.08	165.82	140.28	-198.04
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	65.16	176.14	68.08	165.82	140.28	-198.04
2059	0.00	0.00	102.81	0.00	0.00	0.00	102.81	25.96	51.99	176.14	68.08	165.82	140.28	-198.04
2060	0.00	0.00	191.30	0.00	0.00	0.00	191.30	25.96	61.24	176.14	68.08	165.82	140.28	-198.04
2061	0.00	0.00	91.13	0.00	0.00	0.00	91.13	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2062	0.00	0.00	62.13	0.00	0.00	0.00	62.13	25.96	61.24	176.14	68.08	165.82	140.28	-198.04
2063	0.00	0.00	70.13	0.00	0.00	0.00	70.13	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2064	0.00	0.00	10.60	0.00	8.37	1.68	20.65	25.96	61.24	176.14	68.08	165.82	140.28	-198.04
2065	0.00	0.00	0.00	0.00	20.75	3.37	24.12	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2066	0.00	0.00	104.10	0.00	41.59	10.10	155.79	25.96	61.24	176.14	68.08	165.82	140.28	-198.04
2067	0.00	0.00	149.79	0.00	7.25	15.16	172.19	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2068	0.00	0.00	66.82	0.00	15.50	45.47	127.79	25.96	61.24	176.14	68.08	165.82	140.28	-198.04
2069	0.00	0.00	4.89	0.00	24.45	45.47	74.82	25.96	48.37	176.14	68.08	165.82	140.28	-198.04
2070	0.00	0.00	0.00	0.00	0.01	47.15	47.16	25.96	47.18	176.14	68.08	165.82	140.28	-198.04
2071	0.00	0.00	52.02	0.00	0.00	0.00	52.02	25.96	47.18	176.14	68.08	165.82	140.28	-198.04
2072	0.00	0.00	175.49	0.00	0.00	0.00	175.49	25.96	47.18	176.14	68.08	165.82	140.28	-198.04
2073	0.00	0.00	161.38	0.00	34.29	0.00	195.67	25.96	46.30	176.14	68.08	165.82	140.28	-198.04
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2075	0.00	0.00	4.92	0.00	0.00	0.00	4.92	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	25.96	48.37	176.14	68.08	165.82	140.28	-198.04
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2081	0.00	0.00	0.00	0.00	13.59	0.00	13.59	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2088	0.00	0.00	0.00	0.00	27.94	14.92	42.86	25.96	45.41	176.14	68.08	165.82	140.28	-198.04
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	25.96	48.37	176.14	68.08	165.82	140.28	-198.04
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	25.96	48.37	176.14	68.08	165.82	140.28	-198.04
Salvage Value	0.00	0.00	2.93	0.00	1.80	1.39	6.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	404.68	0.00	190.27	363.70	3528.39	278.38	500.27	5007.90	1490.95	747.02	1783.03	986.89

Net Present Value -3320

K19/C25/250MW

TABLE 261
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	3.87	260.13	1.31	0.00	240.15	105.07	15.82	82.48	36.77
2015	87.06	457.15	0.00	0.00	17.36	2.40	563.97	4.13	0.00	258.65	103.32	17.61	87.24	50.48
2016	173.05	602.85	0.00	0.00	22.96	2.91	801.77	8.14	0.00	265.48	101.40	18.19	88.83	57.07
2017	199.14	728.47	0.00	0.00	32.60	4.36	964.57	12.97	0.00	276.12	99.43	19.45	90.12	67.13
2018	237.78	512.16	0.00	0.00	32.01	13.09	795.04	16.94	0.00	264.15	96.75	21.96	89.69	55.74
2019	241.61	365.25	0.00	0.00	40.52	13.09	660.47	20.24	13.29	279.54	96.33	21.71	90.60	70.91
2020	664.05	148.71	0.00	0.00	2.60	13.57	828.94	24.39	13.51	416.85	104.82	14.14	88.38	209.52
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	30.12	13.26	496.45	105.41	14.49	90.37	286.18
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	34.96	13.48	495.08	103.48	15.16	91.86	284.58
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	38.49	13.31	492.23	101.22	15.15	97.88	277.98
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	41.07	13.26	497.26	98.81	16.84	106.88	274.72
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	42.92	27.65	430.74	103.59	15.04	85.74	226.37
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	43.86	27.45	523.03	111.23	14.66	83.34	313.79
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	44.04	27.33	508.09	110.81	13.91	84.95	298.42
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	27.62	503.03	109.05	14.47	86.17	293.33
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	30.20	494.21	107.21	14.65	87.94	284.41
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	26.13	487.91	105.93	14.45	88.16	279.37
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.96	479.32	104.30	14.80	89.14	271.07
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.58	468.08	102.63	14.89	90.35	260.21
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.65	455.45	100.91	14.93	92.01	247.60
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.77	441.95	99.25	15.03	93.19	234.48
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	27.88	389.98	97.58	15.09	92.16	185.15
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	44.04	24.92	365.43	95.98	15.37	92.22	161.86
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	24.92	349.29	94.38	15.31	93.19	146.42
2038	0.00	0.00	74.15	0.00	0.00	0.00	74.15	44.30	24.92	332.34	92.78	15.29	94.74	129.53
2039	0.00	0.00	92.84	0.00	6.90	0.00	99.74	44.69	27.88	325.16	91.57	14.31	103.82	115.46
2040	0.00	0.00	10.66	0.00	0.00	0.00	10.66	44.74	28.99	313.46	89.54	24.29	105.26	94.38
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.74	28.32	303.94	88.01	27.39	107.75	80.78
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	45.00	28.32	296.10	86.65	29.24	110.56	69.65
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	45.39	28.32	288.00	85.24	28.97	115.68	58.11
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	45.70	34.16	278.71	83.65	43.00	114.74	37.33
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	46.33	37.12	268.69	82.22	47.58	117.53	21.37
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	46.38	38.25	262.52	80.82	54.17	122.13	5.40
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	37.36	253.38	79.40	54.85	129.18	-10.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.47	261.53	80.81	52.20	122.94	5.57
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	46.38	39.43	261.53	80.81	52.20	122.94	5.57
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	46.38	38.25	261.53	80.81	52.20	122.94	5.57
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	46.38	38.26	261.53	80.81	52.20	122.94	5.57
2052	0.00	0.00	0.00	0.00	25.36	1.08	26.43	46.38	38.27	261.53	80.81	52.20	122.94	5.57
2053	0.00	0.00	0.00	0.00	16.51	3.23	19.75	46.38	38.27	261.53	80.81	52.20	122.94	5.57
2054	0.00	0.00	0.00	0.00	14.11	3.23	17.35	46.38	38.27	261.53	80.81	52.20	122.94	5.57
2055	0.00	0.00	0.00	0.00	0.64	3.35	3.99	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	46.38	52.33	261.53	80.81	52.20	122.94	5.57
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	46.38	52.33	261.53	80.81	52.20	122.94	5.57
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	46.38	52.33	261.53	80.81	52.20	122.94	5.57
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	68.16	261.53	80.81	52.20	122.94	5.57
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2064	0.00	0.00	0.00	0.00	8.37	3.75	12.12	46.38	68.16	261.53	80.81	52.20	122.94	5.57
2065	0.00	0.00	0.00	0.00	6.95	2.16	9.11	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2066	0.00	0.00	0.00	0.00	0.84	2.19	3.03	46.38	68.16	261.53	80.81	52.20	122.94	5.57
2067	0.00	0.00	0.00	0.00	7.25	3.28	10.53	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2068	0.00	0.00	51.87	0.00	15.50	9.85	77.22	46.38	68.16	261.53	80.81	52.20	122.94	5.57
2069	0.00	0.00	70.56	0.00	26.41	9.85	106.82	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2070	0.00	0.00	10.66	0.00	1.96	10.22	22.84	46.38	54.10	261.53	80.81	52.20	122.94	5.57
2071	0.00	0.00	0.00	0.00	23.96	0.00	23.96	46.38	38.27	261.53	80.81	52.20	122.94	5.57
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	46.38	54.10	261.53	80.81	52.20	122.94	5.57
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	46.38	37.38	261.53	80.81	52.20	122.94	5.57
2074	0.00	0.00	62.88	0.00	44.58	0.00	107.46	46.38	52.33	261.53	80.81	52.20	122.94	5.57
2075	0.00	0.00	70.98	0.00	48.91	0.00	119.89	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	46.38	54.10	261.53	80.81	52.20	122.94	5.57
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	38.27	261.53	80.81	52.20	122.94	5.57
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	46.38	54.10	261.53	80.81	52.20	122.94	5.57
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	41.23	261.53	80.81	52.20	122.94	5.57
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	46.38	54.10	261.53	80.81	52.20	122.94	5.57
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2084	0.00	0.00	0.00	0.00	10.66	0.12	10.78	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2087	0.00	0.00	0.00	0.00	25.36	1.08	26.43	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2088	0.00	0.00	0.00	0.00	16.51	3.23	19.75	46.38	36.50	261.53	80.81	52.20	122.94	5.57
2089	0.00	0.00	0.00	0.00	13.47	3.23	16.70	46.38	39.46	261.53	80.81	52.20	122.94	5.57
2090	0.00	0.00	0.00	0.00	0.00	3.35	3.35	46.38	39.46	261.53	80.81	52.20	122.94	5.57
Salvage Value	0.79	0.00	1.49	0.00	2.91	0.36	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	88.42	0.00	307.65	46.64	6372.61	512.89	303.25	5894.05	1601.43	357.67	1552.41	2382.55

Net Present Value -4806

K19/Gas24/250MW

TABLE 262
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	3.87	229.11	1.16	0.00	240.15	105.07	15.82	82.48	36.77
2015	0.00	457.15	0.00	0.00	17.36	2.40	476.91	3.54	0.00	258.65	103.32	17.61	87.24	50.48
2016	0.00	602.85	0.00	0.00	22.96	2.91	628.72	6.69	0.00	265.48	101.40	18.19	88.83	57.07
2017	0.00	728.47	0.00	0.00	32.60	4.36	765.43	10.52	0.00	276.37	99.42	19.45	90.12	67.38
2018	0.00	512.16	0.00	0.00	32.01	13.09	557.26	13.30	0.00	264.49	96.75	21.93	89.65	56.15
2019	0.00	365.25	0.00	0.00	37.93	13.09	416.26	15.38	13.29	280.07	96.33	21.71	90.58	71.46
2020	0.00	148.71	0.37	0.00	0.01	13.57	162.66	16.19	13.51	417.64	104.82	14.14	88.37	210.31
2021	0.00	51.45	0.00	0.00	0.00	0.00	51.45	16.45	13.26	497.70	105.39	14.50	90.32	287.49
2022	0.00	0.00	73.33	0.00	0.00	0.00	73.33	16.71	13.48	498.58	103.89	14.32	91.14	289.23
2023	0.00	0.00	91.72	0.00	6.90	0.00	98.62	17.09	13.31	501.21	102.74	12.02	94.04	292.42
2024	0.00	0.00	10.49	0.00	0.00	0.00	10.49	17.14	17.33	509.37	100.82	18.75	98.05	291.76
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	17.14	17.11	374.00	98.52	13.92	94.73	166.83
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.14	16.68	355.31	96.25	16.06	96.37	146.62
2027	0.00	0.00	51.30	0.00	0.00	0.00	51.30	17.40	16.71	320.07	94.16	17.59	97.45	110.86
2028	0.00	0.00	71.91	0.00	54.34	0.00	126.25	18.02	16.77	309.59	92.30	20.54	100.23	96.52
2029	0.00	0.00	113.91	0.00	0.00	0.00	113.91	18.59	23.61	303.50	90.50	28.26	102.44	82.29
2030	0.00	0.00	148.74	0.00	0.00	0.00	148.74	19.33	19.59	302.65	89.58	30.85	103.78	78.44
2031	0.00	0.00	66.35	0.00	6.90	0.00	73.25	19.70	19.59	310.24	90.07	26.31	103.27	90.59
2032	0.00	0.00	4.86	0.00	0.00	0.00	4.86	19.72	26.66	319.15	87.59	54.74	101.87	74.96
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.72	26.66	311.52	86.02	59.39	104.46	61.65
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.72	26.67	304.20	84.51	64.98	106.92	47.80
2035	0.00	0.00	103.99	0.00	0.00	0.00	103.99	20.24	26.00	231.88	82.47	62.17	104.72	-17.49
2036	0.00	0.00	149.64	0.00	0.00	0.00	149.64	20.99	26.01	209.76	80.96	67.05	105.44	-43.70
2037	0.00	0.00	66.75	0.00	0.00	0.00	66.75	21.32	26.01	211.64	81.35	61.45	104.22	-35.38
2038	0.00	0.00	109.19	0.00	0.00	0.00	109.19	21.87	33.08	213.00	78.94	89.44	105.08	-60.47
2039	0.00	0.00	150.09	0.00	0.00	0.00	150.09	22.62	36.03	206.79	77.53	98.63	114.60	-83.97
2040	0.00	0.00	66.95	0.00	45.72	0.00	112.67	23.18	33.08	202.20	76.87	101.37	115.37	-91.40
2041	0.00	0.00	4.90	0.00	0.00	0.00	4.90	23.21	40.15	206.87	75.05	128.66	114.95	-111.79
2042	0.00	0.00	104.72	0.00	0.00	0.00	104.72	23.73	40.15	198.06	73.27	141.87	118.56	-135.64
2043	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.49	40.15	189.88	71.90	151.23	121.23	-154.49
2044	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.82	41.93	184.28	71.32	154.66	121.94	-163.64
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	24.85	49.00	186.11	69.11	191.49	122.47	-196.96
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	49.01	189.47	69.17	190.40	122.86	-192.95
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	48.12	176.60	67.30	208.52	126.70	-225.92
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	24.85	50.20	184.06	68.53	196.80	124.01	-205.28
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2052	0.00	0.00	51.04	0.00	25.36	1.08	77.48	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2053	0.00	0.00	69.44	0.00	16.51	3.23	89.18	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2054	0.00	0.00	10.49	0.00	13.47	3.23	27.20	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2055	0.00	0.00	0.00	0.00	0.00	3.35	3.35	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2057	0.00	0.00	51.30	0.00	0.00	0.00	51.30	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2058	0.00	0.00	69.79	0.00	6.90	0.00	76.69	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2059	0.00	0.00	113.91	0.00	0.00	0.00	113.91	24.85	50.20	184.06	68.53	196.80	124.01	-205.28
2060	0.00	0.00	148.74	0.00	0.00	0.00	148.74	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2061	0.00	0.00	66.35	0.00	0.00	0.00	66.35	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2062	0.00	0.00	4.86	0.00	0.00	0.00	4.86	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2063	0.00	0.00	0.00	0.00	40.76	2.86	43.62	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2064	0.00	0.00	0.00	0.00	8.37	3.75	12.12	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2065	0.00	0.00	103.99	0.00	6.95	2.16	113.10	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2066	0.00	0.00	149.64	0.00	7.74	2.19	159.56	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2067	0.00	0.00	66.75	0.00	7.25	3.28	77.28	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2068	0.00	0.00	109.19	0.00	15.50	9.85	134.55	24.85	63.07	184.06	68.53	196.80	124.01	-205.28
2069	0.00	0.00	150.09	0.00	24.45	9.85	184.40	24.85	50.20	184.06	68.53	196.80	124.01	-205.28
2070	0.00	0.00	66.95	0.00	0.01	10.22	77.18	24.85	49.02	184.06	68.53	196.80	124.01	-205.28
2071	0.00	0.00	4.90	0.00	0.00	0.00	4.90	24.85	49.02	184.06	68.53	196.80	124.01	-205.28
2072	0.00	0.00	104.72	0.00	0.00	0.00	104.72	24.85	49.02	184.06	68.53	196.80	124.01	-205.28
2073	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.85	48.13	184.06	68.53	196.80	124.01	-205.28
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2075	0.00	0.00	4.92	0.00	34.29	0.00	39.21	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2078	0.00	0.00	0.00	0.00	13.59	0.00	13.59	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	50.20	184.06	68.53	196.80	124.01	-205.28
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2082	0.00	0.00	51.04	0.00	0.00	0.00	51.04	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2083	0.00	0.00	69.44	0.00	0.00	0.00	69.44	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2084	0.00	0.00	10.49	0.00	10.66	0.12	21.27	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2087	0.00	0.00	51.30	0.00	25.36	1.08	77.73	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2088	0.00	0.00	69.79	0.00	16.51	3.23	89.53	24.85	47.24	184.06	68.53	196.80	124.01	-205.28
2089	0.00	0.00	10.54	0.00	13.47	3.23	27.25	24.85	50.20	184.06	68.53	196.80	124.01	-205.28
2090	0.00	0.00	0.00	0.00	11.43	3.35	14.78	24.85	50.20	184.06	68.53	196.80	124.01	-205.28
Salvage Value	0.00	0.00	5.34	0.00	1.58	0.36	7.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	546.72	0.00	187.31	46.64	3350.42	262.26	309.00	4888.63	1493.91	893.48	1617.31	883.93

Net Present Value -3038

K19/C31/250MW

TABLE 263
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	206.20	0.00	0.00	19.04	3.87	259.48	1.31	0.00	240.15	105.07	15.82	82.48	36.77
2015	38.25	457.15	0.00	0.00	17.36	2.40	515.16	3.89	0.00	258.65	103.32	17.61	87.24	50.48
2016	10.75	602.85	0.00	0.00	22.96	2.91	639.47	7.08	0.00	265.48	101.40	18.19	88.83	57.07
2017	10.78	728.47	0.00	0.00	32.60	4.36	776.21	10.97	0.00	276.37	99.42	19.45	90.12	67.38
2018	12.78	512.16	0.00	0.00	32.01	13.09	570.04	13.82	0.00	264.49	96.75	21.93	89.65	56.15
2019	12.81	365.25	0.00	0.00	37.93	13.09	429.08	15.96	13.29	280.07	96.33	21.71	90.58	71.46
2020	12.85	148.71	0.37	0.00	0.01	13.57	175.51	16.84	13.51	417.64	104.82	14.14	88.37	210.31
2021	16.21	51.45	0.00	0.00	0.00	0.00	67.66	17.18	13.26	497.70	105.39	14.50	90.32	287.49
2022	152.49	0.00	73.33	0.00	0.00	0.00	225.82	18.19	13.48	498.51	103.88	14.34	91.15	289.13
2023	234.24	0.00	91.72	0.00	6.90	0.00	332.86	19.75	13.31	500.91	102.70	12.12	94.16	291.92
2024	251.18	0.00	10.49	0.00	0.00	0.00	261.67	21.05	17.33	508.96	100.78	18.86	98.23	291.08
2025	253.97	0.00	0.00	0.00	2.60	0.00	256.57	22.34	17.11	373.31	98.49	14.03	94.92	165.88
2026	684.03	0.00	0.00	0.00	2.60	0.00	686.63	25.77	16.68	354.66	96.24	16.21	96.59	145.61
2027	1082.05	0.00	51.30	0.00	31.66	0.00	1165.01	31.60	16.71	318.99	94.15	17.87	97.63	109.34
2028	968.69	0.00	69.79	0.00	23.47	0.00	1061.95	36.91	16.77	308.02	92.22	21.03	100.62	94.14
2029	689.74	0.00	10.54	0.00	27.94	0.00	728.23	40.55	23.60	301.51	90.47	28.89	102.84	79.31
2030	476.30	0.00	0.00	0.00	48.59	0.00	524.89	43.17	19.58	313.39	91.49	25.40	100.37	96.13
2031	311.94	0.00	0.00	0.00	64.31	0.00	376.25	45.05	34.19	347.83	94.66	20.53	86.82	145.81
2032	114.56	0.00	0.00	0.00	75.32	0.00	189.88	46.00	34.42	447.87	101.61	20.31	84.87	241.08
2033	36.05	0.00	0.00	0.00	0.00	0.00	36.05	46.18	34.27	466.99	101.77	21.01	89.40	254.81
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	34.50	451.00	100.00	21.54	90.17	239.29
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.65	398.35	98.29	21.80	89.30	188.95
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.60	374.96	96.68	22.27	89.38	166.63
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.42	356.66	94.78	23.16	90.97	147.75
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.05	336.47	92.81	24.11	93.39	126.17
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	36.08	321.82	90.90	26.50	102.66	101.76
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.24	311.71	89.13	30.04	105.58	86.96
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	36.02	301.10	87.47	34.22	108.47	70.95
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	46.18	33.06	297.89	86.59	34.89	109.98	66.43
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.06	290.29	85.23	34.63	114.71	55.71
2044	0.00	0.00	52.18	0.00	0.00	0.00	52.18	46.44	34.84	278.81	83.66	42.99	114.75	37.41
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	47.07	34.84	268.73	82.22	47.55	117.53	21.43
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.12	38.92	262.56	80.83	54.15	122.12	5.46
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	37.36	253.38	79.40	54.85	129.18	-10.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	36.47	261.56	80.82	52.19	122.94	5.61
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	47.12	39.43	261.56	80.82	52.19	122.94	5.61
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	47.12	36.48	261.56	80.82	52.19	122.94	5.61
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	47.12	39.44	261.56	80.82	52.19	122.94	5.61
2052	0.00	0.00	51.04	0.00	25.36	1.08	77.48	47.12	36.49	261.56	80.82	52.19	122.94	5.61
2053	0.00	0.00	69.44	0.00	16.51	3.23	89.18	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2054	0.00	0.00	10.49	0.00	13.47	3.23	27.20	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2055	0.00	0.00	0.00	0.00	0.00	3.35	3.35	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2057	0.00	0.00	51.30	0.00	0.00	0.00	51.30	47.12	38.27	261.56	80.82	52.19	122.94	5.61
2058	0.00	0.00	69.79	0.00	6.90	0.00	76.69	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2059	0.00	0.00	10.54	0.00	0.00	0.00	10.54	47.12	41.23	261.56	80.82	52.19	122.94	5.61
2060	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2061	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.12	39.46	261.56	80.82	52.19	122.94	5.61
2062	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2063	0.00	0.00	0.00	0.00	10.75	2.86	13.62	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2064	0.00	0.00	0.00	0.00	14.79	3.75	18.54	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2065	0.00	0.00	0.00	0.00	17.86	2.16	20.02	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2066	0.00	0.00	0.00	0.00	16.23	2.19	18.42	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2067	0.00	0.00	0.00	0.00	25.85	3.28	29.14	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2068	0.00	0.00	0.00	0.00	15.50	9.85	25.35	47.12	68.16	261.56	80.82	52.19	122.94	5.61
2069	0.00	0.00	0.00	0.00	24.45	9.85	34.31	47.12	39.46	261.56	80.82	52.19	122.94	5.61
2070	0.00	0.00	0.00	0.00	0.01	10.22	10.23	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	41.23	261.56	80.82	52.19	122.94	5.61
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	37.38	261.56	80.82	52.19	122.94	5.61
2074	0.00	0.00	52.18	0.00	0.00	0.00	52.18	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2075	0.00	0.00	70.98	0.00	1.96	0.00	72.94	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2076	0.00	0.00	10.72	0.00	1.96	0.00	12.68	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2077	0.00	0.00	0.00	0.00	23.96	0.00	23.96	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2078	0.00	0.00	0.00	0.00	12.72	0.00	12.72	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2079	0.00	0.00	0.00	0.00	21.53	0.00	21.53	47.12	39.46	261.56	80.82	52.19	122.94	5.61
2080	0.00	0.00	0.00	0.00	78.44	0.00	78.44	47.12	52.33	261.56	80.82	52.19	122.94	5.61
2081	0.00	0.00	0.00	0.00	48.91	0.00	48.91	47.12	39.46	261.56	80.82	52.19	122.94	5.61
2082	0.00	0.00	51.04	0.00	56.72	0.00	107.76	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2083	0.00	0.00	69.44	0.00	0.00	0.00	69.44	47.12	38.27	261.56	80.82	52.19	122.94	5.61
2084	0.00	0.00	10.49	0.00	10.66	0.12	21.27	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	47.12	38.27	261.56	80.82	52.19	122.94	5.61
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	47.12	54.10	261.56	80.82	52.19	122.94	5.61
2087	0.00	0.00	51.30	0.00	25.36	1.08	77.73	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2088	0.00	0.00	69.79	0.00	16.51	3.23	89.53	47.12	36.50	261.56	80.82	52.19	122.94	5.61
2089	0.00	0.00	10.54	0.00	13.47	3.23	27.25	47.12	39.46	261.56	80.82	52.19	122.94	5.61
2090	0.00	0.00	0.00	0.00	0.00	3.35	3.35	47.12	39.46	261.56	80.82	52.19	122.94	5.61
Salvage Value	5.74	0.00	2.63	0.00	3.20	0.36	11.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2399.77	2569.75	200.69	0.00	264.30	46.64	5481.14	437.84	302.94	5459.81	1564.84	392.16	1571.02	1931.77

Net Present Value -4290

All Gas

TABLE 264
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	266.71	101.39	18.22	88.79	58.31
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	279.77	99.77	18.74	89.52	71.76
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	268.64	97.01	20.92	90.08	60.64
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	262.30	94.99	18.71	89.73	58.87
2020	0.00	0.00	73.22	0.00	0.00	0.00	73.22	0.78	0.00	268.26	94.88	13.34	91.62	68.42
2021	0.00	0.00	91.63	0.00	6.90	0.00	98.53	1.16	0.00	268.97	93.05	12.59	96.78	66.55
2022	0.00	0.00	10.47	0.00	0.00	0.00	10.47	1.21	4.07	263.07	90.80	22.33	98.31	51.63
2023	0.00	0.00	51.10	0.00	0.00	0.00	51.10	1.47	4.07	259.98	88.54	27.51	103.62	40.31
2024	0.00	0.00	71.63	0.00	54.34	0.00	125.97	2.09	4.07	265.82	86.96	32.20	109.94	36.72
2025	0.00	0.00	10.50	0.00	0.00	0.00	10.50	2.14	8.16	171.64	86.40	27.02	101.75	-43.53
2026	0.00	0.00	51.25	0.00	0.00	0.00	51.25	2.39	8.16	157.37	85.07	27.51	102.43	-57.64
2027	0.00	0.00	69.72	0.00	0.00	0.00	69.72	2.74	8.16	146.77	83.19	27.70	108.92	-73.05
2028	0.00	0.00	113.80	0.00	0.00	0.00	113.80	3.31	12.23	138.81	81.24	42.35	108.51	-93.29
2029	0.00	0.00	148.60	0.00	0.00	0.00	148.60	4.06	12.23	128.75	79.78	48.04	110.51	-109.58
2030	0.00	0.00	66.29	0.00	6.90	0.00	73.19	4.42	12.24	135.65	80.64	44.16	108.10	-97.25
2031	0.00	0.00	4.86	0.00	0.00	0.00	4.86	4.45	19.31	142.86	78.28	73.37	105.30	-114.09
2032	0.00	0.00	51.56	0.00	0.00	0.00	51.56	4.70	19.32	128.83	76.35	80.81	108.79	-137.12
2033	0.00	0.00	70.13	0.00	45.72	0.00	115.85	5.28	19.32	116.52	74.61	89.51	111.82	-159.41
2034	0.00	0.00	114.49	0.00	0.00	0.00	114.49	5.85	23.40	108.02	73.17	101.71	113.94	-180.79
2035	0.00	0.00	149.49	0.00	0.00	0.00	149.49	6.60	23.40	100.20	72.22	108.16	114.85	-195.03
2036	0.00	0.00	66.69	0.00	0.00	0.00	66.69	6.94	23.40	99.20	72.11	105.51	118.26	-196.67
2037	0.00	0.00	109.08	0.00	0.00	0.00	109.08	7.48	30.46	97.11	70.16	133.32	112.40	-218.78
2038	0.00	0.00	149.94	0.00	0.00	0.00	149.94	8.23	30.47	88.22	68.91	143.90	115.43	-240.02
2039	0.00	0.00	66.89	0.00	0.00	0.00	66.89	8.57	30.48	84.76	68.76	146.13	122.04	-252.17
2040	0.00	0.00	4.90	0.00	0.00	0.00	4.90	8.59	37.55	84.03	66.94	170.25	121.05	-274.20
2041	0.00	0.00	104.62	0.00	0.00	0.00	104.62	9.11	37.55	78.23	65.12	190.33	125.92	-303.15
2042	0.00	0.00	150.54	0.00	0.00	0.00	150.54	9.87	37.55	75.79	64.03	206.64	128.54	-323.42
2043	0.00	0.00	67.15	0.00	45.72	0.00	112.87	10.43	37.55	76.18	63.94	210.68	128.59	-327.03
2044	0.00	0.00	4.92	0.00	0.00	0.00	4.92	10.45	44.63	76.34	62.47	235.07	127.23	-348.44
2045	0.00	0.00	22.98	0.00	0.00	0.00	22.98	10.57	44.63	71.13	60.89	257.49	130.78	-378.03
2046	0.00	0.00	31.25	0.00	0.00	0.00	31.25	10.73	44.63	67.81	59.74	275.42	134.09	-401.45
2047	0.00	0.00	4.72	0.00	0.00	0.00	4.72	10.75	46.11	63.30	58.87	289.87	136.22	-421.67
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.11	67.41	59.84	274.26	133.70	-400.38
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	10.75	46.12	67.41	59.84	274.26	133.70	-400.38
2050	0.00	0.00	50.94	0.00	10.08	0.00	61.02	10.75	46.12	67.41	59.84	274.26	133.70	-400.38
2051	0.00	0.00	69.30	0.00	10.08	0.00	79.38	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2052	0.00	0.00	10.47	0.00	10.08	0.00	20.55	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2053	0.00	0.00	51.10	0.00	0.00	0.00	51.10	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2054	0.00	0.00	69.51	0.00	0.00	0.00	69.51	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2055	0.00	0.00	10.50	0.00	0.00	0.00	10.50	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2056	0.00	0.00	51.25	0.00	6.90	0.00	58.15	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2057	0.00	0.00	69.72	0.00	0.00	0.00	69.72	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2058	0.00	0.00	113.80	0.00	0.00	0.00	113.80	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2059	0.00	0.00	148.60	0.00	40.76	0.00	189.35	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2060	0.00	0.00	66.29	0.00	0.00	0.00	66.29	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2061	0.00	0.00	4.86	0.00	0.00	0.00	4.86	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2062	0.00	0.00	51.56	0.00	0.00	0.00	51.56	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2063	0.00	0.00	70.13	0.00	0.00	0.00	70.13	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2064	0.00	0.00	114.49	0.00	0.00	0.00	114.49	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2065	0.00	0.00	149.49	0.00	6.90	0.00	156.39	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2066	0.00	0.00	66.69	0.00	0.00	0.00	66.69	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2067	0.00	0.00	109.08	0.00	0.00	0.00	109.08	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2068	0.00	0.00	149.94	0.00	34.29	0.00	184.23	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2069	0.00	0.00	66.89	0.00	0.00	0.00	66.89	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2070	0.00	0.00	4.90	0.00	0.00	0.00	4.90	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2071	0.00	0.00	104.62	0.00	0.00	0.00	104.62	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2072	0.00	0.00	150.54	0.00	0.00	0.00	150.54	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2073	0.00	0.00	67.15	0.00	0.00	0.00	67.15	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2074	0.00	0.00	4.92	0.00	13.59	0.00	18.50	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2075	0.00	0.00	22.98	0.00	0.00	0.00	22.98	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2076	0.00	0.00	31.25	0.00	0.00	0.00	31.25	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2077	0.00	0.00	4.72	0.00	0.00	0.00	4.72	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2078	0.00	0.00	0.00	0.00	34.29	0.00	34.29	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2080	0.00	0.00	50.94	0.00	0.00	0.00	50.94	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2081	0.00	0.00	69.30	0.00	0.00	0.00	69.30	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2082	0.00	0.00	10.47	0.00	0.00	0.00	10.47	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2083	0.00	0.00	51.10	0.00	11.43	0.00	62.52	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2084	0.00	0.00	69.51	0.00	10.08	0.00	79.59	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2085	0.00	0.00	10.50	0.00	10.08	0.00	20.58	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2086	0.00	0.00	51.25	0.00	10.08	0.00	61.33	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2087	0.00	0.00	69.72	0.00	10.08	0.00	79.79	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2088	0.00	0.00	10.53	0.00	0.00	0.00	10.53	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	67.41	59.84	274.26	133.70	-400.38
Salvage Value	0.00	0.00	22.70	0.00	0.81	0.00	23.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	712.65	0.00	102.94	0.00	879.91	61.35	224.68	3021.38	1374.15	1279.18	1705.40	-1337.35

Net Present Value -2503

Wind/Gas

TABLE 265
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	266.71	101.39	18.22	88.79	58.31
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	279.78	99.77	18.74	89.52	71.77
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	268.64	97.01	20.92	90.08	60.64
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	262.30	94.99	18.71	89.73	58.87
2020	0.00	0.00	0.00	7.22	10.78	0.00	18.00	0.61	0.00	265.78	94.45	14.43	91.95	64.95
2021	0.00	0.00	0.37	220.30	17.97	0.00	238.64	1.80	0.00	265.98	92.61	13.95	96.71	62.70
2022	0.00	0.00	0.00	224.43	21.71	0.00	246.14	3.04	6.34	269.34	90.94	14.06	96.78	67.56
2023	0.00	0.00	124.47	217.21	11.36	0.00	353.04	4.69	12.69	273.07	88.41	16.15	100.21	68.30
2024	0.00	0.00	161.34	4.12	19.13	0.00	184.59	5.50	19.03	287.74	86.51	16.53	106.15	78.55
2025	0.00	0.00	21.00	3.61	3.46	0.00	28.07	5.64	27.18	200.86	86.49	18.85	97.03	-1.52
2026	0.00	0.00	51.25	110.15	8.70	0.00	170.10	6.49	27.18	190.05	85.48	17.90	96.89	-10.23
2027	0.00	0.00	71.84	112.21	68.17	0.00	252.22	7.74	30.35	181.03	83.13	21.80	98.79	-22.69
2028	0.00	0.00	10.53	112.21	19.16	0.00	141.91	8.45	37.60	181.02	81.34	28.19	101.21	-29.72
2029	0.00	0.00	51.40	112.21	19.24	0.00	182.85	9.37	40.78	176.25	79.73	30.40	103.01	-36.89
2030	0.00	0.00	69.92	112.21	19.24	0.00	201.37	10.37	43.95	177.50	78.81	31.86	103.51	-36.68
2031	0.00	0.00	62.07	112.21	19.24	0.00	193.52	11.34	51.19	177.81	77.58	37.72	104.29	-41.77
2032	0.00	0.00	70.06	112.21	64.95	0.00	247.23	12.58	54.37	175.32	76.44	38.04	106.17	-45.34
2033	0.00	0.00	10.59	112.21	19.24	0.00	142.04	13.29	61.63	177.64	75.77	40.15	107.15	-45.42
2034	0.00	0.00	51.66	112.21	19.24	0.00	183.11	14.20	64.81	169.53	73.95	46.46	108.18	-59.07
2035	0.00	0.00	70.28	112.21	19.24	0.00	201.72	15.21	67.99	161.56	72.28	50.52	110.11	-71.35
2036	0.00	0.00	62.38	112.21	19.24	0.00	193.83	16.18	75.23	157.95	70.91	58.25	111.46	-82.66
2037	0.00	0.00	70.42	112.21	19.24	0.00	201.87	17.19	78.41	152.02	69.61	61.82	113.60	-93.02
2038	0.00	0.00	62.51	112.21	19.24	0.00	193.96	18.16	85.66	150.60	68.56	67.99	115.94	-101.89
2039	0.00	0.00	70.56	112.21	64.95	0.00	247.72	19.40	88.84	145.27	67.41	66.97	127.72	-116.83
2040	0.00	0.00	10.66	119.43	19.24	0.00	149.33	20.14	96.10	145.84	66.58	70.63	130.79	-122.15
2041	0.00	0.00	52.02	332.52	19.24	0.00	403.78	22.16	99.28	136.32	65.07	83.18	128.87	-140.80
2042	0.00	0.00	70.77	336.64	19.24	0.00	426.64	24.30	102.45	129.00	63.70	89.21	132.12	-156.03
2043	0.00	0.00	62.82	329.42	19.09	0.00	411.34	26.35	109.69	125.41	62.52	98.95	134.32	-170.39
2044	0.00	0.00	70.91	116.34	18.66	0.00	205.91	27.38	112.87	121.80	61.57	102.63	137.12	-179.52
2045	0.00	0.00	33.69	115.82	17.51	0.00	167.02	28.22	120.12	119.63	60.48	108.79	142.34	-191.99
2046	0.00	0.00	31.25	218.76	15.77	0.00	265.78	29.55	123.30	116.41	59.44	109.24	150.16	-202.43
2047	0.00	0.00	4.72	114.28	10.53	0.00	129.53	30.19	127.95	111.77	58.37	113.19	151.66	-211.45
2048	0.00	0.00	0.00	112.21	5.41	0.00	117.62	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2049	0.00	0.00	0.00	112.21	10.15	0.00	122.36	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2050	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2051	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2052	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2053	0.00	0.00	102.19	112.21	0.00	0.00	214.40	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2054	0.00	0.00	139.01	112.21	0.00	0.00	251.23	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2055	0.00	0.00	21.00	112.21	2.70	0.00	135.91	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2056	0.00	0.00	51.25	112.21	4.49	0.00	167.96	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2057	0.00	0.00	69.72	112.21	5.46	0.00	187.39	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2058	0.00	0.00	10.53	112.21	3.06	0.00	125.80	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2059	0.00	0.00	51.40	112.21	15.35	0.00	178.97	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2060	0.00	0.00	69.92	119.43	1.51	0.00	190.87	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2061	0.00	0.00	62.07	332.52	2.43	0.00	397.02	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2062	0.00	0.00	70.06	336.64	44.27	0.00	450.97	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2063	0.00	0.00	10.59	329.42	4.81	0.00	344.82	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2064	0.00	0.00	51.66	116.34	4.81	0.00	172.81	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2065	0.00	0.00	70.28	115.82	4.81	0.00	190.91	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2066	0.00	0.00	62.38	218.76	4.81	0.00	285.95	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2067	0.00	0.00	70.42	114.28	39.10	0.00	223.79	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2068	0.00	0.00	62.51	112.21	4.81	0.00	179.53	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2069	0.00	0.00	70.56	112.21	4.81	0.00	187.58	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2070	0.00	0.00	10.66	112.21	12.90	0.00	135.77	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2071	0.00	0.00	52.02	112.21	18.29	0.00	182.53	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2072	0.00	0.00	70.77	112.21	21.06	0.00	204.04	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2073	0.00	0.00	62.82	112.21	13.11	0.00	188.15	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2074	0.00	0.00	70.91	112.21	42.88	0.00	226.00	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2075	0.00	0.00	33.69	112.21	6.76	0.00	152.66	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2076	0.00	0.00	31.25	112.21	11.08	0.00	154.55	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2077	0.00	0.00	4.72	112.21	28.71	0.00	145.65	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2078	0.00	0.00	0.00	112.21	19.09	0.00	131.31	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2079	0.00	0.00	0.00	112.21	18.88	0.00	131.09	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2080	0.00	0.00	0.00	119.43	18.59	0.00	138.02	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2081	0.00	0.00	0.00	332.52	17.72	0.00	350.24	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2082	0.00	0.00	0.00	336.64	28.24	0.00	364.88	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2083	0.00	0.00	102.19	329.42	15.73	0.00	447.34	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2084	0.00	0.00	139.01	116.34	24.43	0.00	279.78	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2085	0.00	0.00	21.00	115.82	24.29	0.00	161.12	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2086	0.00	0.00	51.25	218.76	23.42	0.00	293.43	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2087	0.00	0.00	69.72	114.28	22.56	0.00	206.55	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2088	0.00	0.00	10.53	112.21	8.15	0.00	130.90	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2089	0.00	0.00	0.00	108.61	15.54	0.00	124.15	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
2090	0.00	0.00	0.00	2.06	0.07	0.00	2.13	30.19	127.95	115.94	59.43	110.41	148.06	-201.95
Salvage Value	0.00	0.00	5.23	14.12	2.97	0.00	22.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	534.25	1420.96	252.38	0.00	2271.91	154.27	641.69	3423.27	1371.11	641.94	1715.01	-304.78

Net Present Value -3373

K22/Gas

TABLE 266
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	102.05	0.00	0.00	10.08	0.00	112.13	0.56	0.00	240.54	105.06	15.80	82.47	37.21
2015	0.00	30.48	0.00	0.00	10.82	0.00	41.30	0.77	0.00	259.79	103.30	17.62	87.22	51.64
2016	0.00	26.48	0.00	0.00	10.88	0.00	37.37	0.95	0.00	266.46	101.39	18.22	88.81	58.05
2017	0.00	196.98	0.00	0.00	23.98	0.00	220.95	2.06	0.00	279.18	99.78	18.74	89.55	71.12
2018	0.00	383.04	0.00	0.00	7.13	0.00	390.17	4.01	0.00	267.36	97.02	20.93	90.12	59.29
2019	0.00	622.95	0.00	0.00	12.41	0.00	635.36	7.19	0.00	260.99	95.00	18.71	89.76	57.53
2020	0.00	691.73	0.00	0.00	22.58	0.00	714.30	10.76	0.00	262.88	94.28	14.85	92.13	61.62
2021	0.00	563.84	0.00	0.00	32.03	0.00	595.87	13.74	0.00	264.39	92.56	14.25	97.41	60.17
2022	0.00	326.51	0.00	0.00	37.93	0.00	364.43	15.56	13.29	267.77	92.54	16.25	92.82	66.16
2023	0.00	151.35	0.00	0.00	0.01	0.00	151.35	16.32	13.51	357.52	98.28	16.17	90.43	152.65
2024	0.00	52.18	0.00	0.00	0.00	0.00	52.18	16.58	13.21	385.15	98.08	18.42	96.23	172.42
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	16.58	13.43	302.65	97.96	12.94	91.13	100.61
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.58	13.26	289.19	96.07	13.10	92.30	87.71
2027	0.00	0.00	73.58	0.00	0.00	0.00	73.58	16.83	13.21	249.07	94.20	12.54	91.62	50.72
2028	0.00	0.00	92.11	0.00	6.90	0.00	99.01	17.22	12.96	236.57	92.60	13.07	93.23	37.67
2029	0.00	0.00	10.54	0.00	0.00	0.00	10.54	17.27	16.59	232.70	91.71	16.16	93.30	31.52
2030	0.00	0.00	51.45	0.00	0.00	0.00	51.45	17.53	16.59	225.45	89.99	19.59	94.97	20.90
2031	0.00	0.00	175.69	0.00	54.34	0.00	230.04	18.67	16.64	217.33	88.33	22.49	97.35	9.17
2032	0.00	0.00	159.62	0.00	0.00	0.00	159.62	19.46	23.48	210.98	86.70	30.57	99.68	-5.97
2033	0.00	0.00	66.49	0.00	6.90	0.00	73.39	19.83	19.46	214.23	86.80	26.75	99.87	0.81
2034	0.00	0.00	4.87	0.00	0.00	0.00	4.87	19.86	26.52	220.53	84.42	54.16	98.25	-16.31
2035	0.00	0.00	103.99	0.00	0.00	0.00	103.99	20.38	26.52	205.84	82.33	59.46	100.86	-36.81
2036	0.00	0.00	149.64	0.00	0.00	0.00	149.64	21.12	26.53	197.36	80.81	66.06	103.02	-52.53
2037	0.00	0.00	66.75	0.00	0.00	0.00	66.75	21.46	26.53	199.02	81.20	60.03	101.87	-44.07
2038	0.00	0.00	109.19	0.00	0.00	0.00	109.19	22.00	32.93	199.01	78.82	86.10	102.77	-68.68
2039	0.00	0.00	150.09	0.00	0.00	0.00	150.09	22.75	32.94	192.67	77.43	95.02	112.20	-91.99
2040	0.00	0.00	66.95	0.00	45.72	0.00	112.67	23.32	32.94	189.70	76.91	97.29	112.53	-97.04
2041	0.00	0.00	4.90	0.00	0.00	0.00	4.90	23.34	40.02	193.04	74.99	124.39	112.37	-118.71
2042	0.00	0.00	104.72	0.00	0.00	0.00	104.72	23.87	42.97	184.02	73.18	138.43	115.92	-143.51
2043	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.62	40.02	176.40	71.81	148.49	118.58	-162.47
2044	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.96	40.02	173.69	71.35	151.87	118.94	-168.48
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	24.98	47.09	177.75	69.80	181.06	117.57	-190.68
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.09	172.15	68.56	193.07	121.00	-210.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	48.87	164.59	67.20	206.82	123.96	-233.39
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	48.88	171.50	68.52	193.65	120.84	-211.52
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	48.88	171.50	68.52	193.65	120.84	-211.52
2050	0.00	0.00	0.00	0.00	10.41	0.00	10.41	24.98	47.99	171.50	68.52	193.65	120.84	-211.52
2051	0.00	0.00	0.00	0.00	10.45	0.00	10.45	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2052	0.00	0.00	0.00	0.00	10.46	0.00	10.46	24.98	50.06	171.50	68.52	193.65	120.84	-211.52
2053	0.00	0.00	0.00	0.00	0.35	0.00	0.35	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2054	0.00	0.00	0.00	0.00	11.52	0.00	11.52	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2055	0.00	0.00	0.00	0.00	15.28	0.00	15.28	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2056	0.00	0.00	0.00	0.00	16.51	0.00	16.51	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2057	0.00	0.00	51.30	0.00	13.47	0.00	64.77	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2058	0.00	0.00	69.79	0.00	0.00	0.00	69.79	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2059	0.00	0.00	10.54	0.00	0.00	0.00	10.54	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2060	0.00	0.00	51.45	0.00	0.00	0.00	51.45	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2061	0.00	0.00	173.57	0.00	0.00	0.00	173.57	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2062	0.00	0.00	159.62	0.00	0.00	0.00	159.62	24.98	50.06	171.50	68.52	193.65	120.84	-211.52
2063	0.00	0.00	66.49	0.00	6.90	0.00	73.39	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2064	0.00	0.00	4.87	0.00	0.00	0.00	4.87	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2065	0.00	0.00	103.99	0.00	0.41	0.00	104.40	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2066	0.00	0.00	149.64	0.00	41.19	0.00	190.83	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2067	0.00	0.00	66.75	0.00	13.52	0.00	80.27	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2068	0.00	0.00	109.19	0.00	13.68	0.00	122.87	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2069	0.00	0.00	150.09	0.00	0.89	0.00	150.98	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2070	0.00	0.00	66.95	0.00	7.30	0.00	74.25	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2071	0.00	0.00	4.90	0.00	15.51	0.00	20.42	24.98	62.94	171.50	68.52	193.65	120.84	-211.52
2072	0.00	0.00	104.72	0.00	24.45	0.00	129.18	24.98	50.06	171.50	68.52	193.65	120.84	-211.52
2073	0.00	0.00	150.69	0.00	0.01	0.00	150.70	24.98	48.88	171.50	68.52	193.65	120.84	-211.52
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.98	48.88	171.50	68.52	193.65	120.84	-211.52
2075	0.00	0.00	4.92	0.00	34.29	0.00	39.21	24.98	48.88	171.50	68.52	193.65	120.84	-211.52
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.99	171.50	68.52	193.65	120.84	-211.52
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2081	0.00	0.00	0.00	0.00	13.59	0.00	13.59	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	50.06	171.50	68.52	193.65	120.84	-211.52
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2087	0.00	0.00	51.30	0.00	10.08	0.00	61.38	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2088	0.00	0.00	69.79	0.00	0.00	0.00	69.79	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2089	0.00	0.00	10.54	0.00	0.00	0.00	10.54	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
2090	0.00	0.00	0.00	0.00	11.43	0.00	11.43	24.98	47.10	171.50	68.52	193.65	120.84	-211.52
Salvage Value	0.00	0.00	4.68	0.00	1.22	0.00	5.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2217.37	488.31	0.00	168.48	0.00	2874.16	224.78	263.16	3976.67	1466.63	842.75	1586.62	80.66

Net Present Value: -3281

K22/C29

TABLE 267
ECONOMIC SUMMARY
NFAT 2012

Energy Price	Low
Discount Rate	High
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	102.05	0.00	0.00	10.08	0.00	142.51	0.71	0.00	240.54	105.06	15.80	82.47	37.21
2015	38.78	30.48	0.00	0.00	10.82	0.00	80.08	1.11	0.00	259.79	103.30	17.62	87.22	51.64
2016	11.28	26.48	0.00	0.00	10.88	0.00	48.65	1.36	0.00	266.46	101.39	18.22	88.81	58.05
2017	11.98	196.98	0.00	0.00	23.98	0.00	232.94	2.52	0.00	279.18	99.78	18.74	89.55	71.12
2018	12.02	383.04	0.00	0.00	7.13	0.00	402.19	4.53	0.00	267.36	97.02	20.93	90.12	59.29
2019	14.33	622.95	0.00	0.00	12.41	0.00	649.69	7.78	0.00	260.99	95.00	18.71	89.76	57.53
2020	154.77	691.73	0.00	0.00	22.58	0.00	869.07	12.13	0.00	262.88	94.28	14.85	92.13	61.62
2021	236.04	563.84	0.00	0.00	32.03	0.00	831.91	16.29	0.00	264.26	92.56	14.25	97.51	59.95
2022	249.69	326.51	0.00	0.00	37.93	0.00	614.13	19.36	13.29	267.60	92.55	16.23	92.91	65.91
2023	252.47	151.35	0.00	0.00	2.60	0.00	406.42	21.39	13.51	357.01	98.28	16.21	90.48	152.04
2024	679.98	52.18	0.00	0.00	2.60	0.00	734.76	25.06	13.21	383.99	98.07	18.42	96.29	171.21
2025	1075.65	0.00	0.00	0.00	31.66	0.00	1107.31	30.60	13.43	301.22	97.98	12.97	91.22	99.04
2026	962.96	0.00	0.00	0.00	16.57	0.00	979.53	35.50	13.26	287.43	96.07	13.14	92.44	85.78
2027	685.66	0.00	0.00	0.00	27.94	0.00	713.61	39.06	13.21	247.84	94.42	12.01	91.54	49.87
2028	473.49	0.00	0.00	0.00	48.59	0.00	522.07	41.67	12.96	232.32	92.50	13.22	93.58	33.02
2029	310.10	0.00	0.00	0.00	64.31	0.00	374.40	43.55	27.13	297.57	96.36	15.10	84.35	101.76
2030	113.88	0.00	0.00	0.00	75.32	0.00	189.20	44.49	27.36	392.81	103.51	14.79	81.00	193.52
2031	35.83	0.00	0.00	0.00	0.00	0.00	35.83	44.67	27.26	405.75	103.43	15.16	83.25	203.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	30.24	392.76	101.73	15.01	84.13	191.89
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	26.04	380.29	100.08	14.92	85.75	179.54
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.99	367.97	98.46	15.18	86.86	167.47
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.82	355.07	96.89	15.24	87.54	155.40
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	44.67	25.44	340.19	95.32	15.26	88.36	141.25
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.52	324.85	93.76	15.29	89.45	126.34
2038	0.00	0.00	74.15	0.00	0.00	0.00	74.15	44.93	24.96	309.82	92.22	15.26	91.40	110.94
2039	0.00	0.00	92.84	0.00	6.90	0.00	99.74	45.32	27.74	303.07	90.85	14.82	101.53	95.87
2040	0.00	0.00	10.66	0.00	0.00	0.00	10.66	45.37	28.85	294.32	89.10	25.21	101.80	78.21
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.37	28.85	285.83	87.63	28.24	104.21	65.75
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	45.63	31.81	277.54	86.21	29.19	108.12	54.03
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	46.02	28.85	268.56	84.72	29.47	113.31	41.05
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	46.33	32.92	260.86	83.25	44.83	111.33	21.45
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	46.96	32.25	252.77	81.98	48.02	114.00	8.76
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.02	36.33	258.08	81.57	47.31	117.29	11.90
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.11	239.35	79.36	62.29	118.82	-21.12
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.11	250.07	80.97	52.54	116.71	-0.15
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	41.07	250.07	80.97	52.54	116.71	-0.15
2050	0.00	0.00	0.00	0.00	10.41	0.00	10.41	47.02	37.23	250.07	80.97	52.54	116.71	-0.15
2051	0.00	0.00	0.00	0.00	10.45	0.00	10.45	47.02	36.35	250.07	80.97	52.54	116.71	-0.15
2052	0.00	0.00	0.00	0.00	10.46	0.00	10.46	47.02	39.31	250.07	80.97	52.54	116.71	-0.15
2053	0.00	0.00	0.00	0.00	0.35	0.00	0.35	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2054	0.00	0.00	0.00	0.00	11.52	0.00	11.52	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2055	0.00	0.00	0.00	0.00	15.28	0.00	15.28	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2056	0.00	0.00	0.00	0.00	16.51	0.00	16.51	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2057	0.00	0.00	0.00	0.00	13.47	0.00	13.47	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2058	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2059	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.02	55.15	250.07	80.97	52.54	116.71	-0.15
2060	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2061	0.00	0.00	0.00	0.00	3.85	0.00	3.85	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2062	0.00	0.00	0.00	0.00	6.42	0.00	6.42	47.02	39.32	250.07	80.97	52.54	116.71	-0.15
2063	0.00	0.00	0.00	0.00	10.91	0.00	10.91	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2064	0.00	0.00	0.00	0.00	15.40	0.00	15.40	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2065	0.00	0.00	0.00	0.00	19.02	0.00	19.02	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2066	0.00	0.00	0.00	0.00	0.44	0.00	0.44	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2067	0.00	0.00	0.00	0.00	13.52	0.00	13.52	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2068	0.00	0.00	51.87	0.00	6.77	0.00	58.64	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2069	0.00	0.00	70.56	0.00	0.89	0.00	71.45	47.02	55.15	250.07	80.97	52.54	116.71	-0.15
2070	0.00	0.00	10.66	0.00	7.30	0.00	17.96	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2071	0.00	0.00	0.00	0.00	15.51	0.00	15.51	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2072	0.00	0.00	52.07	0.00	24.45	0.00	76.53	47.02	55.15	250.07	80.97	52.54	116.71	-0.15
2073	0.00	0.00	70.84	0.00	1.96	0.00	72.80	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2074	0.00	0.00	62.88	0.00	8.86	0.00	71.74	47.02	53.96	250.07	80.97	52.54	116.71	-0.15
2075	0.00	0.00	70.98	0.00	23.96	0.00	94.94	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2076	0.00	0.00	10.72	0.00	12.72	0.00	23.44	47.02	53.08	250.07	80.97	52.54	116.71	-0.15
2077	0.00	0.00	0.00	0.00	21.53	0.00	21.53	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2078	0.00	0.00	0.00	0.00	44.58	0.00	44.58	47.02	52.19	250.07	80.97	52.54	116.71	-0.15
2079	0.00	0.00	0.00	0.00	48.91	0.00	48.91	47.02	39.32	250.07	80.97	52.54	116.71	-0.15
2080	0.00	0.00	0.00	0.00	97.47	0.00	97.47	47.02	53.96	250.07	80.97	52.54	116.71	-0.15
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	56.92	250.07	80.97	52.54	116.71	-0.15
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.13	250.07	80.97	52.54	116.71	-0.15
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	53.96	250.07	80.97	52.54	116.71	-0.15
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	39.32	250.07	80.97	52.54	116.71	-0.15
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	36.36	250.07	80.97	52.54	116.71	-0.15
Salvage Value	4.04	0.00	1.49	0.00	2.72	0.00	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2679.97	2217.37	88.42	0.00	260.56	0.00	5246.32	421.26	248.53	4679.59	1545.80	355.39	1530.27	1248.13

Net Present Value -4668

SCGT/C26

TABLE 268
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	240.54	105.06	15.80	82.47	37.21
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	259.79	103.30	17.62	87.22	51.64
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	266.71	101.39	18.22	88.79	58.31
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	279.78	99.77	18.74	89.52	71.77
2018	199.73	0.00	0.37	0.00	0.00	0.00	200.10	3.18	0.00	268.38	97.01	20.93	90.09	60.35
2019	238.48	0.00	0.00	0.00	0.00	0.00	238.48	4.37	0.00	261.90	94.99	18.71	89.74	58.46
2020	242.33	0.00	73.22	0.00	0.00	0.00	315.55	5.84	0.00	267.55	94.86	13.41	91.63	67.65
2021	666.03	0.00	91.58	0.00	6.90	0.00	764.51	9.55	0.00	268.35	93.03	12.74	97.03	65.55
2022	1066.12	0.00	10.47	0.00	0.49	0.00	1077.08	14.93	4.07	262.34	90.82	22.64	98.57	50.31
2023	954.43	0.00	0.00	0.00	0.99	0.00	955.42	19.71	4.07	258.31	88.40	28.54	104.05	37.32
2024	679.59	0.00	0.00	0.00	1.97	0.00	681.56	23.12	4.07	265.84	87.14	31.91	110.16	36.63
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	25.49	4.07	173.90	87.54	19.50	105.35	-38.49
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	27.03	18.69	213.74	91.57	14.30	89.53	18.33
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	27.60	18.91	301.11	99.31	13.89	83.27	104.65
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	27.78	18.61	325.25	99.56	15.19	88.37	122.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.83	312.33	97.83	15.65	89.53	109.31
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.65	302.35	96.60	15.52	89.63	100.59
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.60	287.80	94.64	16.67	91.43	85.06
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.36	270.83	92.70	17.88	93.14	67.11
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.92	259.42	90.76	21.02	95.98	51.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.92	250.92	89.13	24.35	98.15	39.28
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.96	244.69	87.83	27.13	99.73	29.99
2036	0.00	0.00	51.76	0.00	0.00	0.00	51.76	28.03	20.74	239.45	86.75	27.48	102.05	23.17
2037	0.00	0.00	70.46	0.00	6.90	0.00	77.36	28.42	17.78	230.52	85.21	27.89	107.35	10.07
2038	0.00	0.00	10.64	0.00	0.00	0.00	10.64	28.47	21.85	222.93	83.71	42.55	105.97	-9.30
2039	0.00	0.00	51.92	0.00	0.00	0.00	51.92	28.73	21.85	214.47	82.45	45.29	115.34	-28.62
2040	0.00	0.00	72.75	0.00	54.34	0.00	127.09	29.36	21.85	207.82	81.09	44.88	122.67	-40.83
2041	0.00	0.00	62.69	0.00	0.00	0.00	62.69	29.67	25.94	197.70	79.43	62.51	121.03	-65.27
2042	0.00	0.00	70.77	0.00	0.00	0.00	70.77	30.03	25.27	188.71	78.06	70.25	123.74	-83.34
2043	0.00	0.00	62.82	0.00	0.00	0.00	62.82	30.34	29.34	183.41	76.73	78.89	128.78	-100.99
2044	0.00	0.00	70.91	0.00	45.72	0.00	116.63	30.92	29.34	176.50	75.41	79.52	138.44	-116.87
2045	0.00	0.00	10.71	0.00	0.00	0.00	10.71	30.98	33.43	169.56	74.04	109.25	130.82	-144.55
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	36.39	162.81	72.84	120.65	132.95	-163.63
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.44	156.34	71.51	122.31	144.38	-181.87
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.45	162.90	72.79	117.40	136.05	-163.35
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.45	162.90	72.79	117.40	136.05	-163.35
2050	0.00	0.00	50.94	0.00	10.08	0.00	61.02	30.98	33.46	162.90	72.79	117.40	136.05	-163.35
2051	0.00	0.00	69.30	0.00	10.08	0.00	79.38	30.98	35.24	162.90	72.79	117.40	136.05	-163.35
2052	0.00	0.00	10.47	0.00	10.08	0.00	20.55	30.98	35.25	162.90	72.79	117.40	136.05	-163.35
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	162.90	72.79	117.40	136.05	-163.35
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	162.90	72.79	117.40	136.05	-163.35
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	162.90	72.79	117.40	136.05	-163.35
2056	0.00	0.00	0.00	0.00	6.90	0.00	6.90	30.98	36.43	162.90	72.79	117.40	136.05	-163.35
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2066	0.00	0.00	51.76	0.00	0.00	0.00	51.76	30.98	36.43	162.90	72.79	117.40	136.05	-163.35
2067	0.00	0.00	70.42	0.00	0.00	0.00	70.42	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2068	0.00	0.00	10.64	0.00	0.00	0.00	10.64	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2069	0.00	0.00	51.92	0.00	0.00	0.00	51.92	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2070	0.00	0.00	70.63	0.00	0.00	0.00	70.63	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2071	0.00	0.00	62.69	0.00	0.00	0.00	62.69	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2072	0.00	0.00	70.77	0.00	7.39	0.00	78.16	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2073	0.00	0.00	62.82	0.00	0.99	0.00	63.81	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2074	0.00	0.00	70.91	0.00	1.97	0.00	72.88	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2075	0.00	0.00	10.71	0.00	45.19	0.00	55.91	30.98	49.30	162.90	72.79	117.40	136.05	-163.35
2076	0.00	0.00	0.00	0.00	1.97	0.00	1.97	30.98	36.43	162.90	72.79	117.40	136.05	-163.35
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	51.08	162.90	72.79	117.40	136.05	-163.35
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	162.90	72.79	117.40	136.05	-163.35
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	30.98	51.08	162.90	72.79	117.40	136.05	-163.35
2080	0.00	0.00	50.94	0.00	0.00	0.00	50.94	30.98	35.25	162.90	72.79	117.40	136.05	-163.35
2081	0.00	0.00	69.30	0.00	0.00	0.00	69.30	30.98	51.08	162.90	72.79	117.40	136.05	-163.35
2082	0.00	0.00	10.47	0.00	0.00	0.00	10.47	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	36.43	162.90	72.79	117.40	136.05	-163.35
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
2090	0.00	0.00	0.00	0.00	13.59	0.00	13.59	30.98	33.47	162.90	72.79	117.40	136.05	-163.35
Salvage Value	1.60	0.00	2.56	0.00	0.91	0.00	5.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	246.26	0.00	71.41	0.00	3584.28	284.53	196.32	3971.96	1483.34	577.71	1640.90	270.00

Net Present Value -3795

CCGT/C26

TABLE 269
ECONOMIC SUMMARY
NFAT 2012

Energy Price: Low
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	240.54	105.06	15.80	82.47	37.21
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	259.79	103.30	17.62	87.22	51.64
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	266.71	101.39	18.22	88.79	58.31
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	279.78	99.77	18.74	89.52	71.77
2018	199.73	0.00	0.37	0.00	0.00	0.00	200.10	3.18	0.00	268.38	97.01	20.93	90.09	60.35
2019	238.48	0.00	102.34	0.00	0.00	0.00	340.83	4.88	0.00	261.90	94.99	18.71	89.74	58.46
2020	242.33	0.00	169.55	0.00	0.00	0.00	411.87	6.83	0.00	267.55	94.86	13.41	91.63	67.65
2021	666.03	0.00	87.98	0.00	6.90	0.00	760.90	10.52	0.00	272.38	93.74	11.20	96.02	71.42
2022	1066.12	0.00	4.81	0.00	0.49	0.00	1071.42	15.88	7.06	272.38	91.37	32.35	89.21	59.45
2023	954.43	0.00	0.00	0.00	0.99	0.00	955.42	20.66	7.06	273.44	89.26	38.85	93.65	51.67
2024	679.59	0.00	0.00	0.00	1.97	0.00	681.56	24.07	7.06	288.86	88.14	47.08	98.11	55.53
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	26.43	7.06	195.47	87.66	37.65	95.50	-25.35
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	27.98	21.68	227.74	91.47	28.82	85.45	22.01
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	28.55	21.90	309.96	99.27	20.83	81.48	108.38
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	28.72	21.60	335.34	99.65	22.26	85.88	127.55
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.82	323.77	97.94	23.56	87.07	115.20
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.65	307.03	95.81	25.28	88.88	97.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.60	307.95	95.71	22.57	87.57	102.10
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.35	285.15	92.89	26.39	90.47	75.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.91	275.86	91.14	29.47	92.69	62.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.91	265.15	89.12	33.53	95.78	46.73
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.95	258.07	87.64	36.12	97.79	36.52
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	23.74	248.92	85.99	41.63	99.70	21.59
2037	0.00	0.00	51.82	0.00	0.00	0.00	51.82	28.98	20.78	245.38	85.24	43.03	100.20	16.90
2038	0.00	0.00	70.53	0.00	6.90	0.00	77.43	29.37	20.78	238.93	84.04	43.78	104.14	6.97
2039	0.00	0.00	10.65	0.00	0.00	0.00	10.65	29.42	24.85	229.82	82.27	56.91	111.61	-20.97
2040	0.00	0.00	51.97	0.00	0.00	0.00	51.97	29.68	24.85	222.07	80.83	63.31	114.38	-36.45
2041	0.00	0.00	72.82	0.00	54.34	0.00	127.16	30.31	24.85	212.89	79.50	65.68	118.35	-50.64
2042	0.00	0.00	62.76	0.00	0.00	0.00	62.76	30.62	28.26	207.27	78.14	73.39	123.17	-67.44
2043	0.00	0.00	70.84	0.00	0.00	0.00	70.84	30.98	28.26	197.77	76.73	87.07	121.47	-87.50
2044	0.00	0.00	10.70	0.00	0.00	0.00	10.70	31.03	32.33	191.23	75.39	99.44	123.67	-107.27
2045	0.00	0.00	52.23	0.00	0.00	0.00	52.23	31.29	32.33	184.33	74.07	103.25	131.03	-124.02
2046	0.00	0.00	71.05	0.00	45.72	0.00	116.77	31.87	35.30	181.48	73.15	102.58	138.84	-133.08
2047	0.00	0.00	10.74	0.00	0.00	0.00	10.74	31.93	36.43	168.48	71.54	129.01	132.05	-164.13
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.43	178.10	72.92	111.61	133.98	-140.41
2049	0.00	0.00	102.34	0.00	10.08	0.00	112.42	31.93	36.44	178.10	72.92	111.61	133.98	-140.41
2050	0.00	0.00	147.26	0.00	10.08	0.00	157.34	31.93	36.44	178.10	72.92	111.61	133.98	-140.41
2051	0.00	0.00	65.69	0.00	10.08	0.00	75.77	31.93	38.22	178.10	72.92	111.61	133.98	-140.41
2052	0.00	0.00	4.81	0.00	10.08	0.00	14.89	31.93	38.23	178.10	72.92	111.61	133.98	-140.41
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.23	178.10	72.92	111.61	133.98	-140.41
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	178.10	72.92	111.61	133.98	-140.41
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	178.10	72.92	111.61	133.98	-140.41
2056	0.00	0.00	0.00	0.00	6.90	0.00	6.90	31.93	39.42	178.10	72.92	111.61	133.98	-140.41
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	39.42	178.10	72.92	111.61	133.98	-140.41
2067	0.00	0.00	51.82	0.00	0.00	0.00	51.82	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2068	0.00	0.00	70.49	0.00	0.00	0.00	70.49	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2069	0.00	0.00	10.65	0.00	0.00	0.00	10.65	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2070	0.00	0.00	51.97	0.00	0.00	0.00	51.97	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2071	0.00	0.00	70.70	0.00	0.00	0.00	70.70	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2072	0.00	0.00	62.76	0.00	0.49	0.00	63.25	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2073	0.00	0.00	70.84	0.00	7.89	0.00	78.73	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2074	0.00	0.00	10.70	0.00	1.97	0.00	12.67	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2075	0.00	0.00	52.23	0.00	4.43	0.00	56.66	31.93	52.29	178.10	72.92	111.61	133.98	-140.41
2076	0.00	0.00	71.05	0.00	42.73	0.00	113.78	31.93	39.42	178.10	72.92	111.61	133.98	-140.41
2077	0.00	0.00	10.74	0.00	0.00	0.00	10.74	31.93	54.07	178.10	72.92	111.61	133.98	-140.41
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	178.10	72.92	111.61	133.98	-140.41
2079	0.00	0.00	102.34	0.00	0.00	0.00	102.34	31.93	54.07	178.10	72.92	111.61	133.98	-140.41
2080	0.00	0.00	147.26	0.00	0.00	0.00	147.26	31.93	38.24	178.10	72.92	111.61	133.98	-140.41
2081	0.00	0.00	65.69	0.00	34.29	0.00	99.98	31.93	54.07	178.10	72.92	111.61	133.98	-140.41
2082	0.00	0.00	4.81	0.00	0.00	0.00	4.81	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	39.42	178.10	72.92	111.61	133.98	-140.41
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	178.10	72.92	111.61	133.98	-140.41
Salvage Value	1.60	0.00	4.07	0.00	0.83	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	394.77	0.00	69.68	0.00	3731.07	294.74	222.15	4116.41	1485.51	643.33	1594.51	393.06

Net Present Value: -3855

Wind/C26

TABLE 270
ECONOMIC SUMMARY
NFAT 2012

Energy Price Low
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	240.54	105.06	15.80	82.47	37.21
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	259.79	103.30	17.62	87.22	51.64
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	266.71	101.39	18.22	88.79	58.31
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	279.78	99.77	18.74	89.52	71.77
2018	199.73	0.00	0.00	0.00	0.00	0.00	199.73	3.18	0.00	268.38	97.01	20.93	90.09	60.35
2019	238.48	0.00	0.00	0.00	0.00	0.00	238.48	4.37	0.00	261.90	94.99	18.71	89.74	58.46
2020	242.33	0.00	0.00	7.22	10.78	0.00	260.33	5.67	0.00	265.31	94.46	14.40	91.95	64.51
2021	666.03	0.00	0.00	220.30	17.97	0.00	904.30	10.19	0.00	265.58	92.61	14.02	96.96	61.98
2022	1066.12	0.00	0.00	224.43	22.06	0.00	1312.61	16.76	6.34	268.72	90.94	14.05	97.29	66.44
2023	954.43	0.00	0.00	217.21	11.77	0.00	1183.41	22.67	12.69	272.42	88.42	16.12	100.74	67.14
2024	679.59	0.00	0.00	4.12	5.57	0.00	689.28	26.12	19.03	285.99	86.42	16.73	107.38	75.46
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	28.49	19.03	192.70	86.24	10.98	123.58	-28.11
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	30.04	33.65	247.48	90.37	13.06	89.00	55.06
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	30.60	33.87	335.51	98.08	11.78	83.08	142.58
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	30.78	33.57	355.94	98.13	12.92	87.49	157.40
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.79	345.06	96.44	13.14	89.43	146.05
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.62	336.81	95.35	12.85	89.41	139.20
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.57	327.63	93.91	13.18	90.57	129.97
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	30.78	33.32	314.78	92.44	13.21	91.54	117.58
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	32.88	299.48	90.88	13.10	92.72	102.77
2034	0.00	0.00	73.94	0.00	0.00	0.00	73.94	31.04	32.88	284.51	89.40	13.11	93.55	88.44
2035	0.00	0.00	92.56	0.00	6.90	0.00	99.46	31.42	32.92	278.38	88.36	11.98	94.84	83.20
2036	0.00	0.00	62.38	0.00	0.00	0.00	62.38	31.73	39.78	266.61	86.27	21.57	95.98	62.79
2037	0.00	0.00	70.46	0.00	6.90	0.00	77.36	32.12	36.82	256.87	84.79	24.35	98.21	49.52
2038	0.00	0.00	10.64	0.00	0.00	0.00	10.64	32.17	40.89	251.10	83.53	31.72	100.12	35.72
2039	0.00	0.00	51.92	0.00	0.00	0.00	51.92	32.43	40.89	243.80	82.33	30.91	110.94	19.62
2040	0.00	0.00	72.75	7.22	54.34	0.00	134.31	33.09	40.89	232.16	80.65	38.97	112.31	0.23
2041	0.00	0.00	62.69	220.30	0.00	0.00	283.00	34.51	44.97	225.04	79.22	48.07	114.85	-17.11
2042	0.00	0.00	70.77	224.43	0.00	0.00	295.20	35.99	44.30	216.91	77.93	50.23	119.72	-30.97
2043	0.00	0.00	62.82	217.21	0.00	0.00	280.03	37.39	48.37	211.65	76.61	56.20	125.76	-46.93
2044	0.00	0.00	70.91	4.12	45.72	0.00	120.75	37.99	48.37	200.34	75.24	69.64	123.55	-68.09
2045	0.00	0.00	10.71	0.00	0.00	0.00	10.71	38.04	52.46	193.26	73.94	81.38	125.95	-88.01
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	55.43	185.82	72.65	82.82	134.38	-104.02
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.47	178.87	71.38	83.63	144.58	-120.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.48	185.99	72.66	82.61	134.97	-104.25
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.49	185.99	72.66	82.61	134.97	-104.25
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.49	185.99	72.66	82.61	134.97	-104.25
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	54.27	185.99	72.66	82.61	134.97	-104.25
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	54.28	185.99	72.66	82.61	134.97	-104.25
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	185.99	72.66	82.61	134.97	-104.25
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	185.99	72.66	82.61	134.97	-104.25
2055	0.00	0.00	0.00	0.00	2.70	0.00	2.70	38.04	54.28	185.99	72.66	82.61	134.97	-104.25
2056	0.00	0.00	0.00	0.00	4.49	0.00	4.49	38.04	55.46	185.99	72.66	82.61	134.97	-104.25
2057	0.00	0.00	0.00	0.00	5.39	0.00	5.39	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2058	0.00	0.00	0.00	0.00	2.70	0.00	2.70	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2059	0.00	0.00	0.00	0.00	0.90	0.00	0.90	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2060	0.00	0.00	0.00	7.22	0.00	0.00	7.22	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2061	0.00	0.00	0.00	220.30	0.00	0.00	220.30	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2062	0.00	0.00	0.00	224.43	0.00	0.00	224.43	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2063	0.00	0.00	0.00	217.21	0.00	0.00	217.21	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2064	0.00	0.00	51.66	4.12	0.00	0.00	55.78	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2065	0.00	0.00	70.28	0.00	0.00	0.00	70.28	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2066	0.00	0.00	62.38	0.00	0.00	0.00	62.38	38.04	55.46	185.99	72.66	82.61	134.97	-104.25
2067	0.00	0.00	70.42	0.00	0.00	0.00	70.42	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2068	0.00	0.00	10.64	0.00	0.00	0.00	10.64	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2069	0.00	0.00	51.92	0.00	0.00	0.00	51.92	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2070	0.00	0.00	70.63	0.00	14.99	0.00	85.62	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2071	0.00	0.00	62.69	0.00	13.48	0.00	76.18	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2072	0.00	0.00	70.77	0.00	23.57	0.00	94.34	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2073	0.00	0.00	62.82	0.00	9.07	0.00	71.89	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2074	0.00	0.00	70.91	0.00	4.67	0.00	75.58	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2075	0.00	0.00	10.71	0.00	45.19	0.00	55.91	38.04	68.33	185.99	72.66	82.61	134.97	-104.25
2076	0.00	0.00	0.00	0.00	1.97	0.00	1.97	38.04	55.46	185.99	72.66	82.61	134.97	-104.25
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	70.11	185.99	72.66	82.61	134.97	-104.25
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	185.99	72.66	82.61	134.97	-104.25
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	38.04	70.11	185.99	72.66	82.61	134.97	-104.25
2080	0.00	0.00	0.00	7.22	0.00	0.00	7.22	38.04	54.28	185.99	72.66	82.61	134.97	-104.25
2081	0.00	0.00	0.00	220.30	0.00	0.00	220.30	38.04	70.11	185.99	72.66	82.61	134.97	-104.25
2082	0.00	0.00	0.00	224.43	0.00	0.00	224.43	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2083	0.00	0.00	0.00	217.21	0.00	0.00	217.21	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2084	0.00	0.00	0.00	4.12	10.08	0.00	14.20	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	55.46	185.99	72.66	82.61	134.97	-104.25
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
2090	0.00	0.00	0.00	0.00	13.59	0.00	13.59	38.04	52.50	185.99	72.66	82.61	134.97	-104.25
Salvage Value	1.60	0.00	1.93	3.59	1.22	0.00	8.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	170.10	562.03	110.63	0.00	4109.37	325.49	347.44	4226.82	1478.29	441.48	1625.99	681.06

Net Present Value -4101

K19/C25/750MW (WPS Sale &Inv)

TABLE 271
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	3.78	277.90	1.39	0.00	364.56	103.02	29.28	113.53	118.72
2015	87.48	485.83	0.00	0.00	18.92	6.75	598.98	4.38	0.00	413.65	101.12	33.46	118.97	160.10
2016	182.24	643.32	0.00	0.00	25.89	17.15	868.60	8.73	0.00	428.98	99.29	35.73	122.25	171.72
2017	212.03	779.65	0.00	0.00	37.88	24.95	1054.51	14.00	0.00	462.21	97.29	38.28	129.29	197.36
2018	254.86	549.74	0.00	0.00	39.82	103.34	947.77	18.74	0.00	445.05	95.17	39.19	132.50	178.19
2019	260.97	393.19	0.00	0.00	50.71	85.16	790.03	22.69	13.01	480.30	95.11	36.60	133.23	215.35
2020	719.36	160.55	0.00	0.00	3.54	157.85	1041.30	27.90	44.86	756.52	102.37	28.66	152.47	473.02
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	34.16	42.99	827.24	102.99	31.25	168.19	524.82
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	39.46	41.65	829.91	101.84	31.26	173.13	523.69
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	43.35	39.80	790.64	99.52	30.86	178.60	481.65
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	46.24	38.24	763.84	97.28	34.06	188.22	444.29
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	48.35	50.89	855.29	101.86	30.07	140.66	582.70
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	49.49	49.35	1117.88	110.03	29.97	141.70	836.18
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	49.68	47.92	1163.28	109.94	29.33	156.05	867.97
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	46.91	1147.49	108.29	30.29	159.74	849.16
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	48.20	1118.41	106.38	30.36	164.14	817.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	43.02	1097.70	105.05	29.79	162.19	800.67
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	41.70	1085.00	103.41	30.41	167.48	783.71
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	40.22	1049.25	101.75	30.53	166.57	750.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	39.21	1014.85	99.97	30.57	169.43	714.87
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	38.27	983.15	98.26	30.85	173.62	680.43
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	39.54	949.83	96.59	30.61	165.64	656.99
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	36.10	889.62	94.98	31.21	140.18	623.26
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	49.68	35.57	849.88	93.37	31.37	140.13	585.02
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.68	35.06	815.58	91.71	31.35	145.38	547.13
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	50.07	37.47	784.32	90.11	31.31	158.29	504.62
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	50.66	34.09	802.79	88.82	29.86	174.75	509.36
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	50.74	36.95	781.57	86.80	54.09	177.83	462.84
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	51.13	36.51	764.98	85.25	60.22	189.93	429.58
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	51.72	36.07	753.10	83.86	63.33	204.86	401.03
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	52.21	41.37	749.82	82.65	73.16	218.92	375.08
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	53.12	43.86	719.12	80.79	94.71	224.62	319.00
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	53.20	44.56	702.32	79.34	114.88	233.62	274.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	43.31	686.72	78.06	120.19	249.06	239.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	42.07	702.72	79.40	109.93	235.77	277.63
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	53.20	44.61	702.72	79.40	109.93	235.77	277.63
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	53.20	43.11	702.72	79.40	109.93	235.77	277.63
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	53.20	42.78	702.72	79.40	109.93	235.77	277.63
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	53.20	42.46	702.72	79.40	109.93	235.77	277.63
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	53.20	42.15	702.72	79.40	109.93	235.77	277.63
2054	0.00	0.00	0.00	0.00	17.63	18.49	36.12	53.20	41.84	702.72	79.40	109.93	235.77	277.63
2055	0.00	0.00	0.00	0.00	0.87	19.18	20.05	53.20	42.71	702.72	79.40	109.93	235.77	277.63
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	53.20	55.02	702.72	79.40	109.93	235.77	277.63
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	53.20	39.25	702.72	79.40	109.93	235.77	277.63
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	53.20	54.48	702.72	79.40	109.93	235.77	277.63
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	53.20	41.62	702.72	79.40	109.93	235.77	277.63
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	53.20	51.26	702.72	79.40	109.93	235.77	277.63
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	66.75	702.72	79.40	109.93	235.77	277.63
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	53.20	66.75	702.72	79.40	109.93	235.77	277.63
2065	0.00	0.00	0.00	0.00	8.65	4.18	12.82	53.20	38.66	702.72	79.40	109.93	235.77	277.63
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	53.20	66.75	702.72	79.40	109.93	235.77	277.63
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	53.20	66.75	702.72	79.40	109.93	235.77	277.63
2069	0.00	0.00	78.30	0.00	33.08	56.37	167.75	53.20	38.66	702.72	79.40	109.93	235.77	277.63
2070	0.00	0.00	106.94	0.00	2.67	58.46	168.07	53.20	53.00	702.72	79.40	109.93	235.77	277.63
2071	0.00	0.00	16.22	0.00	32.44	0.00	48.66	53.20	37.50	702.72	79.40	109.93	235.77	277.63
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	53.20	53.00	702.72	79.40	109.93	235.77	277.63
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	53.20	36.63	702.72	79.40	109.93	235.77	277.63
2074	0.00	0.00	96.75	0.00	50.02	0.00	146.76	53.20	51.26	702.72	79.40	109.93	235.77	277.63
2075	0.00	0.00	109.64	0.00	75.23	0.00	184.87	53.20	38.66	702.72	79.40	109.93	235.77	277.63
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	53.20	53.00	702.72	79.40	109.93	235.77	277.63
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	37.50	702.72	79.40	109.93	235.77	277.63
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	53.20	53.00	702.72	79.40	109.93	235.77	277.63
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	40.40	702.72	79.40	109.93	235.77	277.63
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	53.20	53.00	702.72	79.40	109.93	235.77	277.63
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	53.20	38.66	702.72	79.40	109.93	235.77	277.63
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	53.20	35.76	702.72	79.40	109.93	235.77	277.63
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	53.20	38.66	702.72	79.40	109.93	235.77	277.63
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	53.20	38.66	702.72	79.40	109.93	235.77	277.63
Salvage Value	2.31	0.00	6.54	0.00	10.30	4.78	23.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	193.35	0.00	449.81	337.17	7837.52	779.59	651.85	15184.50	1940.75	999.17	3426.92	8817.66

Net Present Value -451

K19/C25/750MW

TABLE 272
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	5.28	279.40	1.40	0.00	370.55	103.02	29.26	113.08	125.18
2015	87.48	485.83	0.00	0.00	18.92	8.56	600.79	4.40	0.00	422.34	101.11	33.45	118.89	168.89
2016	182.24	643.32	0.00	0.00	25.89	17.93	869.38	8.75	0.00	437.56	99.27	35.69	122.05	180.54
2017	212.03	779.65	0.00	0.00	37.88	24.95	1054.51	14.02	0.00	472.28	97.29	38.30	129.07	207.63
2018	254.86	549.74	0.00	0.00	39.82	146.07	990.49	18.97	0.00	455.27	95.16	39.08	132.35	188.68
2019	260.97	393.19	0.00	0.00	50.71	100.61	805.48	23.00	13.01	489.90	95.10	36.58	132.98	225.24
2020	719.36	160.55	0.00	0.00	3.54	278.17	1161.63	28.81	47.98	779.75	102.36	28.63	151.05	497.71
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	35.08	46.21	844.33	102.99	31.43	167.26	542.65
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	40.37	44.90	846.10	101.84	31.26	172.05	540.95
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	44.26	42.92	807.81	99.51	30.86	177.32	500.11
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	47.15	41.22	781.22	97.27	34.13	187.03	462.78
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	49.27	53.76	873.69	101.85	30.13	138.22	603.50
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	50.40	52.09	1129.78	110.04	30.11	135.74	853.88
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	50.60	50.55	1164.32	109.96	29.10	141.73	883.54
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	49.42	1150.03	108.30	30.26	144.59	866.88
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	50.61	1124.07	106.38	30.33	149.29	838.07
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	45.33	1107.06	105.05	29.79	148.17	824.04
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	43.90	1099.59	103.40	30.54	153.55	812.10
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	42.32	1068.02	101.75	30.59	153.29	782.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	41.21	1036.95	99.99	30.51	155.76	750.70
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	40.19	1009.85	98.28	30.70	160.49	720.39
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	41.37	940.27	96.66	30.91	134.50	678.19
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	37.85	903.13	94.99	31.25	134.74	642.16
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	50.60	37.25	870.89	93.35	31.29	138.56	607.69
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.60	36.67	837.56	91.71	31.29	143.38	571.18
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	50.99	39.01	807.05	90.11	31.37	156.04	529.54
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	51.57	35.57	805.38	88.81	29.87	172.16	514.55
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	51.65	38.37	779.48	86.80	54.09	175.43	463.15
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	52.05	37.86	763.51	85.25	60.22	187.99	430.06
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	52.64	37.36	751.85	83.86	63.33	203.13	401.52
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	53.12	42.61	748.95	82.65	73.16	217.40	375.75
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	54.03	45.04	718.13	80.79	94.71	223.22	319.41
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	54.12	45.69	701.31	79.34	114.88	232.20	274.90
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	44.39	685.39	78.06	120.19	247.41	239.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	43.10	701.61	79.40	109.93	234.28	278.01
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	54.12	45.59	701.61	79.40	109.93	234.28	278.01
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	54.12	44.04	701.61	79.40	109.93	234.28	278.01
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	54.12	43.67	701.61	79.40	109.93	234.28	278.01
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	54.12	43.30	701.61	79.40	109.93	234.28	278.01
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	54.12	42.95	701.61	79.40	109.93	234.28	278.01
2054	0.00	0.00	0.00	0.00	17.63	18.49	36.12	54.12	42.61	701.61	79.40	109.93	234.28	278.01
2055	0.00	0.00	0.00	0.00	0.87	19.18	20.05	54.12	43.43	701.61	79.40	109.93	234.28	278.01
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	54.12	55.71	701.61	79.40	109.93	234.28	278.01
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	54.12	39.90	701.61	79.40	109.93	234.28	278.01
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	54.12	55.10	701.61	79.40	109.93	234.28	278.01
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	54.12	42.21	701.61	79.40	109.93	234.28	278.01
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	54.12	51.26	701.61	79.40	109.93	234.28	278.01
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	66.75	701.61	79.40	109.93	234.28	278.01
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	54.12	66.75	701.61	79.40	109.93	234.28	278.01
2065	0.00	0.00	0.00	0.00	8.65	4.18	12.82	54.12	38.66	701.61	79.40	109.93	234.28	278.01
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	54.12	66.75	701.61	79.40	109.93	234.28	278.01
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	54.12	66.75	701.61	79.40	109.93	234.28	278.01
2069	0.00	0.00	78.30	0.00	33.08	56.37	167.75	54.12	38.66	701.61	79.40	109.93	234.28	278.01
2070	0.00	0.00	106.94	0.00	2.67	58.46	168.07	54.12	53.00	701.61	79.40	109.93	234.28	278.01
2071	0.00	0.00	16.22	0.00	32.44	0.00	48.66	54.12	37.50	701.61	79.40	109.93	234.28	278.01
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	54.12	53.00	701.61	79.40	109.93	234.28	278.01
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	54.12	36.63	701.61	79.40	109.93	234.28	278.01
2074	0.00	0.00	96.75	0.00	50.02	0.00	146.76	54.12	51.26	701.61	79.40	109.93	234.28	278.01
2075	0.00	0.00	109.64	0.00	75.23	0.00	184.87	54.12	38.66	701.61	79.40	109.93	234.28	278.01
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	54.12	53.00	701.61	79.40	109.93	234.28	278.01
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	37.50	701.61	79.40	109.93	234.28	278.01
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	54.12	53.00	701.61	79.40	109.93	234.28	278.01
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	40.40	701.61	79.40	109.93	234.28	278.01
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	54.12	53.00	701.61	79.40	109.93	234.28	278.01
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	54.12	38.66	701.61	79.40	109.93	234.28	278.01
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	54.12	35.76	701.61	79.40	109.93	234.28	278.01
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	54.12	38.66	701.61	79.40	109.93	234.28	278.01
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	54.12	38.66	701.61	79.40	109.93	234.28	278.01
Salvage Value	2.31	0.00	6.54	0.00	10.30	4.78	23.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	193.35	0.00	449.81	477.79	7978.14	793.78	680.39	15367.95	1940.74	999.22	3343.29	9084.70

Net Present Value -368

K19/Gas25/750MW (WPS Sale & INV)

TABLE 273
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	3.78	246.19	1.23	0.00	364.56	103.02	29.28	113.53	118.72
2015	0.00	485.83	0.00	0.00	18.92	6.75	511.50	3.79	0.00	413.66	101.13	33.45	118.95	160.13
2016	0.00	643.32	0.00	0.00	25.89	17.15	686.36	7.22	0.00	428.91	99.29	35.71	122.15	171.76
2017	0.00	779.65	0.00	0.00	37.88	24.95	842.49	11.43	0.00	462.61	97.29	38.26	129.22	197.84
2018	0.00	549.74	0.00	0.00	39.82	103.34	692.91	14.90	0.00	445.76	95.17	39.11	132.43	179.05
2019	0.00	393.19	0.00	0.00	47.18	85.16	525.53	17.52	13.01	481.48	95.11	36.58	133.15	216.64
2020	0.00	160.55	0.00	0.00	0.01	157.85	318.41	19.12	44.86	758.40	102.36	28.63	152.29	475.13
2021	0.00	55.71	0.36	0.00	0.00	0.00	56.07	19.40	42.99	830.65	102.99	31.24	167.98	528.44
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.40	41.65	833.60	101.84	31.18	172.82	527.76
2023	0.00	0.00	94.10	0.00	0.00	0.00	94.10	19.76	39.80	790.92	98.99	32.92	178.35	480.65
2024	0.00	0.00	193.21	0.00	9.28	0.00	202.49	20.66	38.24	768.61	96.93	35.95	186.82	448.92
2025	0.00	0.00	116.29	0.00	73.08	0.00	189.37	21.60	40.58	725.50	96.66	34.96	162.81	431.07
2026	0.00	0.00	88.44	0.00	0.00	0.00	88.44	22.04	42.81	731.63	95.34	41.92	175.53	418.84
2027	0.00	0.00	100.23	0.00	0.00	0.00	100.23	22.54	41.52	708.23	93.36	41.18	189.99	383.69
2028	0.00	0.00	15.20	0.00	0.00	0.00	15.20	22.62	44.28	685.25	91.01	62.65	197.71	333.88
2029	0.00	0.00	74.49	0.00	0.00	0.00	74.49	22.99	45.74	664.07	89.20	69.60	208.70	296.58
2030	0.00	0.00	101.74	0.00	61.48	0.00	163.22	23.80	40.62	659.33	88.11	76.39	215.77	279.06
2031	0.00	0.00	90.67	0.00	0.00	0.00	90.67	24.26	43.47	673.10	87.76	83.93	220.70	280.71
2032	0.00	0.00	102.76	0.00	0.00	0.00	102.76	24.77	42.36	642.64	85.35	101.55	233.84	221.90
2033	0.00	0.00	15.59	0.00	0.00	0.00	15.59	24.85	45.27	629.83	83.81	121.72	243.58	180.73
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	44.22	625.09	83.08	129.57	249.61	162.84
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	42.77	550.54	80.94	122.97	240.72	105.91
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	42.23	480.16	79.48	123.85	207.82	69.00
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	41.71	451.52	78.06	135.61	211.18	26.68
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	41.21	448.03	77.32	134.44	225.61	10.66
2039	0.00	0.00	161.42	0.00	0.00	0.00	161.42	25.66	43.61	415.11	75.37	164.76	235.77	-60.79
2040	0.00	0.00	233.20	0.00	0.00	0.00	233.20	26.82	40.24	409.05	74.03	183.11	245.48	-93.56
2041	0.00	0.00	104.44	0.00	9.28	0.00	113.72	27.39	39.77	429.29	74.32	182.79	244.29	-72.11
2042	0.00	0.00	7.68	0.00	0.00	0.00	7.68	27.43	46.24	494.70	72.04	293.56	237.16	-108.05
2043	0.00	0.00	79.88	0.00	0.00	0.00	79.88	27.83	45.80	464.20	70.29	316.40	250.55	-173.05
2044	0.00	0.00	109.10	0.00	61.48	0.00	170.58	28.68	47.12	434.84	68.66	340.82	262.67	-237.31
2045	0.00	0.00	52.04	0.00	0.00	0.00	52.04	28.94	50.71	419.44	67.35	373.39	272.38	-293.69
2046	0.00	0.00	48.47	0.00	0.00	0.00	48.47	29.18	50.31	401.49	66.14	399.88	282.79	-347.32
2047	0.00	0.00	7.35	0.00	0.00	0.00	7.35	29.22	50.50	393.34	65.35	416.21	295.00	-383.22
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	49.26	404.76	66.28	396.49	283.39	-341.41
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	29.22	51.80	404.76	66.28	396.49	283.39	-341.41
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	29.22	48.56	404.76	66.28	396.49	283.39	-341.41
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	29.22	48.23	404.76	66.28	396.49	283.39	-341.41
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	29.22	47.91	404.76	66.28	396.49	283.39	-341.41
2053	0.00	0.00	72.30	0.00	20.54	18.49	111.33	29.22	47.60	404.76	66.28	396.49	283.39	-341.41
2054	0.00	0.00	171.40	0.00	16.76	18.49	206.65	29.22	47.29	404.76	66.28	396.49	283.39	-341.41
2055	0.00	0.00	114.21	0.00	0.00	19.18	133.39	29.22	47.00	404.76	66.28	396.49	283.39	-341.41
2056	0.00	0.00	88.44	0.00	0.00	0.00	88.44	29.22	62.21	404.76	66.28	396.49	283.39	-341.41
2057	0.00	0.00	100.23	0.00	0.00	0.00	100.23	29.22	46.44	404.76	66.28	396.49	283.39	-341.41
2058	0.00	0.00	15.20	0.00	0.00	0.00	15.20	29.22	61.67	404.76	66.28	396.49	283.39	-341.41
2059	0.00	0.00	74.49	0.00	9.28	0.00	83.77	29.22	48.81	404.76	66.28	396.49	283.39	-341.41
2060	0.00	0.00	101.74	0.00	54.81	0.00	156.55	29.22	58.45	404.76	66.28	396.49	283.39	-341.41
2061	0.00	0.00	90.67	0.00	0.00	0.00	90.67	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2062	0.00	0.00	102.76	0.00	0.00	0.00	102.76	29.22	58.45	404.76	66.28	396.49	283.39	-341.41
2063	0.00	0.00	15.59	0.00	0.00	0.00	15.59	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2064	0.00	0.00	0.00	0.00	10.42	2.09	12.50	29.22	58.45	404.76	66.28	396.49	283.39	-341.41
2065	0.00	0.00	0.00	0.00	54.75	4.18	58.93	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2066	0.00	0.00	0.00	0.00	1.04	12.53	13.57	29.22	58.45	404.76	66.28	396.49	283.39	-341.41
2067	0.00	0.00	0.00	0.00	9.01	18.79	27.80	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	29.22	58.45	404.76	66.28	396.49	283.39	-341.41
2069	0.00	0.00	161.42	0.00	30.42	56.37	248.21	29.22	45.85	404.76	66.28	396.49	283.39	-341.41
2070	0.00	0.00	233.20	0.00	0.01	58.46	291.66	29.22	44.69	404.76	66.28	396.49	283.39	-341.41
2071	0.00	0.00	104.44	0.00	0.00	0.00	104.44	29.22	44.69	404.76	66.28	396.49	283.39	-341.41
2072	0.00	0.00	7.68	0.00	0.00	0.00	7.68	29.22	44.69	404.76	66.28	396.49	283.39	-341.41
2073	0.00	0.00	79.88	0.00	0.00	0.00	79.88	29.22	43.82	404.76	66.28	396.49	283.39	-341.41
2074	0.00	0.00	109.10	0.00	0.00	0.00	109.10	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2075	0.00	0.00	52.04	0.00	18.27	0.00	70.31	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2076	0.00	0.00	48.47	0.00	9.28	0.00	57.75	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2077	0.00	0.00	7.35	0.00	0.00	0.00	7.35	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	29.22	45.85	404.76	66.28	396.49	283.39	-341.41
2080	0.00	0.00	0.00	0.00	15.37	0.00	15.37	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2083	0.00	0.00	72.30	0.00	0.00	0.00	72.30	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2084	0.00	0.00	171.40	0.00	10.59	0.68	182.68	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2085	0.00	0.00	114.21	0.00	10.27	1.37	125.86	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2086	0.00	0.00	88.44	0.00	24.85	4.11	117.40	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2087	0.00	0.00	100.23	0.00	28.87	6.16	135.26	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2088	0.00	0.00	15.20	0.00	20.54	18.49	54.24	29.22	42.95	404.76	66.28	396.49	283.39	-341.41
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	29.22	45.85	404.76	66.28	396.49	283.39	-341.41
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	29.22	45.85	404.76	66.28	396.49	283.39	-341.41
Salvage Value	0.00	0.00	20.83	0.00	5.66	4.78	31.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	890.47	0.00	292.17	337.17	4376.86	416.42	675.38	11140.80	1775.47	2783.57	4030.00	2551.76

Net Present Value -2917

K19/C31/750MW

TABLE 274
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	221.41	0.00	0.00	21.01	5.28	278.77	1.39	0.00	370.55	103.02	29.26	113.08	125.18
2015	39.22	485.83	0.00	0.00	18.92	8.56	552.53	4.16	0.00	422.34	101.11	33.45	118.89	168.89
2016	10.66	643.32	0.00	0.00	25.89	17.93	697.80	7.65	0.00	437.56	99.27	35.70	122.03	180.55
2017	10.72	779.65	0.00	0.00	37.88	24.95	853.21	11.91	0.00	472.84	97.28	38.30	129.04	208.23
2018	12.74	549.74	0.00	0.00	39.82	146.07	748.37	15.65	0.00	455.96	95.15	39.07	132.28	189.46
2019	12.82	393.19	0.00	0.00	47.18	100.61	553.80	18.42	13.01	491.07	95.09	36.64	132.97	226.37
2020	12.89	160.55	0.00	0.00	0.01	278.17	451.63	20.68	47.98	781.78	102.35	28.69	150.82	499.92
2021	16.30	55.71	0.00	0.00	0.00	0.00	72.02	21.04	46.21	847.19	102.98	31.36	166.88	545.97
2022	164.90	0.00	0.00	0.00	0.00	0.00	164.90	21.87	44.90	850.27	101.85	31.21	171.78	545.44
2023	251.53	0.00	0.00	0.00	0.00	0.00	251.53	23.12	42.92	805.88	98.89	33.32	177.66	496.01
2024	273.27	0.00	0.00	0.00	0.00	0.00	273.27	24.49	41.22	782.40	96.73	36.80	187.36	461.51
2025	278.50	0.00	0.00	0.00	3.53	0.00	282.03	25.90	39.45	739.68	96.68	26.48	170.00	446.52
2026	753.38	0.00	0.00	0.00	3.53	0.00	756.91	29.68	37.57	719.70	94.76	27.24	188.58	409.12
2027	1196.26	0.00	0.00	0.00	42.90	0.00	1239.16	35.88	36.17	665.73	92.87	25.77	181.82	365.27
2028	1074.05	0.00	0.00	0.00	22.26	0.00	1096.31	41.36	34.83	639.62	91.27	26.75	197.83	323.76
2029	766.99	0.00	0.00	0.00	37.45	0.00	804.44	45.38	36.18	617.92	89.65	27.55	219.41	281.31
2030	531.19	0.00	0.00	0.00	64.84	0.00	596.03	48.36	30.95	610.56	88.31	28.09	238.04	256.12
2031	348.90	0.00	0.00	0.00	86.88	0.00	435.78	50.54	44.00	732.90	92.34	32.47	153.36	454.73
2032	128.50	0.00	0.00	0.00	102.39	0.00	230.89	51.70	43.00	978.89	99.64	31.95	142.43	704.86
2033	40.55	0.00	0.00	0.00	0.00	0.00	40.55	51.90	41.68	1042.11	100.07	31.30	156.56	754.18
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	40.76	1010.00	98.28	30.69	160.43	720.60
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	39.05	939.09	96.65	30.72	134.35	677.37
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	38.38	903.15	94.99	31.42	134.89	641.85
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	51.90	37.61	871.50	93.36	31.36	138.64	608.14
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.90	36.66	837.66	91.71	31.28	143.36	571.31
2039	0.00	0.00	100.11	0.00	0.00	0.00	100.11	52.29	39.07	807.16	90.12	31.35	156.05	529.65
2040	0.00	0.00	128.75	0.00	9.28	0.00	138.03	52.87	35.74	805.39	88.81	29.86	172.16	514.57
2041	0.00	0.00	16.22	0.00	0.00	0.00	16.22	52.95	41.92	779.47	86.80	54.09	175.39	463.19
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	53.35	38.52	763.51	85.25	60.22	187.94	430.11
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	53.94	38.02	751.85	83.86	63.33	203.08	401.57
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	54.42	43.27	748.95	82.65	73.16	217.41	375.74
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	55.34	42.80	718.13	80.79	94.71	223.21	319.42
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	55.42	46.35	701.31	79.34	114.88	232.22	274.87
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	44.39	685.39	78.06	120.19	247.38	239.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	43.10	701.61	79.40	109.93	234.27	278.02
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	55.42	45.59	701.61	79.40	109.93	234.27	278.02
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	55.42	42.30	701.61	79.40	109.93	234.27	278.02
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	55.42	44.82	701.61	79.40	109.93	234.27	278.02
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	55.42	41.57	701.61	79.40	109.93	234.27	278.02
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	55.42	41.22	701.61	79.40	109.93	234.27	278.02
2054	0.00	0.00	0.00	0.00	16.76	18.49	35.25	55.42	40.87	701.61	79.40	109.93	234.27	278.02
2055	0.00	0.00	0.00	0.00	0.00	19.18	19.18	55.42	40.54	701.61	79.40	109.93	234.27	278.02
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	57.45	701.61	79.40	109.93	234.27	278.02
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	41.64	701.61	79.40	109.93	234.27	278.02
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	56.83	701.61	79.40	109.93	234.27	278.02
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	43.95	701.61	79.40	109.93	234.27	278.02
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	55.42	53.00	701.61	79.40	109.93	234.27	278.02
2061	0.00	0.00	0.00	0.00	0.87	0.00	0.87	55.42	38.66	701.61	79.40	109.93	234.27	278.02
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2063	0.00	0.00	0.00	0.00	5.23	0.00	5.23	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2064	0.00	0.00	0.00	0.00	19.14	2.09	21.22	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2065	0.00	0.00	0.00	0.00	23.47	4.18	27.65	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2066	0.00	0.00	0.00	0.00	21.97	12.53	34.50	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2067	0.00	0.00	0.00	0.00	34.31	18.79	53.10	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2068	0.00	0.00	0.00	0.00	19.28	56.37	75.65	55.42	66.75	701.61	79.40	109.93	234.27	278.02
2069	0.00	0.00	78.30	0.00	30.42	56.37	165.09	55.42	38.66	701.61	79.40	109.93	234.27	278.02
2070	0.00	0.00	106.94	0.00	0.01	58.46	165.41	55.42	53.00	701.61	79.40	109.93	234.27	278.02
2071	0.00	0.00	16.22	0.00	0.00	0.00	16.22	55.42	40.40	701.61	79.40	109.93	234.27	278.02
2072	0.00	0.00	79.48	0.00	0.00	0.00	79.48	55.42	53.00	701.61	79.40	109.93	234.27	278.02
2073	0.00	0.00	108.56	0.00	0.00	0.00	108.56	55.42	36.63	701.61	79.40	109.93	234.27	278.02
2074	0.00	0.00	96.75	0.00	0.00	0.00	96.75	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2075	0.00	0.00	109.64	0.00	11.94	0.00	121.58	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2076	0.00	0.00	16.63	0.00	2.66	0.00	19.29	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2077	0.00	0.00	0.00	0.00	32.44	0.00	32.44	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2078	0.00	0.00	0.00	0.00	26.30	0.00	26.30	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2079	0.00	0.00	0.00	0.00	28.73	0.00	28.73	55.42	38.66	701.61	79.40	109.93	234.27	278.02
2080	0.00	0.00	0.00	0.00	104.82	0.00	104.82	55.42	51.26	701.61	79.40	109.93	234.27	278.02
2081	0.00	0.00	0.00	0.00	65.95	0.00	65.95	55.42	38.66	701.61	79.40	109.93	234.27	278.02
2082	0.00	0.00	0.00	0.00	77.10	0.00	77.10	55.42	53.00	701.61	79.40	109.93	234.27	278.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42	37.50	701.61	79.40	109.93	234.27	278.02
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	55.42	53.00	701.61	79.40	109.93	234.27	278.02
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	55.42	37.50	701.61	79.40	109.93	234.27	278.02
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	55.42	53.00	701.61	79.40	109.93	234.27	278.02
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2088	0.00	0.00	0.00	0.00	20.54	18.49	39.04	55.42	35.76	701.61	79.40	109.93	234.27	278.02
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	55.42	38.66	701.61	79.40	109.93	234.27	278.02
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	55.42	38.66	701.61	79.40	109.93	234.27	278.02
Salvage Value	17.09	0.00	6.54	0.00	11.55	4.78	39.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3127.55	2857.05	193.35	0.00	385.74	477.79	7041.47	698.05	634.27	13890.92	1889.73	994.81	3508.59	7497.80

Net Present Value -876

K19/Gas31/750MW | **TABLE 275** | **Energy Price: High**

ECONOMIC SUMMARY | **Discount Rate: Reference**

NFAT 2012 | **Capital Cost: Reference**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	5.28	247.70	1.24	0.00	370.55	103.02	29.26	113.08	125.18
2015	0.00	485.83	0.00	0.00	18.92	8.56	513.31	3.81	0.00	422.34	101.11	33.45	118.89	168.89
2016	0.00	643.32	0.00	0.00	25.89	17.93	687.14	7.24	0.00	437.56	99.27	35.70	122.03	180.55
2017	0.00	779.65	0.00	0.00	37.88	24.95	842.49	11.45	0.00	472.84	97.28	38.30	129.04	208.23
2018	0.00	549.74	0.00	0.00	39.82	146.07	735.63	15.13	0.00	455.96	95.15	39.07	132.28	189.46
2019	0.00	393.19	0.00	0.00	47.18	100.61	540.98	17.84	13.01	491.07	95.09	36.64	132.97	226.37
2020	0.00	160.55	0.00	0.00	0.01	278.17	438.74	20.03	47.98	781.78	102.35	28.69	150.82	499.92
2021	0.00	55.71	0.00	0.00	0.00	0.00	55.71	20.31	46.21	847.19	102.98	31.36	166.88	545.97
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	44.90	850.18	101.85	31.24	171.78	545.32
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	42.92	806.58	98.89	33.32	177.69	496.68
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	41.22	783.74	96.74	36.82	187.34	462.83
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	39.45	742.96	96.67	26.50	170.82	448.97
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.31	37.57	726.22	94.75	27.43	190.63	413.42
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	20.31	36.17	673.97	92.85	25.85	183.66	371.62
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	20.31	34.83	651.74	91.25	26.77	201.75	331.97
2029	0.00	0.00	170.79	0.00	0.00	0.00	170.79	21.05	36.18	627.49	89.70	27.19	219.92	290.68
2030	0.00	0.00	300.16	0.00	18.56	0.00	318.72	22.54	30.95	629.12	89.12	24.05	231.53	284.42
2031	0.00	0.00	135.19	0.00	73.08	0.00	208.27	23.57	37.66	617.26	86.92	56.68	196.46	277.20
2032	0.00	0.00	91.13	0.00	0.00	0.00	91.13	24.02	40.44	603.87	85.34	72.24	205.14	241.15
2033	0.00	0.00	103.28	0.00	0.00	0.00	103.28	24.54	39.27	586.20	83.89	79.20	215.86	207.25
2034	0.00	0.00	15.67	0.00	0.00	0.00	15.67	24.62	42.11	588.27	83.10	86.43	225.76	192.98
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.62	40.58	508.81	80.98	104.37	196.54	126.93
2036	0.00	0.00	159.02	0.00	0.00	0.00	159.02	25.41	39.95	480.27	79.53	114.03	200.55	86.15
2037	0.00	0.00	229.73	0.00	0.00	0.00	229.73	26.56	39.36	461.78	78.20	125.00	209.36	49.22
2038	0.00	0.00	102.89	0.00	61.48	0.00	164.37	27.38	38.79	473.08	78.11	117.86	221.81	55.30
2039	0.00	0.00	7.57	0.00	0.00	0.00	7.57	27.42	48.06	539.29	75.84	242.47	205.66	15.33
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.42	44.62	510.82	73.94	260.94	219.60	-43.66
2041	0.00	0.00	79.09	0.00	0.00	0.00	79.09	27.82	44.09	488.30	72.46	278.19	230.89	-93.24
2042	0.00	0.00	271.87	0.00	0.00	0.00	271.87	29.18	43.58	467.20	71.10	297.63	241.15	-142.67
2043	0.00	0.00	253.10	0.00	0.00	0.00	253.10	30.44	47.08	461.15	70.24	315.69	250.14	-174.91
2044	0.00	0.00	106.02	0.00	61.48	0.00	167.50	31.28	48.34	464.51	69.93	306.17	266.62	-178.21
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	31.32	54.81	539.82	67.95	453.03	236.78	-217.94
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	54.37	518.64	66.73	469.16	248.82	-266.07
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	53.07	495.65	65.47	493.79	257.54	-321.16
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	51.78	518.04	66.72	471.99	247.72	-268.39
2049	0.00	0.00	0.00	0.00	10.59	0.68	11.28	31.32	54.27	518.04	66.72	471.99	247.72	-268.39
2050	0.00	0.00	0.00	0.00	10.27	1.37	11.64	31.32	50.99	518.04	66.72	471.99	247.72	-268.39
2051	0.00	0.00	0.00	0.00	24.85	4.11	28.96	31.32	50.61	518.04	66.72	471.99	247.72	-268.39
2052	0.00	0.00	0.00	0.00	28.87	6.16	35.03	31.32	50.25	518.04	66.72	471.99	247.72	-268.39
2053	0.00	0.00	0.00	0.00	20.54	18.49	39.04	31.32	49.89	518.04	66.72	471.99	247.72	-268.39
2054	0.00	0.00	0.00	0.00	16.76	18.49	35.25	31.32	49.55	518.04	66.72	471.99	247.72	-268.39
2055	0.00	0.00	0.00	0.00	0.00	19.18	19.18	31.32	49.22	518.04	66.72	471.99	247.72	-268.39
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	64.39	518.04	66.72	471.99	247.72	-268.39
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	48.58	518.04	66.72	471.99	247.72	-268.39
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	63.78	518.04	66.72	471.99	247.72	-268.39
2059	0.00	0.00	148.99	0.00	0.00	0.00	148.99	31.32	50.89	518.04	66.72	471.99	247.72	-268.39
2060	0.00	0.00	278.35	0.00	0.00	0.00	278.35	31.32	59.94	518.04	66.72	471.99	247.72	-268.39
2061	0.00	0.00	133.12	0.00	0.00	0.00	133.12	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2062	0.00	0.00	91.13	0.00	0.00	0.00	91.13	31.32	59.94	518.04	66.72	471.99	247.72	-268.39
2063	0.00	0.00	103.28	0.00	0.00	0.00	103.28	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2064	0.00	0.00	15.67	0.00	10.42	2.09	28.17	31.32	59.94	518.04	66.72	471.99	247.72	-268.39
2065	0.00	0.00	0.00	0.00	27.20	4.18	31.38	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2066	0.00	0.00	159.02	0.00	55.85	12.53	227.39	31.32	59.94	518.04	66.72	471.99	247.72	-268.39
2067	0.00	0.00	229.73	0.00	9.01	18.79	257.54	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2068	0.00	0.00	102.89	0.00	19.28	56.37	178.54	31.32	59.94	518.04	66.72	471.99	247.72	-268.39
2069	0.00	0.00	7.57	0.00	30.42	56.37	94.36	31.32	47.34	518.04	66.72	471.99	247.72	-268.39
2070	0.00	0.00	0.00	0.00	0.01	58.46	58.46	31.32	46.18	518.04	66.72	471.99	247.72	-268.39
2071	0.00	0.00	79.09	0.00	0.00	0.00	79.09	31.32	46.18	518.04	66.72	471.99	247.72	-268.39
2072	0.00	0.00	271.87	0.00	0.00	0.00	271.87	31.32	46.18	518.04	66.72	471.99	247.72	-268.39
2073	0.00	0.00	253.10	0.00	46.11	0.00	299.21	31.32	45.31	518.04	66.72	471.99	247.72	-268.39
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2075	0.00	0.00	7.80	0.00	0.00	0.00	7.80	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	31.32	47.34	518.04	66.72	471.99	247.72	-268.39
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2081	0.00	0.00	0.00	0.00	18.27	0.00	18.27	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2084	0.00	0.00	0.00	0.00	10.59	0.68	11.28	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2085	0.00	0.00	0.00	0.00	10.27	1.37	11.64	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2086	0.00	0.00	0.00	0.00	24.85	4.11	28.96	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2087	0.00	0.00	0.00	0.00	28.87	6.16	35.03	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2088	0.00	0.00	0.00	0.00	35.91	18.49	54.41	31.32	44.44	518.04	66.72	471.99	247.72	-268.39
2089	0.00	0.00	0.00	0.00	16.76	18.49	35.25	31.32	47.34	518.04	66.72	471.99	247.72	-268.39
2090	0.00	0.00	0.00	0.00	0.00	19.18	19.18	31.32	47.34	518.04	66.72	471.99	247.72	-268.39
Salvage Value	0.00	0.00	12.49	0.00	6.21	4.78	23.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	839.87	0.00	268.91	477.79	4443.62	425.09	668.78	11651.46	1776.85	2994.53	3826.40	3053.67

Net Present Value: -2484

K19/C25/250MW

TABLE 276
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.71	221.41	0.00	0.00	21.01	3.97	278.09	1.40	0.00	370.55	103.02	29.26	113.08	125.18
2015	87.48	485.83	0.00	0.00	18.92	2.72	594.95	4.38	0.00	422.34	101.11	33.45	118.89	168.89
2016	182.24	643.32	0.00	0.00	25.89	3.96	855.41	8.66	0.00	437.56	99.27	35.69	122.05	180.54
2017	212.03	779.65	0.00	0.00	37.88	5.94	1035.50	13.83	0.00	472.28	97.29	38.30	129.07	207.63
2018	254.86	549.74	0.00	0.00	39.82	17.82	862.24	18.14	0.00	451.12	94.57	41.83	134.51	180.21
2019	260.97	393.19	0.00	0.00	50.71	17.82	722.69	21.76	13.01	480.90	94.22	41.57	135.08	210.03
2020	719.36	160.55	0.00	0.00	3.54	18.48	901.93	26.27	13.22	726.64	102.70	29.62	128.49	465.83
2021	1154.84	55.71	0.00	0.00	42.90	0.00	1253.46	32.54	12.98	770.66	103.41	30.17	135.69	501.39
2022	1036.87	0.00	0.00	0.00	22.26	0.00	1059.12	37.83	13.20	756.76	101.50	31.30	141.61	482.36
2023	740.43	0.00	0.00	0.00	37.45	0.00	777.88	41.72	13.02	738.34	99.29	31.07	155.29	452.70
2024	512.79	0.00	0.00	0.00	64.84	0.00	577.64	44.61	12.98	725.68	96.96	34.25	173.09	421.39
2025	336.82	0.00	0.00	0.00	86.88	0.00	423.70	46.73	27.06	806.08	101.65	30.47	117.58	556.38
2026	124.05	0.00	0.00	0.00	102.39	0.00	226.44	47.86	26.87	1033.24	109.37	29.63	113.01	781.23
2027	39.15	0.00	0.00	0.00	0.00	0.00	39.15	48.06	26.75	1044.22	108.69	28.05	117.09	790.39
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	27.03	1027.13	106.96	29.25	120.43	770.49
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	29.55	1000.67	105.16	29.52	122.93	743.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.57	984.70	103.90	29.20	122.03	729.58
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.40	970.83	102.29	29.83	124.80	713.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.04	940.96	100.69	30.08	125.26	684.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.11	903.41	99.04	30.28	122.06	652.04
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	25.22	872.92	97.40	30.55	124.14	620.84
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	27.29	846.01	95.79	30.81	120.34	599.07
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	48.06	24.39	813.03	94.22	31.27	121.66	565.88
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.06	24.39	778.57	92.65	31.23	123.61	531.09
2038	0.00	0.00	99.72	0.00	0.00	0.00	99.72	48.44	24.39	742.56	91.10	31.25	126.28	493.92
2039	0.00	0.00	128.22	0.00	9.28	0.00	137.50	49.02	27.29	731.22	89.91	29.57	140.28	471.45
2040	0.00	0.00	16.14	0.00	0.00	0.00	16.14	49.10	28.37	709.81	87.88	52.83	146.69	422.42
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.72	692.70	86.37	59.20	156.36	390.78
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	49.50	27.72	679.10	85.03	62.78	166.41	364.88
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	50.09	27.72	665.84	83.64	62.77	183.52	335.90
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	50.57	33.44	649.37	82.06	95.04	183.58	288.70
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	51.49	36.33	630.36	80.65	104.58	194.55	250.59
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	51.57	37.43	617.40	79.27	118.86	207.46	211.81
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	36.57	598.36	77.87	120.55	227.22	172.71
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.70	615.38	79.26	114.66	209.74	211.70
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	51.57	38.59	615.38	79.26	114.66	209.74	211.70
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	51.57	37.44	615.38	79.26	114.66	209.74	211.70
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	51.57	37.45	615.38	79.26	114.66	209.74	211.70
2052	0.00	0.00	0.00	0.00	28.87	1.47	30.34	51.57	37.45	615.38	79.26	114.66	209.74	211.70
2053	0.00	0.00	0.00	0.00	20.54	4.40	24.95	51.57	37.46	615.38	79.26	114.66	209.74	211.70
2054	0.00	0.00	0.00	0.00	17.63	4.40	22.03	51.57	37.46	615.38	79.26	114.66	209.74	211.70
2055	0.00	0.00	0.00	0.00	0.87	4.56	5.44	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2056	0.00	0.00	0.00	0.00	10.47	0.00	10.47	51.57	51.21	615.38	79.26	114.66	209.74	211.70
2057	0.00	0.00	0.00	0.00	5.23	0.00	5.23	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2058	0.00	0.00	0.00	0.00	8.72	0.00	8.72	51.57	51.21	615.38	79.26	114.66	209.74	211.70
2059	0.00	0.00	0.00	0.00	14.83	0.00	14.83	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2060	0.00	0.00	0.00	0.00	20.93	0.00	20.93	51.57	51.21	615.38	79.26	114.66	209.74	211.70
2061	0.00	0.00	0.00	0.00	25.29	0.00	25.29	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	66.71	615.38	79.26	114.66	209.74	211.70
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2064	0.00	0.00	0.00	0.00	10.42	3.81	14.22	51.57	66.71	615.38	79.26	114.66	209.74	211.70
2065	0.00	0.00	0.00	0.00	8.65	2.40	11.04	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2066	0.00	0.00	0.00	0.00	1.04	2.98	4.02	51.57	66.71	615.38	79.26	114.66	209.74	211.70
2067	0.00	0.00	0.00	0.00	9.01	4.47	13.49	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2068	0.00	0.00	77.91	0.00	19.28	13.42	110.61	51.57	66.71	615.38	79.26	114.66	209.74	211.70
2069	0.00	0.00	106.41	0.00	33.08	13.42	152.91	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2070	0.00	0.00	16.14	0.00	2.67	13.91	32.72	51.57	52.95	615.38	79.26	114.66	209.74	211.70
2071	0.00	0.00	0.00	0.00	32.44	0.00	32.44	51.57	37.46	615.38	79.26	114.66	209.74	211.70
2072	0.00	0.00	79.48	0.00	17.02	0.00	96.51	51.57	52.95	615.38	79.26	114.66	209.74	211.70
2073	0.00	0.00	108.56	0.00	28.73	0.00	137.28	51.57	36.59	615.38	79.26	114.66	209.74	211.70
2074	0.00	0.00	96.75	0.00	59.30	0.00	156.04	51.57	51.21	615.38	79.26	114.66	209.74	211.70
2075	0.00	0.00	109.64	0.00	65.95	0.00	175.59	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2076	0.00	0.00	16.63	0.00	77.10	0.00	93.73	51.57	52.95	615.38	79.26	114.66	209.74	211.70
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	37.46	615.38	79.26	114.66	209.74	211.70
2078	0.00	0.00	0.00	0.00	9.28	0.00	9.28	51.57	52.95	615.38	79.26	114.66	209.74	211.70
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	40.35	615.38	79.26	114.66	209.74	211.70
2080	0.00	0.00	0.00	0.00	54.81	0.00	54.81	51.57	52.95	615.38	79.26	114.66	209.74	211.70
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2084	0.00	0.00	0.00	0.00	10.59	0.16	10.75	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2087	0.00	0.00	0.00	0.00	28.87	1.47	30.34	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2088	0.00	0.00	0.00	0.00	20.54	4.40	24.95	51.57	35.72	615.38	79.26	114.66	209.74	211.70
2089	0.00	0.00	0.00	0.00	16.76	4.40	21.16	51.57	38.62	615.38	79.26	114.66	209.74	211.70
2090	0.00	0.00	0.00	0.00	0.00	4.56	4.56	51.57	38.62	615.38	79.26	114.66	209.74	211.70
Salvage Value	2.31	0.00	6.36	0.00	10.29	1.28	20.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4000.14	2857.05	197.32	0.00	449.97	66.04	7570.52	754.04	426.24	13975.02	1932.80	1034.92	2985.95	8021.34

Net Present Value -729

K19/Gas24/250MW

TABLE 277
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	221.41	0.00	0.00	21.01	3.97	246.39	1.25	0.00	370.55	103.02	29.26	113.08	125.18
2015	0.00	485.83	0.00	0.00	18.92	2.72	507.47	3.78	0.00	422.34	101.11	33.45	118.89	168.89
2016	0.00	643.32	0.00	0.00	25.89	3.96	673.16	7.15	0.00	437.56	99.27	35.70	122.04	180.54
2017	0.00	779.65	0.00	0.00	37.88	5.94	823.47	11.27	0.00	472.84	97.28	38.30	129.04	208.23
2018	0.00	549.74	0.00	0.00	39.82	17.82	607.38	14.30	0.00	451.89	94.57	41.78	134.42	181.12
2019	0.00	393.19	0.00	0.00	47.18	17.82	458.19	16.59	13.01	482.17	94.21	41.56	135.01	211.40
2020	0.00	160.55	0.36	0.00	0.01	18.48	179.40	17.49	13.22	728.74	102.69	29.64	128.50	467.91
2021	0.00	55.71	0.00	0.00	0.00	0.00	55.71	17.77	12.98	773.97	103.39	30.17	135.56	504.86
2022	0.00	0.00	93.75	0.00	0.00	0.00	93.75	18.13	13.20	766.78	101.95	29.54	140.19	495.10
2023	0.00	0.00	120.06	0.00	9.28	0.00	129.34	18.67	13.02	761.80	100.87	24.80	145.63	490.50
2024	0.00	0.00	14.90	0.00	0.00	0.00	14.90	18.74	16.96	755.52	99.00	40.41	150.59	465.51
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.74	16.74	665.43	96.74	30.85	136.40	401.44
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.74	16.33	638.63	94.45	34.93	145.04	364.21
2027	0.00	0.00	73.75	0.00	0.00	0.00	73.75	19.11	16.35	604.65	92.39	37.90	147.66	326.70
2028	0.00	0.00	102.81	0.00	73.08	0.00	175.88	19.98	16.42	584.48	90.54	43.93	155.53	294.48
2029	0.00	0.00	168.84	0.00	0.00	0.00	168.84	20.82	23.11	570.56	88.80	60.62	162.30	258.84
2030	0.00	0.00	221.85	0.00	0.00	0.00	221.85	21.93	19.18	567.36	87.89	65.39	166.04	248.04
2031	0.00	0.00	99.36	0.00	9.28	0.00	108.64	22.47	19.18	594.09	88.48	56.77	167.67	281.18
2032	0.00	0.00	7.31	0.00	0.00	0.00	7.31	22.51	26.09	628.15	85.94	154.73	144.84	242.64
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.51	26.10	615.42	84.43	164.96	155.06	210.98
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.51	26.10	601.28	82.94	177.41	163.92	177.01
2035	0.00	0.00	158.23	0.00	0.00	0.00	158.23	23.30	25.45	531.45	80.93	178.00	154.75	117.78
2036	0.00	0.00	228.59	0.00	0.00	0.00	228.59	24.45	25.46	504.96	79.45	188.51	159.31	77.70
2037	0.00	0.00	102.38	0.00	0.00	0.00	102.38	24.96	25.46	522.52	79.90	181.31	158.22	103.10
2038	0.00	0.00	168.14	0.00	0.00	0.00	168.14	25.80	32.37	563.28	77.48	295.60	139.67	50.53
2039	0.00	0.00	232.04	0.00	0.00	0.00	232.04	26.96	35.27	547.85	76.09	309.54	156.78	5.44
2040	0.00	0.00	103.92	0.00	61.48	0.00	165.40	27.78	32.37	547.37	75.47	313.97	165.22	-7.29
2041	0.00	0.00	7.64	0.00	0.00	0.00	7.64	27.82	39.30	596.45	73.61	429.09	142.53	-48.79
2042	0.00	0.00	163.85	0.00	0.00	0.00	163.85	28.64	39.30	575.18	71.81	456.48	152.95	-106.06
2043	0.00	0.00	236.71	0.00	0.00	0.00	236.71	29.83	39.30	559.75	70.48	478.16	160.80	-149.69
2044	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.36	41.04	551.98	69.99	478.88	168.72	-165.60
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	30.40	47.96	596.44	67.69	614.78	150.87	-236.90
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	47.96	604.94	67.87	608.91	151.52	-223.36
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	47.10	576.98	65.90	651.31	164.20	-304.43
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	30.40	49.14	592.79	67.15	625.00	155.53	-254.90
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2052	0.00	0.00	71.94	0.00	28.87	1.47	102.27	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2053	0.00	0.00	98.25	0.00	20.54	4.40	123.20	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2054	0.00	0.00	14.90	0.00	16.76	4.40	36.07	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2055	0.00	0.00	0.00	0.00	0.00	4.56	4.56	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2057	0.00	0.00	73.75	0.00	0.00	0.00	73.75	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2058	0.00	0.00	100.73	0.00	9.28	0.00	110.01	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2059	0.00	0.00	168.84	0.00	0.00	0.00	168.84	30.40	49.14	592.79	67.15	625.00	155.53	-254.90
2060	0.00	0.00	221.85	0.00	0.00	0.00	221.85	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2061	0.00	0.00	99.36	0.00	0.00	0.00	99.36	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2062	0.00	0.00	7.31	0.00	0.00	0.00	7.31	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2063	0.00	0.00	0.00	0.00	54.81	2.80	57.61	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2064	0.00	0.00	0.00	0.00	10.42	3.81	14.22	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2065	0.00	0.00	158.23	0.00	8.65	2.40	169.27	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2066	0.00	0.00	228.59	0.00	10.32	2.98	241.89	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2067	0.00	0.00	102.38	0.00	9.01	4.47	115.87	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2068	0.00	0.00	168.14	0.00	19.28	13.42	200.84	30.40	61.73	592.79	67.15	625.00	155.53	-254.90
2069	0.00	0.00	232.04	0.00	30.42	13.42	275.88	30.40	49.14	592.79	67.15	625.00	155.53	-254.90
2070	0.00	0.00	103.92	0.00	0.01	13.91	117.85	30.40	47.98	592.79	67.15	625.00	155.53	-254.90
2071	0.00	0.00	7.64	0.00	0.00	0.00	7.64	30.40	47.98	592.79	67.15	625.00	155.53	-254.90
2072	0.00	0.00	163.85	0.00	0.00	0.00	163.85	30.40	47.98	592.79	67.15	625.00	155.53	-254.90
2073	0.00	0.00	236.71	0.00	0.00	0.00	236.71	30.40	47.11	592.79	67.15	625.00	155.53	-254.90
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2075	0.00	0.00	7.80	0.00	46.11	0.00	53.90	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2078	0.00	0.00	0.00	0.00	18.27	0.00	18.27	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	49.14	592.79	67.15	625.00	155.53	-254.90
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2082	0.00	0.00	71.94	0.00	0.00	0.00	71.94	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2083	0.00	0.00	98.25	0.00	0.00	0.00	98.25	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2084	0.00	0.00	14.90	0.00	10.59	0.16	25.66	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2087	0.00	0.00	73.75	0.00	28.87	1.47	104.09	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2088	0.00	0.00	100.73	0.00	20.54	4.40	125.68	30.40	46.24	592.79	67.15	625.00	155.53	-254.90
2089	0.00	0.00	15.28	0.00	16.76	4.40	36.44	30.40	49.14	592.79	67.15	625.00	155.53	-254.90
2090	0.00	0.00	0.00	0.00	15.37	4.56	19.93	30.40	49.14	592.79	67.15	625.00	155.53	-254.90
Salvage Value	0.00	0.00	22.22	0.00	5.37	1.28	28.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2857.05	1097.53	0.00	259.43	66.04	4280.05	404.31	445.49	11722.75	1781.44	4090.04	2935.42	2915.85

Net Present Value -2214

K19/C31/250MW | **TABLE 278** | **Energy Price** High
ECONOMIC SUMMARY | **Discount Rate** Reference
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	221.41	0.00	0.00	21.01	3.97	277.46	1.40	0.00	370.55	103.02	29.26	113.08	125.18
2015	39.22	485.83	0.00	0.00	18.92	2.72	546.70	4.13	0.00	422.34	101.11	33.45	118.89	168.89
2016	10.66	643.32	0.00	0.00	25.89	3.96	683.82	7.55	0.00	437.56	99.27	35.70	122.04	180.54
2017	10.72	779.65	0.00	0.00	37.88	5.94	834.19	11.72	0.00	472.84	97.28	38.30	129.04	208.23
2018	12.74	549.74	0.00	0.00	39.82	17.82	620.12	14.83	0.00	451.89	94.57	41.78	134.42	181.12
2019	12.82	393.19	0.00	0.00	47.18	17.82	471.00	17.18	13.01	482.17	94.21	41.56	135.01	211.40
2020	12.89	160.55	0.36	0.00	0.01	18.48	192.29	18.14	13.22	728.74	102.69	29.64	128.50	467.91
2021	16.30	55.71	0.00	0.00	0.00	0.00	72.02	18.50	12.98	773.97	103.39	30.17	135.56	504.86
2022	164.90	0.00	93.75	0.00	0.00	0.00	258.64	19.68	13.20	766.61	101.93	29.59	140.24	494.85
2023	251.53	0.00	120.06	0.00	9.28	0.00	380.87	21.48	13.02	760.97	100.84	24.97	145.90	489.25
2024	273.27	0.00	14.90	0.00	0.00	0.00	288.17	22.92	16.96	754.72	98.98	40.67	151.11	463.95
2025	278.50	0.00	0.00	0.00	3.53	0.00	282.03	24.33	16.74	664.08	96.70	31.03	137.19	399.17
2026	753.38	0.00	0.00	0.00	3.53	0.00	756.91	28.12	16.33	636.96	94.44	35.18	145.63	361.71
2027	1196.26	0.00	73.75	0.00	42.90	0.00	1312.92	34.68	16.35	602.15	92.38	38.33	148.28	323.16
2028	1074.05	0.00	100.73	0.00	31.54	0.00	1206.32	40.71	16.42	580.75	90.47	45.08	156.32	288.88
2029	766.99	0.00	15.28	0.00	37.45	0.00	819.72	44.81	23.10	566.42	88.77	61.86	163.65	252.14
2030	531.19	0.00	0.00	0.00	64.84	0.00	596.03	47.79	19.16	594.99	89.84	54.07	157.73	293.36
2031	348.90	0.00	0.00	0.00	86.88	0.00	435.78	49.97	33.47	681.58	92.95	45.27	122.35	421.01
2032	128.50	0.00	0.00	0.00	102.39	0.00	230.89	51.12	33.68	908.51	100.07	43.70	114.94	649.79
2033	40.55	0.00	0.00	0.00	0.00	0.00	40.55	51.33	33.55	939.87	99.99	45.32	122.07	672.49
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	33.76	904.54	98.22	46.43	124.41	635.49
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.93	874.96	96.53	47.09	120.79	610.54
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.88	844.24	94.90	48.27	122.20	578.87
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.71	803.82	93.04	50.05	125.41	535.32
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.35	757.42	91.07	52.15	128.67	485.52
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	35.31	725.39	89.17	57.65	141.25	437.32
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.53	705.43	87.47	65.23	148.68	404.05
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	35.25	684.34	85.82	73.93	157.71	366.89
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	51.33	32.36	682.37	84.97	74.88	164.08	358.44
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.33	32.36	670.32	83.63	74.60	180.25	331.84
2044	0.00	0.00	80.28	0.00	0.00	0.00	80.28	51.73	34.10	649.63	82.07	94.99	183.56	289.01
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	52.64	34.10	630.48	80.65	104.55	194.50	250.78
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	52.72	38.09	617.53	79.27	118.85	207.45	211.96
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	36.57	598.37	77.87	120.55	227.22	172.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	35.70	615.46	79.26	114.65	209.72	211.82
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	52.72	38.59	615.46	79.26	114.65	209.72	211.82
2050	0.00	0.00	0.00	0.00	10.27	0.33	10.60	52.72	35.70	615.46	79.26	114.65	209.72	211.82
2051	0.00	0.00	0.00	0.00	24.85	0.98	25.83	52.72	38.60	615.46	79.26	114.65	209.72	211.82
2052	0.00	0.00	71.94	0.00	28.87	1.47	102.27	52.72	35.71	615.46	79.26	114.65	209.72	211.82
2053	0.00	0.00	98.25	0.00	20.54	4.40	123.20	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2054	0.00	0.00	14.90	0.00	16.76	4.40	36.07	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2055	0.00	0.00	0.00	0.00	0.00	4.56	4.56	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2057	0.00	0.00	73.75	0.00	0.00	0.00	73.75	52.72	37.46	615.46	79.26	114.65	209.72	211.82
2058	0.00	0.00	100.73	0.00	9.28	0.00	110.01	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2059	0.00	0.00	15.28	0.00	0.00	0.00	15.28	52.72	40.35	615.46	79.26	114.65	209.72	211.82
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2061	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.72	38.62	615.46	79.26	114.65	209.72	211.82
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2063	0.00	0.00	0.00	0.00	14.51	2.80	17.32	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2064	0.00	0.00	0.00	0.00	19.14	3.81	22.95	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2065	0.00	0.00	0.00	0.00	23.47	2.40	25.87	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2066	0.00	0.00	0.00	0.00	21.97	2.98	24.95	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2067	0.00	0.00	0.00	0.00	34.31	4.47	38.78	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2068	0.00	0.00	0.00	0.00	19.28	13.42	32.70	52.72	66.71	615.46	79.26	114.65	209.72	211.82
2069	0.00	0.00	0.00	0.00	30.42	13.42	43.84	52.72	38.62	615.46	79.26	114.65	209.72	211.82
2070	0.00	0.00	0.00	0.00	0.01	13.91	13.92	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	40.35	615.46	79.26	114.65	209.72	211.82
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.72	36.59	615.46	79.26	114.65	209.72	211.82
2074	0.00	0.00	80.28	0.00	0.00	0.00	80.28	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2075	0.00	0.00	109.64	0.00	2.66	0.00	112.30	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2076	0.00	0.00	16.63	0.00	2.66	0.00	19.29	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2077	0.00	0.00	0.00	0.00	32.44	0.00	32.44	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2078	0.00	0.00	0.00	0.00	17.02	0.00	17.02	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2079	0.00	0.00	0.00	0.00	28.73	0.00	28.73	52.72	38.62	615.46	79.26	114.65	209.72	211.82
2080	0.00	0.00	0.00	0.00	104.82	0.00	104.82	52.72	51.21	615.46	79.26	114.65	209.72	211.82
2081	0.00	0.00	0.00	0.00	65.95	0.00	65.95	52.72	38.62	615.46	79.26	114.65	209.72	211.82
2082	0.00	0.00	71.94	0.00	77.10	0.00	149.03	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2083	0.00	0.00	98.25	0.00	0.00	0.00	98.25	52.72	37.46	615.46	79.26	114.65	209.72	211.82
2084	0.00	0.00	14.90	0.00	10.59	0.16	25.66	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2085	0.00	0.00	0.00	0.00	10.27	0.33	10.60	52.72	37.46	615.46	79.26	114.65	209.72	211.82
2086	0.00	0.00	0.00	0.00	24.85	0.98	25.83	52.72	52.95	615.46	79.26	114.65	209.72	211.82
2087	0.00	0.00	73.75	0.00	28.87	1.47	104.09	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2088	0.00	0.00	100.73	0.00	20.54	4.40	125.68	52.72	35.72	615.46	79.26	114.65	209.72	211.82
2089	0.00	0.00	15.28	0.00	16.76	4.40	36.44	52.72	38.62	615.46	79.26	114.65	209.72	211.82
2090	0.00	0.00	0.00	0.00	0.00	4.56	4.56	52.72	38.62	615.46	79.26	114.65	209.72	211.82
Salvage Value	17.09	0.00	10.66	0.00	11.35	1.28	40.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3127.55	2857.05	353.00	0.00	392.78	66.04	6796.42	670.23	428.42	12794.67	1889.56	1146.73	3061.09	6697.30

Net Present Value -1198

All Gas

TABLE 279
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	424.74	101.10	33.46	118.80	171.38
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	440.11	99.26	35.68	121.95	183.21
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	480.37	97.64	36.87	127.50	218.35
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	458.44	94.84	40.19	133.19	190.22
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	442.22	92.91	35.62	136.04	177.66
2020	0.00	0.00	93.03	0.00	0.00	0.00	93.03	0.87	0.00	472.97	92.97	28.13	142.16	209.70
2021	0.00	0.00	119.13	0.00	9.28	0.00	128.41	1.40	0.00	464.24	91.22	26.32	154.81	191.89
2022	0.00	0.00	14.76	0.00	0.00	0.00	14.76	1.47	3.98	452.03	88.95	48.91	160.20	153.97
2023	0.00	0.00	72.30	0.00	0.00	0.00	72.30	1.84	3.98	434.04	86.76	60.21	170.77	116.29
2024	0.00	0.00	100.82	0.00	73.08	0.00	173.89	2.70	3.98	425.79	85.29	68.73	179.75	92.02
2025	0.00	0.00	14.98	0.00	0.00	0.00	14.98	2.77	7.98	373.14	84.81	57.58	157.14	73.61
2026	0.00	0.00	73.39	0.00	0.00	0.00	73.39	3.14	7.98	354.21	83.50	59.58	162.05	49.09
2027	0.00	0.00	100.23	0.00	0.00	0.00	100.23	3.64	7.98	332.49	81.64	59.89	180.23	10.73
2028	0.00	0.00	168.00	0.00	0.00	0.00	168.00	4.48	11.97	309.35	79.70	93.39	178.88	-42.62
2029	0.00	0.00	220.75	0.00	0.00	0.00	220.75	5.58	11.97	288.25	78.24	106.18	186.61	-82.77
2030	0.00	0.00	98.87	0.00	9.28	0.00	108.15	6.12	11.98	306.69	79.18	98.82	180.95	-52.25
2031	0.00	0.00	7.27	0.00	0.00	0.00	7.27	6.16	18.90	331.68	76.77	184.33	161.28	-90.71
2032	0.00	0.00	75.62	0.00	0.00	0.00	75.62	6.54	18.90	301.55	74.86	201.65	171.38	-146.35
2033	0.00	0.00	103.28	0.00	61.48	0.00	164.75	7.36	18.90	274.62	73.12	218.99	182.02	-199.51
2034	0.00	0.00	173.11	0.00	0.00	0.00	173.11	8.23	22.90	256.85	71.70	245.64	188.32	-248.82
2035	0.00	0.00	227.45	0.00	0.00	0.00	227.45	9.36	22.90	241.05	70.81	258.09	194.31	-282.16
2036	0.00	0.00	101.87	0.00	0.00	0.00	101.87	9.87	22.90	240.00	70.77	251.03	204.29	-286.09
2037	0.00	0.00	167.31	0.00	0.00	0.00	167.31	10.71	29.82	250.57	68.78	343.09	173.49	-334.79
2038	0.00	0.00	230.88	0.00	0.00	0.00	230.88	11.86	29.82	228.87	67.56	361.36	183.16	-383.20
2039	0.00	0.00	103.41	0.00	0.00	0.00	103.41	12.38	29.83	224.88	67.51	367.02	191.21	-400.85
2040	0.00	0.00	7.60	0.00	0.00	0.00	7.60	12.42	36.75	243.71	65.58	457.65	170.15	-449.67
2041	0.00	0.00	163.04	0.00	0.00	0.00	163.04	13.23	36.76	227.72	63.80	495.09	186.15	-517.32
2042	0.00	0.00	235.53	0.00	0.00	0.00	235.53	14.41	36.76	218.04	62.75	520.95	198.09	-563.76
2043	0.00	0.00	105.49	0.00	61.48	0.00	166.97	15.25	36.76	221.21	62.75	526.23	202.55	-570.32
2044	0.00	0.00	7.76	0.00	0.00	0.00	7.76	15.29	43.68	242.37	61.17	620.70	177.09	-616.58
2045	0.00	0.00	35.49	0.00	0.00	0.00	35.49	15.46	43.68	229.47	59.65	661.24	192.61	-684.02
2046	0.00	0.00	48.47	0.00	0.00	0.00	48.47	15.71	43.68	219.73	58.55	694.78	204.48	-738.07
2047	0.00	0.00	7.35	0.00	0.00	0.00	7.35	15.74	45.13	215.85	57.69	732.22	210.53	-784.59
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.13	221.69	58.63	696.08	202.54	-735.56
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	15.74	45.14	221.69	58.63	696.08	202.54	-735.56
2050	0.00	0.00	71.22	0.00	9.87	0.00	81.09	15.74	45.14	221.69	58.63	696.08	202.54	-735.56
2051	0.00	0.00	97.28	0.00	9.87	0.00	107.14	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2052	0.00	0.00	14.76	0.00	9.87	0.00	24.62	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2053	0.00	0.00	72.30	0.00	0.00	0.00	72.30	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2054	0.00	0.00	98.74	0.00	0.00	0.00	98.74	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2055	0.00	0.00	14.98	0.00	0.00	0.00	14.98	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2056	0.00	0.00	73.39	0.00	9.28	0.00	82.67	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2057	0.00	0.00	100.23	0.00	0.00	0.00	100.23	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2058	0.00	0.00	168.00	0.00	0.00	0.00	168.00	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2059	0.00	0.00	220.75	0.00	54.81	0.00	275.55	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2060	0.00	0.00	98.87	0.00	0.00	0.00	98.87	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2061	0.00	0.00	7.27	0.00	0.00	0.00	7.27	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2062	0.00	0.00	75.62	0.00	0.00	0.00	75.62	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2063	0.00	0.00	103.28	0.00	0.00	0.00	103.28	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2064	0.00	0.00	173.11	0.00	0.00	0.00	173.11	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2065	0.00	0.00	227.45	0.00	9.28	0.00	236.73	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2066	0.00	0.00	101.87	0.00	0.00	0.00	101.87	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2067	0.00	0.00	167.31	0.00	0.00	0.00	167.31	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2068	0.00	0.00	230.88	0.00	46.11	0.00	276.99	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2069	0.00	0.00	103.41	0.00	0.00	0.00	103.41	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2070	0.00	0.00	7.60	0.00	0.00	0.00	7.60	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2071	0.00	0.00	163.04	0.00	0.00	0.00	163.04	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2072	0.00	0.00	235.53	0.00	0.00	0.00	235.53	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2073	0.00	0.00	105.49	0.00	0.00	0.00	105.49	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2074	0.00	0.00	7.76	0.00	18.27	0.00	26.03	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2075	0.00	0.00	35.49	0.00	0.00	0.00	35.49	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2076	0.00	0.00	48.47	0.00	0.00	0.00	48.47	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2077	0.00	0.00	7.35	0.00	0.00	0.00	7.35	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2078	0.00	0.00	0.00	0.00	46.11	0.00	46.11	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2080	0.00	0.00	71.22	0.00	0.00	0.00	71.22	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2081	0.00	0.00	97.28	0.00	0.00	0.00	97.28	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2082	0.00	0.00	14.76	0.00	0.00	0.00	14.76	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2083	0.00	0.00	72.30	0.00	15.37	0.00	87.67	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2084	0.00	0.00	98.74	0.00	9.87	0.00	108.61	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2085	0.00	0.00	14.98	0.00	9.87	0.00	24.84	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2086	0.00	0.00	73.39	0.00	9.87	0.00	83.25	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2087	0.00	0.00	100.23	0.00	9.87	0.00	110.10	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2088	0.00	0.00	15.20	0.00	0.00	0.00	15.20	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.74	45.15	221.69	58.63	696.08	202.54	-735.56
Salvage Value	0.00	0.00	41.11	0.00	2.72	0.00	43.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1405.03	0.00	150.53	0.00	1618.51	130.92	343.48	6899.48	1625.85	4899.33	3385.54	-3011.24

Net Present Value: -5104

Wind/Gas

TABLE 280
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	424.74	101.10	33.46	118.82	171.36
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	440.11	99.26	35.68	121.98	183.19
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	480.42	97.64	36.87	127.52	218.38
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	458.44	94.84	40.19	133.19	190.22
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	442.22	92.91	35.62	136.04	177.66
2020	0.00	0.00	0.00	9.58	13.53	0.00	23.11	0.63	0.00	467.41	92.50	30.33	143.54	201.03
2021	0.00	0.00	0.36	292.47	22.55	0.00	315.39	2.20	0.00	458.63	90.76	29.14	155.72	183.00
2022	0.00	0.00	0.00	297.95	27.23	0.00	325.18	3.83	6.21	468.67	89.13	29.23	157.40	192.91
2023	0.00	0.00	166.40	288.37	14.18	0.00	468.95	6.06	12.42	465.62	86.65	33.43	163.08	182.46
2024	0.00	0.00	219.34	5.47	25.01	0.00	249.82	7.20	18.63	472.29	84.88	33.70	167.49	186.22
2025	0.00	0.00	29.96	4.79	3.89	0.00	38.64	7.40	26.60	433.94	84.97	39.38	138.73	170.88
2026	0.00	0.00	73.39	146.24	9.78	0.00	229.40	8.54	26.60	423.21	83.97	37.64	142.74	158.85
2027	0.00	0.00	102.31	148.97	88.61	0.00	339.89	10.23	29.70	405.41	81.60	46.24	150.66	126.91
2028	0.00	0.00	15.20	148.97	21.53	0.00	185.71	11.16	36.81	399.13	79.86	59.96	155.96	103.36
2029	0.00	0.00	74.49	148.97	21.61	0.00	245.08	12.39	39.91	387.99	78.28	65.10	161.54	83.08
2030	0.00	0.00	101.74	148.97	21.61	0.00	272.32	13.75	43.02	390.56	77.36	68.24	162.82	82.14
2031	0.00	0.00	90.67	148.97	21.61	0.00	261.26	15.06	50.10	395.51	76.15	80.92	166.57	71.88
2032	0.00	0.00	102.76	148.97	83.09	0.00	334.82	16.73	53.22	391.38	75.05	81.66	172.23	62.44
2033	0.00	0.00	15.59	148.97	21.61	0.00	186.17	17.66	60.32	400.11	74.40	87.00	175.72	62.98
2034	0.00	0.00	76.37	148.97	21.61	0.00	246.96	18.90	63.43	383.57	72.60	102.40	180.19	28.38
2035	0.00	0.00	104.31	148.97	21.61	0.00	274.89	20.27	66.55	366.94	70.94	110.48	188.92	-3.40
2036	0.00	0.00	92.96	148.97	21.61	0.00	263.55	21.59	73.63	360.22	69.59	126.97	193.64	-29.97
2037	0.00	0.00	105.36	148.97	21.61	0.00	275.94	22.97	76.75	349.02	68.31	134.53	200.66	-54.48
2038	0.00	0.00	93.90	148.97	21.61	0.00	264.48	24.29	83.84	348.56	67.29	148.24	206.24	-73.21
2039	0.00	0.00	106.41	148.97	83.09	0.00	338.47	25.98	86.95	342.00	66.15	148.68	226.59	-99.42
2040	0.00	0.00	16.14	158.55	21.61	0.00	196.31	26.96	94.06	348.60	65.36	157.44	235.74	-109.93
2041	0.00	0.00	79.09	441.45	21.61	0.00	542.15	29.67	97.17	331.10	63.85	189.02	233.01	-154.78
2042	0.00	0.00	108.02	446.92	21.61	0.00	576.55	32.56	100.27	316.84	62.49	202.23	243.43	-191.31
2043	0.00	0.00	96.27	437.34	21.45	0.00	555.06	35.33	107.36	310.62	61.33	223.64	250.09	-224.44
2044	0.00	0.00	109.10	154.45	20.96	0.00	284.51	36.75	110.47	304.97	60.42	232.49	258.14	-246.07
2045	0.00	0.00	52.04	153.76	19.66	0.00	225.47	37.88	117.57	301.13	59.34	246.14	271.35	-275.71
2046	0.00	0.00	48.47	290.42	17.72	0.00	356.61	39.67	120.68	294.68	58.31	247.68	290.99	-302.30
2047	0.00	0.00	7.35	151.71	11.83	0.00	170.90	40.52	125.23	286.48	57.27	256.12	295.43	-322.33
2048	0.00	0.00	0.00	148.97	6.08	0.00	155.05	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2049	0.00	0.00	0.00	148.97	9.95	0.00	158.92	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2050	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2051	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2052	0.00	0.00	0.00	148.97	9.87	0.00	158.84	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2053	0.00	0.00	144.60	148.97	0.00	0.00	293.57	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2054	0.00	0.00	197.48	148.97	0.00	0.00	346.46	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2055	0.00	0.00	29.96	148.97	3.38	0.00	182.32	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2056	0.00	0.00	73.39	148.97	5.64	0.00	228.00	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2057	0.00	0.00	100.23	148.97	6.85	0.00	256.05	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2058	0.00	0.00	15.20	148.97	3.79	0.00	167.97	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2059	0.00	0.00	74.49	148.97	20.42	0.00	243.88	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2060	0.00	0.00	101.74	158.55	1.70	0.00	262.00	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2061	0.00	0.00	90.67	441.45	2.73	0.00	534.85	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2062	0.00	0.00	102.76	446.92	58.75	0.00	608.43	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2063	0.00	0.00	15.59	437.34	5.40	0.00	458.33	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2064	0.00	0.00	76.37	154.45	5.40	0.00	236.23	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2065	0.00	0.00	104.31	153.76	5.40	0.00	263.48	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2066	0.00	0.00	92.96	290.42	5.40	0.00	388.79	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2067	0.00	0.00	105.36	151.71	51.51	0.00	308.58	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2068	0.00	0.00	93.90	148.97	5.40	0.00	248.27	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2069	0.00	0.00	106.41	148.97	5.40	0.00	260.79	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2070	0.00	0.00	16.14	148.97	15.55	0.00	180.67	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2071	0.00	0.00	79.09	148.97	22.32	0.00	250.38	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2072	0.00	0.00	108.02	148.97	25.78	0.00	282.77	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2073	0.00	0.00	96.27	148.97	15.79	0.00	261.04	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2074	0.00	0.00	109.10	148.97	56.11	0.00	314.18	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2075	0.00	0.00	52.04	148.97	7.59	0.00	208.60	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2076	0.00	0.00	48.47	148.97	12.45	0.00	209.90	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2077	0.00	0.00	7.35	148.97	35.26	0.00	191.59	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2078	0.00	0.00	0.00	148.97	21.45	0.00	170.42	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2079	0.00	0.00	0.00	148.97	21.20	0.00	170.18	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2080	0.00	0.00	0.00	158.55	20.88	0.00	179.43	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2081	0.00	0.00	0.00	441.45	19.91	0.00	461.36	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2082	0.00	0.00	0.00	446.92	34.25	0.00	481.17	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2083	0.00	0.00	144.60	437.34	17.67	0.00	599.60	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2084	0.00	0.00	197.48	154.45	25.99	0.00	377.92	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2085	0.00	0.00	29.96	153.76	25.83	0.00	209.55	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2086	0.00	0.00	73.39	290.42	24.86	0.00	388.67	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2087	0.00	0.00	100.23	151.71	23.88	0.00	275.83	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2088	0.00	0.00	15.20	148.97	9.16	0.00	173.34	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2089	0.00	0.00	0.00	144.18	19.99	0.00	164.17	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
2090	0.00	0.00	0.00	2.74	0.08	0.00	2.82	40.52	125.23	294.10	58.30	249.98	285.92	-300.11
Salvage Value	0.00	0.00	21.35	52.69	9.71	0.00	83.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1026.26	2582.12	374.98	0.00	4046.32	315.52	974.12	7953.44	1622.30	2069.86	3731.41	529.87

Net Present Value -4806

K22/Gas

TABLE 281
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	104.90	0.00	0.00	9.87	0.00	114.77	0.57	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	31.84	0.00	0.00	10.78	0.00	42.62	0.79	0.00	424.74	101.10	33.46	118.80	171.38
2016	0.00	28.25	0.00	0.00	10.87	0.00	39.11	0.98	0.00	439.57	99.26	35.69	121.95	182.66
2017	0.00	210.82	0.00	0.00	27.15	0.00	237.97	2.17	0.00	479.01	97.65	36.90	127.57	216.89
2018	0.00	411.14	0.00	0.00	8.86	0.00	420.01	4.27	0.00	455.49	94.85	40.21	133.34	187.10
2019	0.00	670.60	0.00	0.00	15.43	0.00	686.04	7.70	0.00	439.20	92.92	35.63	136.18	174.47
2020	0.00	746.81	0.00	0.00	28.08	0.00	774.89	11.58	0.00	460.61	92.33	31.28	144.58	192.42
2021	0.00	610.51	0.00	0.00	39.84	0.00	650.35	14.83	0.00	455.59	90.71	29.74	157.97	177.18
2022	0.00	354.56	0.00	0.00	47.18	0.00	401.74	16.84	13.01	464.15	90.68	33.82	145.91	193.74
2023	0.00	164.83	0.00	0.00	0.01	0.00	164.84	17.66	13.22	614.31	96.36	33.27	129.56	355.13
2024	0.00	56.99	0.00	0.00	0.00	0.00	56.99	17.95	12.93	639.16	96.21	37.58	138.59	366.78
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	17.95	13.15	609.25	96.20	26.20	121.14	365.71
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.95	12.97	588.51	94.34	26.53	127.00	340.64
2027	0.00	0.00	95.56	0.00	0.00	0.00	95.56	18.32	12.93	543.47	92.50	25.38	123.64	301.95
2028	0.00	0.00	122.58	0.00	9.28	0.00	131.86	18.87	12.69	517.98	90.96	26.46	128.16	272.40
2029	0.00	0.00	15.28	0.00	0.00	0.00	15.28	18.94	16.24	511.19	90.13	33.37	129.75	257.95
2030	0.00	0.00	74.87	0.00	0.00	0.00	74.87	19.32	16.24	495.06	88.36	41.36	136.54	228.79
2031	0.00	0.00	259.43	0.00	73.08	0.00	332.51	20.97	16.28	482.53	86.70	48.50	145.12	202.22
2032	0.00	0.00	239.59	0.00	0.00	0.00	239.59	22.17	22.98	468.37	85.09	65.31	152.26	165.71
2033	0.00	0.00	100.36	0.00	9.28	0.00	109.64	22.71	19.04	482.76	85.28	57.50	155.79	184.20
2034	0.00	0.00	7.38	0.00	0.00	0.00	7.38	22.75	25.96	517.73	82.86	155.78	133.37	145.73
2035	0.00	0.00	158.23	0.00	0.00	0.00	158.23	23.54	25.96	490.60	80.80	170.84	143.59	95.37
2036	0.00	0.00	228.59	0.00	0.00	0.00	228.59	24.69	25.96	474.05	79.28	185.11	151.54	58.11
2037	0.00	0.00	102.38	0.00	0.00	0.00	102.38	25.20	25.97	490.32	79.73	175.52	151.70	83.38
2038	0.00	0.00	168.14	0.00	0.00	0.00	168.14	26.04	32.23	525.38	77.36	283.38	133.10	31.54
2039	0.00	0.00	232.04	0.00	0.00	0.00	232.04	27.20	32.24	510.69	76.00	298.12	149.87	-13.29
2040	0.00	0.00	103.92	0.00	61.48	0.00	165.40	28.03	32.24	513.59	75.52	300.98	157.57	-20.48
2041	0.00	0.00	7.64	0.00	0.00	0.00	7.64	28.06	39.16	555.23	73.54	413.18	135.15	-66.65
2042	0.00	0.00	163.85	0.00	0.00	0.00	163.85	28.88	42.06	534.04	71.74	441.58	145.77	-125.04
2043	0.00	0.00	236.71	0.00	0.00	0.00	236.71	30.07	39.16	519.13	70.40	463.47	154.11	-168.85
2044	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.60	39.16	516.26	70.04	463.55	161.07	-178.40
2045	0.00	0.00	7.80	0.00	0.00	0.00	7.80	30.64	46.09	566.49	68.44	581.66	138.84	-222.45
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.09	549.59	67.20	602.92	148.70	-269.23
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	47.84	533.90	65.84	632.59	158.54	-323.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	47.84	550.00	67.16	605.72	148.69	-271.58
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	47.84	550.00	67.16	605.72	148.69	-271.58
2050	0.00	0.00	0.00	0.00	10.27	0.00	10.27	30.64	46.97	550.00	67.16	605.72	148.69	-271.58
2051	0.00	0.00	0.00	0.00	10.32	0.00	10.32	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2052	0.00	0.00	0.00	0.00	10.34	0.00	10.34	30.64	49.00	550.00	67.16	605.72	148.69	-271.58
2053	0.00	0.00	0.00	0.00	0.44	0.00	0.44	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2054	0.00	0.00	0.00	0.00	14.33	0.00	14.33	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2055	0.00	0.00	0.00	0.00	19.00	0.00	19.00	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2056	0.00	0.00	0.00	0.00	20.54	0.00	20.54	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2057	0.00	0.00	73.75	0.00	16.76	0.00	90.51	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2058	0.00	0.00	100.73	0.00	0.00	0.00	100.73	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2059	0.00	0.00	15.28	0.00	0.00	0.00	15.28	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2060	0.00	0.00	74.87	0.00	0.00	0.00	74.87	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2061	0.00	0.00	257.35	0.00	0.00	0.00	257.35	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2062	0.00	0.00	239.59	0.00	0.00	0.00	239.59	30.64	49.00	550.00	67.16	605.72	148.69	-271.58
2063	0.00	0.00	100.36	0.00	9.28	0.00	109.64	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2064	0.00	0.00	7.38	0.00	0.00	0.00	7.38	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2065	0.00	0.00	158.23	0.00	0.51	0.00	158.74	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2066	0.00	0.00	228.59	0.00	55.35	0.00	283.94	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2067	0.00	0.00	102.38	0.00	16.82	0.00	119.20	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2068	0.00	0.00	168.14	0.00	17.71	0.00	185.85	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2069	0.00	0.00	232.04	0.00	1.11	0.00	233.14	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2070	0.00	0.00	103.92	0.00	9.08	0.00	113.01	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2071	0.00	0.00	7.64	0.00	19.30	0.00	26.94	30.64	61.60	550.00	67.16	605.72	148.69	-271.58
2072	0.00	0.00	163.85	0.00	30.42	0.00	194.27	30.64	49.00	550.00	67.16	605.72	148.69	-271.58
2073	0.00	0.00	236.71	0.00	0.01	0.00	236.72	30.64	47.84	550.00	67.16	605.72	148.69	-271.58
2074	0.00	0.00	106.02	0.00	0.00	0.00	106.02	30.64	47.84	550.00	67.16	605.72	148.69	-271.58
2075	0.00	0.00	7.80	0.00	46.12	0.00	53.91	30.64	47.84	550.00	67.16	605.72	148.69	-271.58
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.97	550.00	67.16	605.72	148.69	-271.58
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2081	0.00	0.00	0.00	0.00	18.27	0.00	18.27	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	49.00	550.00	67.16	605.72	148.69	-271.58
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2087	0.00	0.00	73.75	0.00	9.87	0.00	83.62	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2088	0.00	0.00	100.73	0.00	0.00	0.00	100.73	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2089	0.00	0.00	15.28	0.00	0.00	0.00	15.28	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
2090	0.00	0.00	0.00	0.00	15.37	0.00	15.37	30.64	46.10	550.00	67.16	605.72	148.69	-271.58
Salvage Value	0.00	0.00	19.65	0.00	4.12	0.00	23.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2572.26	1020.22	0.00	238.16	0.00	3830.64	360.75	393.87	10243.67	1751.77	3843.68	2806.28	1841.94

Net Present Value: -2743

K22/C29

TABLE 282
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	104.90	0.00	0.00	9.87	0.00	145.84	0.73	0.00	371.50	103.01	29.23	113.00	126.25
2015	39.75	31.84	0.00	0.00	10.78	0.00	82.37	1.14	0.00	424.74	101.10	33.46	118.80	171.38
2016	11.18	28.25	0.00	0.00	10.87	0.00	50.30	1.39	0.00	439.57	99.26	35.69	121.95	182.66
2017	11.92	210.82	0.00	0.00	27.15	0.00	249.88	2.64	0.00	479.01	97.65	36.90	127.57	216.89
2018	11.99	411.14	0.00	0.00	8.86	0.00	431.99	4.80	0.00	455.49	94.85	40.21	133.34	187.10
2019	14.33	670.60	0.00	0.00	15.43	0.00	700.37	8.30	0.00	439.20	92.92	35.63	136.18	174.47
2020	166.16	746.81	0.00	0.00	28.08	0.00	941.05	13.01	0.00	460.62	92.33	31.28	144.59	192.42
2021	251.80	610.51	0.00	0.00	39.84	0.00	902.15	17.52	0.00	455.29	90.71	29.75	158.24	176.60
2022	270.08	354.56	0.00	0.00	47.18	0.00	671.81	20.88	13.01	463.78	90.69	33.78	146.18	193.13
2023	275.25	164.83	0.00	0.00	3.54	0.00	443.62	23.10	13.22	612.97	96.35	33.35	129.67	353.60
2024	744.58	56.99	0.00	0.00	3.53	0.00	805.11	27.12	12.93	636.46	96.20	37.59	138.68	363.98
2025	1182.29	0.00	0.00	0.00	42.90	0.00	1225.20	33.25	13.15	605.89	96.22	26.24	121.30	362.12
2026	1061.52	0.00	0.00	0.00	22.26	0.00	1083.77	38.67	12.97	584.35	94.34	26.60	127.30	336.10
2027	758.04	0.00	0.00	0.00	37.45	0.00	795.49	42.64	12.93	541.31	92.74	24.37	123.64	300.56
2028	524.99	0.00	0.00	0.00	64.84	0.00	589.83	45.59	12.69	508.52	90.85	26.78	129.38	261.51
2029	344.82	0.00	0.00	0.00	86.88	0.00	431.70	47.75	26.56	667.23	94.61	30.71	115.02	426.89
2030	127.00	0.00	0.00	0.00	102.39	0.00	229.39	48.90	26.78	886.24	101.77	29.87	105.64	648.96
2031	40.08	0.00	0.00	0.00	0.00	0.00	40.08	49.10	26.68	917.59	101.47	30.54	110.95	674.63
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	29.59	886.19	99.81	30.19	111.94	644.25
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.48	851.29	98.21	30.18	109.62	613.29
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.44	824.43	96.62	30.82	111.58	585.41
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.27	793.49	95.08	31.03	112.29	555.10
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	49.10	24.90	760.41	93.54	30.98	113.35	522.54
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	24.97	726.99	92.02	31.14	115.18	488.65
2038	0.00	0.00	99.72	0.00	0.00	0.00	99.72	49.49	24.43	694.62	90.51	31.19	118.63	454.29
2039	0.00	0.00	128.22	0.00	9.28	0.00	137.50	50.07	27.15	683.42	89.16	30.55	135.63	428.08
2040	0.00	0.00	16.14	0.00	0.00	0.00	16.14	50.15	28.24	667.83	87.44	54.39	138.07	387.93
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.15	28.24	650.99	85.98	60.70	146.48	357.83
2042	0.00	0.00	79.53	0.00	0.00	0.00	79.53	50.55	31.13	637.74	84.58	62.59	160.16	330.41
2043	0.00	0.00	108.56	0.00	9.28	0.00	117.84	51.14	28.24	621.63	83.11	63.79	176.98	297.75
2044	0.00	0.00	96.75	0.00	0.00	0.00	96.75	51.62	32.22	606.64	81.65	98.38	173.42	253.18
2045	0.00	0.00	111.72	0.00	73.08	0.00	184.80	52.53	31.56	593.06	80.40	105.42	184.15	223.10
2046	0.00	0.00	16.63	0.00	0.00	0.00	16.63	52.62	35.56	610.71	80.04	104.38	194.08	232.20
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.30	567.06	77.84	139.72	200.84	148.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.30	590.28	79.43	116.51	193.03	201.32
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	40.20	590.28	79.43	116.51	193.03	201.32
2050	0.00	0.00	0.00	0.00	10.27	0.00	10.27	52.62	36.44	590.28	79.43	116.51	193.03	201.32
2051	0.00	0.00	0.00	0.00	10.32	0.00	10.32	52.62	35.57	590.28	79.43	116.51	193.03	201.32
2052	0.00	0.00	0.00	0.00	10.34	0.00	10.34	52.62	38.48	590.28	79.43	116.51	193.03	201.32
2053	0.00	0.00	0.00	0.00	0.44	0.00	0.44	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2054	0.00	0.00	0.00	0.00	14.33	0.00	14.33	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2055	0.00	0.00	0.00	0.00	19.00	0.00	19.00	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2056	0.00	0.00	0.00	0.00	20.54	0.00	20.54	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2057	0.00	0.00	0.00	0.00	16.76	0.00	16.76	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2058	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2059	0.00	0.00	0.00	0.00	0.87	0.00	0.87	52.62	53.98	590.28	79.43	116.51	193.03	201.32
2060	0.00	0.00	0.00	0.00	10.47	0.00	10.47	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2061	0.00	0.00	0.00	0.00	5.23	0.00	5.23	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2062	0.00	0.00	0.00	0.00	8.72	0.00	8.72	52.62	38.48	590.28	79.43	116.51	193.03	201.32
2063	0.00	0.00	0.00	0.00	14.83	0.00	14.83	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2064	0.00	0.00	0.00	0.00	20.93	0.00	20.93	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2065	0.00	0.00	0.00	0.00	25.81	0.00	25.81	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2066	0.00	0.00	0.00	0.00	0.54	0.00	0.54	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2067	0.00	0.00	0.00	0.00	16.82	0.00	16.82	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2068	0.00	0.00	77.91	0.00	8.43	0.00	86.34	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2069	0.00	0.00	106.41	0.00	1.11	0.00	107.52	52.62	53.98	590.28	79.43	116.51	193.03	201.32
2070	0.00	0.00	16.14	0.00	9.08	0.00	25.22	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2071	0.00	0.00	0.00	0.00	19.30	0.00	19.30	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2072	0.00	0.00	79.48	0.00	30.42	0.00	109.91	52.62	53.98	590.28	79.43	116.51	193.03	201.32
2073	0.00	0.00	108.56	0.00	2.67	0.00	111.22	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2074	0.00	0.00	96.75	0.00	11.94	0.00	108.69	52.62	52.82	590.28	79.43	116.51	193.03	201.32
2075	0.00	0.00	109.64	0.00	32.44	0.00	142.08	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2076	0.00	0.00	16.63	0.00	17.02	0.00	33.66	52.62	51.95	590.28	79.43	116.51	193.03	201.32
2077	0.00	0.00	0.00	0.00	28.73	0.00	28.73	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2078	0.00	0.00	0.00	0.00	59.30	0.00	59.30	52.62	51.08	590.28	79.43	116.51	193.03	201.32
2079	0.00	0.00	0.00	0.00	65.95	0.00	65.95	52.62	38.48	590.28	79.43	116.51	193.03	201.32
2080	0.00	0.00	0.00	0.00	131.90	0.00	131.90	52.62	52.82	590.28	79.43	116.51	193.03	201.32
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	55.71	590.28	79.43	116.51	193.03	201.32
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	37.32	590.28	79.43	116.51	193.03	201.32
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	52.82	590.28	79.43	116.51	193.03	201.32
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	35.59	590.28	79.43	116.51	193.03	201.32
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	38.48	590.28	79.43	116.51	193.03	201.32
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.62	35.59	590.28	79.43	116.51	193.03	201.32
Salvage Value	11.98	0.00	6.36	0.00	9.70	0.00	28.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3392.16	2572.26	197.32	0.00	391.93	0.00	6553.68	650.13	364.53	11787.81	1869.66	1037.11	2873.54	6007.50

Net Present Value: -1561

SCGT/C26

TABLE 283
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	371.50	103.01	29.23	113.00	126.25
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	424.74	101.10	33.46	118.81	171.37
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	440.11	99.26	35.68	121.95	183.21
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	480.41	97.64	36.87	127.53	218.36
2018	213.28	0.00	0.36	0.00	0.00	0.00	213.64	3.29	0.00	457.85	94.84	40.21	133.23	189.57
2019	256.36	0.00	0.00	0.00	0.00	0.00	256.36	4.57	0.00	441.28	92.91	35.63	136.08	176.67
2020	262.51	0.00	93.03	0.00	0.00	0.00	355.54	6.24	0.00	471.23	92.94	28.29	142.27	207.74
2021	723.60	0.00	119.08	0.00	9.28	0.00	851.97	10.39	0.00	462.55	91.19	26.65	155.37	189.35
2022	1161.65	0.00	14.76	0.00	0.54	0.00	1176.95	16.27	3.98	450.34	88.97	49.53	160.89	150.95
2023	1042.98	0.00	0.00	0.00	1.07	0.00	1044.05	21.49	3.98	430.30	86.62	62.59	171.97	109.13
2024	744.80	0.00	0.00	0.00	2.14	0.00	746.95	25.23	3.98	425.28	85.46	68.14	179.67	92.01
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	27.83	3.98	380.27	85.97	42.27	161.10	90.92
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	29.54	18.29	485.12	89.91	32.16	128.20	234.85
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	30.16	18.51	694.82	97.70	29.76	116.04	451.33
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	30.36	18.21	730.34	97.71	32.59	127.35	472.70
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.43	697.83	95.99	33.58	129.60	438.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.26	669.84	94.81	33.12	124.96	416.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	18.21	642.07	92.84	36.08	130.55	382.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.97	598.13	90.95	38.41	130.92	337.86
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.54	569.09	89.03	45.12	136.36	298.58
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.54	554.92	87.47	52.08	145.18	270.19
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.36	17.58	541.41	86.17	57.93	150.97	246.34
2036	0.00	0.00	77.14	0.00	0.00	0.00	77.14	30.74	20.30	534.51	85.10	58.51	160.21	230.69
2037	0.00	0.00	105.40	0.00	9.28	0.00	114.68	31.32	17.41	519.38	83.60	59.55	177.26	198.95
2038	0.00	0.00	15.98	0.00	0.00	0.00	15.98	31.40	21.39	505.83	82.11	91.92	175.48	156.33
2039	0.00	0.00	78.30	0.00	0.00	0.00	78.30	31.79	21.39	493.13	80.85	99.84	191.62	120.82
2040	0.00	0.00	109.02	0.00	73.08	0.00	182.10	32.69	21.39	483.39	79.52	99.23	213.12	91.52
2041	0.00	0.00	95.31	0.00	0.00	0.00	95.31	33.17	25.39	465.64	77.87	140.10	212.67	35.00
2042	0.00	0.00	108.02	0.00	0.00	0.00	108.02	33.71	24.73	447.67	76.54	157.67	220.50	-7.04
2043	0.00	0.00	96.27	0.00	0.00	0.00	96.27	34.19	28.71	438.44	75.23	176.69	234.75	-48.24
2044	0.00	0.00	109.10	0.00	61.48	0.00	170.58	35.04	28.71	424.19	73.94	179.05	259.56	-88.35
2045	0.00	0.00	16.55	0.00	0.00	0.00	16.55	35.12	32.72	413.09	72.61	245.68	243.96	-149.16
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	35.62	399.92	71.44	271.10	251.50	-194.12
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.73	386.31	70.13	276.12	280.64	-240.58
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.73	399.78	71.39	264.30	258.70	-194.62
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.74	399.78	71.39	264.30	258.70	-194.62
2050	0.00	0.00	71.22	0.00	9.87	0.00	81.09	35.12	32.75	399.78	71.39	264.30	258.70	-194.62
2051	0.00	0.00	97.28	0.00	9.87	0.00	107.14	35.12	34.49	399.78	71.39	264.30	258.70	-194.62
2052	0.00	0.00	14.76	0.00	9.87	0.00	24.62	35.12	34.50	399.78	71.39	264.30	258.70	-194.62
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	399.78	71.39	264.30	258.70	-194.62
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	399.78	71.39	264.30	258.70	-194.62
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	399.78	71.39	264.30	258.70	-194.62
2056	0.00	0.00	0.00	0.00	9.28	0.00	9.28	35.12	35.65	399.78	71.39	264.30	258.70	-194.62
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2066	0.00	0.00	77.14	0.00	0.00	0.00	77.14	35.12	35.65	399.78	71.39	264.30	258.70	-194.62
2067	0.00	0.00	105.36	0.00	0.00	0.00	105.36	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2068	0.00	0.00	15.98	0.00	0.00	0.00	15.98	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2069	0.00	0.00	78.30	0.00	0.00	0.00	78.30	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2070	0.00	0.00	106.94	0.00	0.00	0.00	106.94	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2071	0.00	0.00	95.31	0.00	0.00	0.00	95.31	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2072	0.00	0.00	108.02	0.00	9.82	0.00	117.83	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2073	0.00	0.00	96.27	0.00	1.07	0.00	97.34	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2074	0.00	0.00	109.10	0.00	2.14	0.00	111.24	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2075	0.00	0.00	16.55	0.00	59.63	0.00	76.18	35.12	48.25	399.78	71.39	264.30	258.70	-194.62
2076	0.00	0.00	0.00	0.00	2.14	0.00	2.14	35.12	35.65	399.78	71.39	264.30	258.70	-194.62
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	49.99	399.78	71.39	264.30	258.70	-194.62
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	34.50	399.78	71.39	264.30	258.70	-194.62
2079	0.00	0.00	0.00	0.00	46.12	0.00	46.12	35.12	49.99	399.78	71.39	264.30	258.70	-194.62
2080	0.00	0.00	71.22	0.00	0.00	0.00	71.22	35.12	34.50	399.78	71.39	264.30	258.70	-194.62
2081	0.00	0.00	97.28	0.00	0.00	0.00	97.28	35.12	49.99	399.78	71.39	264.30	258.70	-194.62
2082	0.00	0.00	14.76	0.00	0.00	0.00	14.76	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	35.65	399.78	71.39	264.30	258.70	-194.62
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
2090	0.00	0.00	0.00	0.00	18.27	0.00	18.27	35.12	32.76	399.78	71.39	264.30	258.70	-194.62
Salvage Value	4.70	0.00	10.58	0.00	3.05	0.00	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	462.69	0.00	98.87	0.00	4490.74	438.50	293.52	9672.78	1780.93	1889.33	3441.45	2561.07

Net Present Value: -2662

CCGT/C26

TABLE 284
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	371.50	103.01	29.23	113.00	126.25
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	424.74	101.10	33.46	118.81	171.37
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	440.11	99.26	35.68	121.95	183.21
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	480.41	97.64	36.87	127.53	218.36
2018	213.28	0.00	0.36	0.00	0.00	0.00	213.64	3.29	0.00	457.85	94.84	40.21	133.23	189.57
2019	256.36	0.00	146.09	0.00	0.00	0.00	402.45	5.30	0.00	441.28	92.91	35.63	136.08	176.67
2020	262.51	0.00	232.87	0.00	0.00	0.00	495.38	7.67	0.00	471.23	92.94	28.29	142.27	207.74
2021	723.60	0.00	116.34	0.00	9.28	0.00	849.22	11.81	0.00	472.78	91.95	23.51	152.56	204.76
2022	1161.65	0.00	6.95	0.00	0.54	0.00	1169.14	17.65	6.91	495.57	89.49	96.71	129.09	180.28
2023	1042.98	0.00	0.00	0.00	1.07	0.00	1044.05	22.87	6.91	487.20	87.45	111.41	137.47	150.87
2024	744.80	0.00	0.00	0.00	2.14	0.00	746.95	26.61	6.91	487.65	86.47	118.58	142.25	140.36
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	29.21	6.91	441.54	86.16	100.17	133.41	121.81
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	30.91	21.22	534.19	89.84	85.89	110.67	247.80
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	31.54	21.44	738.19	97.68	75.36	101.60	463.55
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	31.74	21.14	775.63	97.85	77.37	110.84	489.56
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.36	746.97	96.13	84.82	110.17	455.85
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.19	707.30	94.01	92.30	109.97	411.02
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	21.14	718.76	93.98	87.96	106.33	430.50
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.90	663.30	91.11	99.32	110.49	362.38
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.47	636.05	89.47	105.36	111.03	330.19
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.47	612.09	87.47	116.09	118.05	290.48
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	20.51	598.50	86.01	124.77	123.24	264.48
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.74	23.23	581.50	84.38	136.86	130.25	230.00
2037	0.00	0.00	77.53	0.00	0.00	0.00	77.53	32.12	20.34	579.37	83.66	141.12	133.42	221.17
2038	0.00	0.00	105.93	0.00	9.28	0.00	115.21	32.70	20.34	571.45	82.47	143.76	145.62	199.60
2039	0.00	0.00	16.06	0.00	0.00	0.00	16.06	32.78	24.32	555.47	80.71	172.56	157.53	144.68
2040	0.00	0.00	78.69	0.00	0.00	0.00	78.69	33.17	24.32	541.30	79.28	184.55	167.42	110.04
2041	0.00	0.00	109.56	0.00	73.08	0.00	182.63	34.08	24.32	527.29	77.98	192.58	179.89	76.84
2042	0.00	0.00	95.79	0.00	0.00	0.00	95.79	34.55	27.66	517.65	76.65	209.35	193.41	38.25
2043	0.00	0.00	108.56	0.00	0.00	0.00	108.56	35.10	27.66	498.50	75.25	237.04	194.15	-7.93
2044	0.00	0.00	16.47	0.00	0.00	0.00	16.47	35.18	31.64	484.88	73.94	261.61	202.58	-53.25
2045	0.00	0.00	80.68	0.00	0.00	0.00	80.68	35.58	31.64	469.64	72.62	269.60	221.57	-94.14
2046	0.00	0.00	110.19	0.00	61.48	0.00	171.67	36.44	34.55	461.69	71.73	268.75	239.28	-118.06
2047	0.00	0.00	16.72	0.00	0.00	0.00	16.72	36.52	35.65	436.96	70.15	322.51	233.47	-189.16
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.66	456.10	71.50	286.95	231.44	-133.79
2049	0.00	0.00	146.09	0.00	9.87	0.00	155.96	36.52	35.66	456.10	71.50	286.95	231.44	-133.79
2050	0.00	0.00	211.06	0.00	9.87	0.00	220.92	36.52	35.66	456.10	71.50	286.95	231.44	-133.79
2051	0.00	0.00	94.53	0.00	9.87	0.00	104.39	36.52	37.41	456.10	71.50	286.95	231.44	-133.79
2052	0.00	0.00	6.95	0.00	9.87	0.00	16.82	36.52	37.41	456.10	71.50	286.95	231.44	-133.79
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.42	456.10	71.50	286.95	231.44	-133.79
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	456.10	71.50	286.95	231.44	-133.79
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	456.10	71.50	286.95	231.44	-133.79
2056	0.00	0.00	0.00	0.00	9.28	0.00	9.28	36.52	38.58	456.10	71.50	286.95	231.44	-133.79
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	38.58	456.10	71.50	286.95	231.44	-133.79
2067	0.00	0.00	77.53	0.00	0.00	0.00	77.53	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2068	0.00	0.00	105.88	0.00	0.00	0.00	105.88	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2069	0.00	0.00	16.06	0.00	0.00	0.00	16.06	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2070	0.00	0.00	78.69	0.00	0.00	0.00	78.69	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2071	0.00	0.00	107.48	0.00	0.00	0.00	107.48	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2072	0.00	0.00	95.79	0.00	0.54	0.00	96.32	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2073	0.00	0.00	108.56	0.00	10.35	0.00	118.91	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2074	0.00	0.00	16.47	0.00	2.14	0.00	18.61	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2075	0.00	0.00	80.68	0.00	4.82	0.00	85.50	36.52	51.18	456.10	71.50	286.95	231.44	-133.79
2076	0.00	0.00	110.19	0.00	56.95	0.00	167.14	36.52	38.58	456.10	71.50	286.95	231.44	-133.79
2077	0.00	0.00	16.72	0.00	0.00	0.00	16.72	36.52	52.92	456.10	71.50	286.95	231.44	-133.79
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	37.43	456.10	71.50	286.95	231.44	-133.79
2079	0.00	0.00	146.09	0.00	0.00	0.00	146.09	36.52	52.92	456.10	71.50	286.95	231.44	-133.79
2080	0.00	0.00	211.06	0.00	0.00	0.00	211.06	36.52	37.43	456.10	71.50	286.95	231.44	-133.79
2081	0.00	0.00	94.53	0.00	46.11	0.00	140.64	36.52	52.92	456.10	71.50	286.95	231.44	-133.79
2082	0.00	0.00	6.95	0.00	0.00	0.00	6.95	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	38.58	456.10	71.50	286.95	231.44	-133.79
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.52	35.69	456.10	71.50	286.95	231.44	-133.79
Salvage Value	4.70	0.00	16.67	0.00	2.74	0.00	24.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	712.52	0.00	95.97	0.00	4737.68	458.33	328.31	10441.82	1783.74	2526.44	3062.03	3069.62

Net Present Value: -2455

Wind/C26

TABLE 285
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.07	62.96	0.00	0.00	9.87	0.00	103.90	0.52	0.00	371.50	103.01	29.23	113.00	126.25
2015	39.75	0.00	0.00	0.00	9.87	0.00	49.61	0.77	0.00	424.74	101.10	33.46	118.82	171.36
2016	87.85	0.00	0.00	0.00	9.87	0.00	97.71	1.26	0.00	440.11	99.26	35.68	121.98	183.19
2017	183.32	0.00	0.00	0.00	9.87	0.00	193.18	2.22	0.00	480.42	97.64	36.87	127.52	218.38
2018	213.28	0.00	0.00	0.00	0.00	0.00	213.28	3.29	0.00	457.85	94.84	40.21	133.22	189.58
2019	256.36	0.00	0.00	0.00	0.00	0.00	256.36	4.57	0.00	441.28	92.91	35.63	136.09	176.66
2020	262.51	0.00	0.00	9.58	13.53	0.00	285.62	6.00	0.00	466.18	92.51	30.30	143.59	199.78
2021	723.60	0.00	0.00	292.47	22.55	0.00	1038.63	11.19	0.00	457.68	90.76	29.26	156.43	181.23
2022	1161.65	0.00	0.00	297.95	27.60	0.00	1487.20	18.63	6.21	467.11	89.13	29.19	158.75	190.04
2023	1042.98	0.00	0.00	288.37	14.60	0.00	1345.96	25.36	12.42	464.11	86.67	33.30	164.49	179.65
2024	744.80	0.00	0.00	5.47	6.65	0.00	756.93	29.14	18.63	468.43	84.78	34.04	170.99	178.62
2025	515.82	0.00	0.00	0.00	4.82	0.00	520.64	31.75	18.63	418.10	84.70	22.38	179.19	131.83
2026	338.80	0.00	0.00	0.00	2.14	0.00	340.95	33.45	32.93	560.78	88.67	26.58	127.31	318.21
2027	124.79	0.00	0.00	0.00	0.00	0.00	124.79	34.07	33.15	771.27	96.44	24.01	113.53	537.29
2028	39.38	0.00	0.00	0.00	0.00	0.00	39.38	34.27	32.86	799.11	96.24	26.17	123.68	553.02
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	33.07	768.49	94.59	26.56	126.14	521.19
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.90	747.48	93.54	25.94	123.30	504.69
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.85	731.40	92.11	26.86	126.01	486.42
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	34.27	32.61	697.64	90.72	26.79	124.82	455.31
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.27	32.18	656.63	89.22	26.67	121.58	419.16
2034	0.00	0.00	98.18	0.00	0.00	0.00	98.18	34.65	32.18	624.16	87.77	26.83	123.42	386.14
2035	0.00	0.00	126.12	0.00	9.28	0.00	135.40	35.22	32.22	612.80	86.76	24.83	129.15	372.06
2036	0.00	0.00	92.96	0.00	0.00	0.00	92.96	35.69	38.93	588.86	84.68	46.18	135.78	322.22
2037	0.00	0.00	105.40	0.00	9.28	0.00	114.68	36.26	36.03	572.06	83.22	52.13	145.21	291.50
2038	0.00	0.00	15.98	0.00	0.00	0.00	15.98	36.34	40.02	563.55	81.96	67.77	151.76	262.06
2039	0.00	0.00	78.30	0.00	0.00	0.00	78.30	36.73	40.02	554.81	80.79	66.79	172.96	234.26
2040	0.00	0.00	109.02	9.58	73.08	0.00	191.68	37.68	40.02	533.18	79.11	86.16	179.06	188.85
2041	0.00	0.00	95.31	292.47	0.00	0.00	387.79	39.62	44.02	520.54	77.72	105.47	188.40	148.94
2042	0.00	0.00	108.02	297.95	0.00	0.00	405.96	41.65	43.36	505.54	76.43	110.34	202.90	115.87
2043	0.00	0.00	96.27	288.37	0.00	0.00	384.64	43.57	47.34	495.75	75.13	123.31	219.88	77.43
2044	0.00	0.00	109.10	5.47	61.48	0.00	176.05	44.45	47.34	474.30	73.77	155.30	217.55	27.67
2045	0.00	0.00	16.55	0.00	0.00	0.00	16.55	44.53	51.35	461.81	72.50	181.26	226.30	-18.25
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	54.25	446.54	71.25	185.00	248.48	-58.18
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.36	432.68	70.00	187.83	275.31	-100.47
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.36	447.01	71.25	184.70	250.03	-58.97
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.37	447.01	71.25	184.70	250.03	-58.97
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.38	447.01	71.25	184.70	250.03	-58.97
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	53.12	447.01	71.25	184.70	250.03	-58.97
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	53.13	447.01	71.25	184.70	250.03	-58.97
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	447.01	71.25	184.70	250.03	-58.97
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	447.01	71.25	184.70	250.03	-58.97
2055	0.00	0.00	0.00	0.00	3.38	0.00	3.38	44.53	53.13	447.01	71.25	184.70	250.03	-58.97
2056	0.00	0.00	0.00	0.00	5.64	0.00	5.64	44.53	54.28	447.01	71.25	184.70	250.03	-58.97
2057	0.00	0.00	0.00	0.00	6.77	0.00	6.77	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2058	0.00	0.00	0.00	0.00	3.38	0.00	3.38	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2059	0.00	0.00	0.00	0.00	1.13	0.00	1.13	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2060	0.00	0.00	0.00	9.58	0.00	0.00	9.58	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2061	0.00	0.00	0.00	292.47	0.00	0.00	292.47	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2062	0.00	0.00	0.00	297.95	0.00	0.00	297.95	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2063	0.00	0.00	0.00	288.37	0.00	0.00	288.37	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2064	0.00	0.00	76.37	5.47	0.00	0.00	81.85	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2065	0.00	0.00	104.31	0.00	0.00	0.00	104.31	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2066	0.00	0.00	92.96	0.00	0.00	0.00	92.96	44.53	54.28	447.01	71.25	184.70	250.03	-58.97
2067	0.00	0.00	105.36	0.00	0.00	0.00	105.36	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2068	0.00	0.00	15.98	0.00	0.00	0.00	15.98	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2069	0.00	0.00	78.30	0.00	0.00	0.00	78.30	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2070	0.00	0.00	106.94	0.00	19.43	0.00	126.37	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2071	0.00	0.00	95.31	0.00	16.92	0.00	112.23	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2072	0.00	0.00	108.02	0.00	30.11	0.00	138.13	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2073	0.00	0.00	96.27	0.00	11.22	0.00	107.49	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2074	0.00	0.00	109.10	0.00	5.53	0.00	114.63	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2075	0.00	0.00	16.55	0.00	59.63	0.00	76.18	44.53	66.88	447.01	71.25	184.70	250.03	-58.97
2076	0.00	0.00	0.00	0.00	2.14	0.00	2.14	44.53	54.28	447.01	71.25	184.70	250.03	-58.97
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	68.62	447.01	71.25	184.70	250.03	-58.97
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	53.13	447.01	71.25	184.70	250.03	-58.97
2079	0.00	0.00	0.00	0.00	46.11	0.00	46.11	44.53	68.62	447.01	71.25	184.70	250.03	-58.97
2080	0.00	0.00	0.00	9.58	0.00	0.00	9.58	44.53	53.13	447.01	71.25	184.70	250.03	-58.97
2081	0.00	0.00	0.00	292.47	0.00	0.00	292.47	44.53	68.62	447.01	71.25	184.70	250.03	-58.97
2082	0.00	0.00	0.00	297.95	0.00	0.00	297.95	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2083	0.00	0.00	0.00	288.37	0.00	0.00	288.37	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2084	0.00	0.00	0.00	5.47	9.87	0.00	15.34	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	54.28	447.01	71.25	184.70	250.03	-58.97
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
2090	0.00	0.00	0.00	0.00	18.27	0.00	18.27	44.53	51.39	447.01	71.25	184.70	250.03	-58.97
Salvage Value	4.70	0.00	8.17	13.34	4.15	0.00	30.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3866.23	62.96	367.50	931.16	155.69	0.00	5383.54	519.43	505.89	10428.25	1774.80	1386.08	3309.98	3957.39

Net Present Value -2451

K19/C25/750MW (WPS Sale &Inv)

TABLE 286
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	4.85	313.82	1.57	0.00	364.56	103.02	29.28	113.53	118.72
2015	88.09	546.76	0.00	0.00	21.74	8.74	665.32	4.90	0.00	413.65	101.12	33.46	118.97	160.10
2016	199.23	726.88	0.00	0.00	30.88	22.51	979.50	9.79	0.00	428.98	99.29	35.73	122.25	171.72
2017	235.75	881.35	0.00	0.00	46.60	32.83	1196.53	15.78	0.00	462.21	97.29	38.28	129.29	197.36
2018	283.83	628.16	0.00	0.00	52.22	132.68	1096.88	21.26	0.00	445.05	95.17	39.19	132.50	178.19
2019	291.12	440.82	0.00	0.00	66.10	110.86	908.90	25.80	13.01	480.30	95.11	36.60	133.23	215.35
2020	803.86	182.49	0.00	0.00	4.25	198.41	1189.00	31.75	44.86	756.52	102.37	28.66	152.47	473.02
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	38.79	42.99	827.24	102.99	31.25	168.19	524.82
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	44.74	41.65	829.91	101.84	31.26	173.13	523.69
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	49.12	39.80	790.64	99.52	30.86	178.60	481.65
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	52.41	38.24	763.84	97.28	34.06	188.22	444.29
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	54.83	50.89	855.29	101.86	30.07	140.66	582.70
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	56.14	49.35	1117.88	110.03	29.97	141.70	836.18
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	56.36	47.92	1163.28	109.94	29.33	156.05	867.97
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	46.91	1147.49	108.29	30.29	159.74	849.16
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	48.20	1118.41	106.38	30.36	164.14	817.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	43.02	1097.70	105.05	29.79	162.19	800.67
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	41.70	1085.00	103.41	30.41	167.48	783.71
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	40.22	1049.25	101.75	30.53	166.57	750.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	39.21	1014.85	99.97	30.57	169.43	714.87
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	38.27	983.15	98.26	30.85	173.62	680.43
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	39.54	949.83	96.59	30.61	165.64	656.99
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	36.10	889.62	94.98	31.21	140.18	623.26
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	56.36	35.57	849.88	93.37	31.37	140.13	585.02
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.36	35.06	815.58	91.71	31.35	145.38	547.13
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	56.93	37.47	784.32	90.11	31.31	158.29	504.62
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	57.75	34.09	802.79	88.82	29.86	174.75	509.36
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	57.87	36.95	781.57	86.80	54.09	177.83	462.84
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	58.44	36.51	764.98	85.25	60.22	189.93	429.58
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	59.29	36.07	753.10	83.86	63.33	204.86	401.03
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	59.99	41.37	749.82	82.65	73.16	218.92	375.08
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	61.26	43.86	719.12	80.79	94.71	224.62	319.00
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	61.38	44.56	702.32	79.34	114.88	233.62	274.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	43.31	686.72	78.06	120.19	249.06	239.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	42.07	702.72	79.40	109.93	235.77	277.63
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	61.38	44.61	702.72	79.40	109.93	235.77	277.63
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	61.38	43.11	702.72	79.40	109.93	235.77	277.63
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	61.38	42.78	702.72	79.40	109.93	235.77	277.63
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	61.38	42.46	702.72	79.40	109.93	235.77	277.63
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	61.38	42.15	702.72	79.40	109.93	235.77	277.63
2054	0.00	0.00	0.00	0.00	23.02	24.33	47.35	61.38	41.84	702.72	79.40	109.93	235.77	277.63
2055	0.00	0.00	0.00	0.00	1.05	25.23	26.28	61.38	42.71	702.72	79.40	109.93	235.77	277.63
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	61.38	55.02	702.72	79.40	109.93	235.77	277.63
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	61.38	39.25	702.72	79.40	109.93	235.77	277.63
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	61.38	54.48	702.72	79.40	109.93	235.77	277.63
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	61.38	41.62	702.72	79.40	109.93	235.77	277.63
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	61.38	51.26	702.72	79.40	109.93	235.77	277.63
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	66.75	702.72	79.40	109.93	235.77	277.63
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	61.38	66.75	702.72	79.40	109.93	235.77	277.63
2065	0.00	0.00	0.00	0.00	11.34	5.49	16.83	61.38	38.66	702.72	79.40	109.93	235.77	277.63
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	61.38	66.75	702.72	79.40	109.93	235.77	277.63
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	61.38	66.75	702.72	79.40	109.93	235.77	277.63
2069	0.00	0.00	112.14	0.00	43.08	74.17	229.39	61.38	38.66	702.72	79.40	109.93	235.77	277.63
2070	0.00	0.00	153.46	0.00	3.20	76.92	233.57	61.38	53.00	702.72	79.40	109.93	235.77	277.63
2071	0.00	0.00	23.33	0.00	39.09	0.00	62.41	61.38	37.50	702.72	79.40	109.93	235.77	277.63
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	61.38	53.00	702.72	79.40	109.93	235.77	277.63
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	61.38	36.63	702.72	79.40	109.93	235.77	277.63
2074	0.00	0.00	139.93	0.00	61.47	0.00	201.40	61.38	51.26	702.72	79.40	109.93	235.77	277.63
2075	0.00	0.00	158.90	0.00	91.86	0.00	250.76	61.38	38.66	702.72	79.40	109.93	235.77	277.63
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	61.38	53.00	702.72	79.40	109.93	235.77	277.63
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	37.50	702.72	79.40	109.93	235.77	277.63
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	61.38	53.00	702.72	79.40	109.93	235.77	277.63
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	40.40	702.72	79.40	109.93	235.77	277.63
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	61.38	53.00	702.72	79.40	109.93	235.77	277.63
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	61.38	38.66	702.72	79.40	109.93	235.77	277.63
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	61.38	35.76	702.72	79.40	109.93	235.77	277.63
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	61.38	38.66	702.72	79.40	109.93	235.77	277.63
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	61.38	38.66	702.72	79.40	109.93	235.77	277.63
Salvage Value	2.58	0.00	9.43	0.00	12.68	6.30	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	272.89	0.00	551.46	432.79	8953.82	888.95	651.85	15184.50	1940.75	999.17	3426.92	8817.66

Net Present Value -1677

K19/C25/750MW

TABLE 287
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	6.66	315.63	1.58	0.00	370.55	103.02	29.26	113.08	125.18
2015	88.09	546.76	0.00	0.00	21.74	10.91	667.49	4.92	0.00	422.34	101.11	33.45	118.89	168.89
2016	199.23	726.88	0.00	0.00	30.88	23.45	980.43	9.82	0.00	437.56	99.27	35.69	122.05	180.54
2017	235.75	881.35	0.00	0.00	46.60	32.83	1196.53	15.80	0.00	472.28	97.29	38.30	129.07	207.63
2018	283.83	628.16	0.00	0.00	52.22	183.95	1148.15	21.54	0.00	455.27	95.16	39.08	132.35	188.68
2019	291.12	440.82	0.00	0.00	66.10	129.40	927.44	26.18	13.01	489.90	95.10	36.58	132.98	225.24
2020	803.86	182.49	0.00	0.00	4.25	342.80	1333.39	32.85	47.98	779.75	102.36	28.63	151.05	497.71
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	39.88	46.21	844.33	102.99	31.43	167.26	542.65
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	45.83	44.90	846.10	101.84	31.26	172.05	540.95
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	50.22	42.92	807.81	99.51	30.86	177.32	500.11
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	53.50	41.22	781.22	97.27	34.13	187.03	462.78
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	55.92	53.76	873.69	101.85	30.13	138.22	603.50
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	57.24	52.09	1129.78	110.04	30.11	135.74	853.88
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	57.46	50.55	1164.32	109.96	29.10	141.73	883.54
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	49.42	1150.03	108.30	30.26	144.59	866.88
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	50.61	1124.07	106.38	30.33	149.29	838.07
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	45.33	1107.06	105.05	29.79	148.17	824.04
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	43.90	1099.59	103.40	30.54	153.55	812.10
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	42.32	1068.02	101.75	30.59	153.29	782.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	41.21	1036.95	99.99	30.51	155.76	750.70
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	40.19	1009.85	98.28	30.70	160.49	720.39
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	41.37	940.27	96.66	30.91	134.50	678.19
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	37.85	903.13	94.99	31.25	134.74	642.16
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	57.46	37.25	870.89	93.35	31.29	138.56	607.69
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.46	36.67	837.56	91.71	31.29	143.38	571.18
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	58.02	39.01	807.05	90.11	31.37	156.04	529.54
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	58.85	35.57	805.38	88.81	29.87	172.16	514.55
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	58.97	38.37	779.48	86.80	54.09	175.43	463.15
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	59.54	37.86	763.51	85.25	60.22	187.99	430.06
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	60.38	37.36	751.85	83.86	63.33	203.13	401.52
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	61.08	42.61	748.95	82.65	73.16	217.40	375.75
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	62.35	45.04	718.13	80.79	94.71	223.22	319.41
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	62.47	45.69	701.31	79.34	114.88	232.20	274.90
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	44.39	685.39	78.06	120.19	247.41	239.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	43.10	701.61	79.40	109.93	234.28	278.01
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	62.47	45.59	701.61	79.40	109.93	234.28	278.01
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	62.47	44.04	701.61	79.40	109.93	234.28	278.01
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	62.47	43.67	701.61	79.40	109.93	234.28	278.01
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	62.47	43.30	701.61	79.40	109.93	234.28	278.01
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	62.47	42.95	701.61	79.40	109.93	234.28	278.01
2054	0.00	0.00	0.00	0.00	23.02	24.33	47.35	62.47	42.61	701.61	79.40	109.93	234.28	278.01
2055	0.00	0.00	0.00	0.00	1.05	25.23	26.28	62.47	43.43	701.61	79.40	109.93	234.28	278.01
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	62.47	55.71	701.61	79.40	109.93	234.28	278.01
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	62.47	39.90	701.61	79.40	109.93	234.28	278.01
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	62.47	55.10	701.61	79.40	109.93	234.28	278.01
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	62.47	42.21	701.61	79.40	109.93	234.28	278.01
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	62.47	51.26	701.61	79.40	109.93	234.28	278.01
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	66.75	701.61	79.40	109.93	234.28	278.01
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	62.47	66.75	701.61	79.40	109.93	234.28	278.01
2065	0.00	0.00	0.00	0.00	11.34	5.49	16.83	62.47	38.66	701.61	79.40	109.93	234.28	278.01
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	62.47	66.75	701.61	79.40	109.93	234.28	278.01
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	62.47	66.75	701.61	79.40	109.93	234.28	278.01
2069	0.00	0.00	112.14	0.00	43.08	74.17	229.39	62.47	38.66	701.61	79.40	109.93	234.28	278.01
2070	0.00	0.00	153.46	0.00	3.20	76.92	233.57	62.47	53.00	701.61	79.40	109.93	234.28	278.01
2071	0.00	0.00	23.33	0.00	39.09	0.00	62.41	62.47	37.50	701.61	79.40	109.93	234.28	278.01
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	62.47	53.00	701.61	79.40	109.93	234.28	278.01
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	62.47	36.63	701.61	79.40	109.93	234.28	278.01
2074	0.00	0.00	139.93	0.00	61.47	0.00	201.40	62.47	51.26	701.61	79.40	109.93	234.28	278.01
2075	0.00	0.00	158.90	0.00	91.86	0.00	250.76	62.47	38.66	701.61	79.40	109.93	234.28	278.01
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	62.47	53.00	701.61	79.40	109.93	234.28	278.01
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	37.50	701.61	79.40	109.93	234.28	278.01
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	62.47	53.00	701.61	79.40	109.93	234.28	278.01
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	40.40	701.61	79.40	109.93	234.28	278.01
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	62.47	53.00	701.61	79.40	109.93	234.28	278.01
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	62.47	38.66	701.61	79.40	109.93	234.28	278.01
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	62.47	35.76	701.61	79.40	109.93	234.28	278.01
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	62.47	38.66	701.61	79.40	109.93	234.28	278.01
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	62.47	38.66	701.61	79.40	109.93	234.28	278.01
Salvage Value	2.58	0.00	9.43	0.00	12.68	6.30	30.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	272.89	0.00	551.46	601.54	9122.57	905.99	680.39	15367.95	1940.74	999.22	3343.29	9084.70

Net Present Value -1624

K19/Gas25/750MW (WPS Sale & INV)

TABLE 288
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	4.85	281.90	1.41	0.00	364.56	103.02	29.28	113.53	118.72
2015	0.00	546.76	0.00	0.00	21.74	8.74	577.24	4.30	0.00	413.66	101.13	33.45	118.95	160.13
2016	0.00	726.88	0.00	0.00	30.88	22.51	780.27	8.20	0.00	428.91	99.29	35.71	122.15	171.76
2017	0.00	881.35	0.00	0.00	46.60	32.83	960.79	13.00	0.00	462.61	97.29	38.26	129.22	197.84
2018	0.00	628.16	0.00	0.00	52.22	132.68	813.06	17.07	0.00	445.76	95.17	39.11	132.43	179.05
2019	0.00	440.82	0.00	0.00	61.87	110.86	613.54	20.13	13.01	481.48	95.11	36.58	133.15	216.64
2020	0.00	182.49	0.00	0.00	0.01	198.41	380.91	22.04	44.86	758.40	102.36	28.63	152.29	475.13
2021	0.00	63.43	0.36	0.00	0.00	0.00	63.79	22.36	42.99	830.65	102.99	31.24	167.98	528.44
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	22.36	41.65	833.60	101.84	31.18	172.82	527.76
2023	0.00	0.00	122.10	0.00	0.00	0.00	122.10	22.86	39.80	790.92	98.99	32.92	178.35	480.65
2024	0.00	0.00	260.05	0.00	12.08	0.00	272.13	24.11	38.24	768.61	96.93	35.95	186.82	448.92
2025	0.00	0.00	161.15	0.00	95.12	0.00	256.27	25.38	40.58	725.50	96.66	34.96	162.81	431.07
2026	0.00	0.00	123.42	0.00	0.00	0.00	123.42	26.00	42.81	731.63	95.34	41.92	175.53	418.84
2027	0.00	0.00	140.15	0.00	0.00	0.00	140.15	26.70	41.52	708.23	93.36	41.18	189.99	383.69
2028	0.00	0.00	21.30	0.00	0.00	0.00	21.30	26.80	44.28	685.25	91.01	62.65	197.71	333.88
2029	0.00	0.00	104.58	0.00	0.00	0.00	104.58	27.33	45.74	664.07	89.20	69.60	208.70	296.58
2030	0.00	0.00	143.12	0.00	80.02	0.00	223.14	28.44	40.62	659.33	88.11	76.39	215.77	279.06
2031	0.00	0.00	127.80	0.00	0.00	0.00	127.80	29.08	43.47	673.10	87.76	83.93	220.70	280.71
2032	0.00	0.00	145.13	0.00	0.00	0.00	145.13	29.81	42.36	642.64	85.35	101.55	233.84	221.90
2033	0.00	0.00	22.06	0.00	0.00	0.00	22.06	29.92	45.27	629.83	83.81	121.72	243.58	180.73
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	44.22	625.09	83.08	129.57	249.61	162.84
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	42.77	550.54	80.94	122.97	240.72	105.91
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	42.23	480.16	79.48	123.85	207.82	69.00
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	41.71	451.52	78.06	135.61	211.18	26.68
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.92	41.21	448.03	77.32	134.44	225.61	10.66
2039	0.00	0.00	234.92	0.00	0.00	0.00	234.92	31.09	43.61	415.11	75.37	164.76	235.77	-60.79
2040	0.00	0.00	340.07	0.00	0.00	0.00	340.07	32.79	40.24	409.05	74.03	183.11	245.48	-93.56
2041	0.00	0.00	152.61	0.00	12.08	0.00	164.69	33.62	39.77	429.29	74.32	182.79	244.29	-72.11
2042	0.00	0.00	11.24	0.00	0.00	0.00	11.24	33.67	46.24	494.70	72.04	293.56	237.16	-108.05
2043	0.00	0.00	115.31	0.00	0.00	0.00	115.31	34.25	45.80	464.20	70.29	316.40	250.55	-173.05
2044	0.00	0.00	157.80	0.00	80.02	0.00	237.82	35.44	47.12	434.84	68.66	340.82	262.67	-237.31
2045	0.00	0.00	75.42	0.00	0.00	0.00	75.42	35.82	50.71	419.44	67.35	373.39	272.38	-293.69
2046	0.00	0.00	70.39	0.00	0.00	0.00	70.39	36.17	50.31	401.49	66.14	399.88	282.79	-347.32
2047	0.00	0.00	10.70	0.00	0.00	0.00	10.70	36.22	50.50	393.34	65.35	416.21	295.00	-383.22
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	49.26	404.76	66.28	396.49	283.39	-341.41
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	36.22	51.80	404.76	66.28	396.49	283.39	-341.41
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	36.22	48.56	404.76	66.28	396.49	283.39	-341.41
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	36.22	48.23	404.76	66.28	396.49	283.39	-341.41
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	36.22	47.91	404.76	66.28	396.49	283.39	-341.41
2053	0.00	0.00	100.29	0.00	26.94	24.33	151.56	36.22	47.60	404.76	66.28	396.49	283.39	-341.41
2054	0.00	0.00	238.25	0.00	21.98	24.33	284.55	36.22	47.29	404.76	66.28	396.49	283.39	-341.41
2055	0.00	0.00	159.07	0.00	0.00	25.23	184.31	36.22	47.00	404.76	66.28	396.49	283.39	-341.41
2056	0.00	0.00	123.42	0.00	0.00	0.00	123.42	36.22	62.21	404.76	66.28	396.49	283.39	-341.41
2057	0.00	0.00	140.15	0.00	0.00	0.00	140.15	36.22	46.44	404.76	66.28	396.49	283.39	-341.41
2058	0.00	0.00	21.30	0.00	0.00	0.00	21.30	36.22	61.67	404.76	66.28	396.49	283.39	-341.41
2059	0.00	0.00	104.58	0.00	12.08	0.00	116.66	36.22	48.81	404.76	66.28	396.49	283.39	-341.41
2060	0.00	0.00	143.12	0.00	71.34	0.00	214.46	36.22	58.45	404.76	66.28	396.49	283.39	-341.41
2061	0.00	0.00	127.80	0.00	0.00	0.00	127.80	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2062	0.00	0.00	145.13	0.00	0.00	0.00	145.13	36.22	58.45	404.76	66.28	396.49	283.39	-341.41
2063	0.00	0.00	22.06	0.00	0.00	0.00	22.06	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2064	0.00	0.00	0.00	0.00	13.66	2.75	16.40	36.22	58.45	404.76	66.28	396.49	283.39	-341.41
2065	0.00	0.00	0.00	0.00	71.35	5.49	76.85	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2066	0.00	0.00	0.00	0.00	1.36	16.48	17.85	36.22	58.45	404.76	66.28	396.49	283.39	-341.41
2067	0.00	0.00	0.00	0.00	11.82	24.72	36.54	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	36.22	58.45	404.76	66.28	396.49	283.39	-341.41
2069	0.00	0.00	234.92	0.00	39.89	74.17	348.98	36.22	45.85	404.76	66.28	396.49	283.39	-341.41
2070	0.00	0.00	340.07	0.00	0.01	76.92	416.99	36.22	44.69	404.76	66.28	396.49	283.39	-341.41
2071	0.00	0.00	152.61	0.00	0.00	0.00	152.61	36.22	44.69	404.76	66.28	396.49	283.39	-341.41
2072	0.00	0.00	11.24	0.00	0.00	0.00	11.24	36.22	44.69	404.76	66.28	396.49	283.39	-341.41
2073	0.00	0.00	115.31	0.00	0.00	0.00	115.31	36.22	43.82	404.76	66.28	396.49	283.39	-341.41
2074	0.00	0.00	157.80	0.00	0.00	0.00	157.80	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2075	0.00	0.00	75.42	0.00	23.78	0.00	99.20	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2076	0.00	0.00	70.39	0.00	12.08	0.00	82.47	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2077	0.00	0.00	10.70	0.00	0.00	0.00	10.70	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	36.22	45.85	404.76	66.28	396.49	283.39	-341.41
2080	0.00	0.00	0.00	0.00	20.01	0.00	20.01	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2083	0.00	0.00	100.29	0.00	0.00	0.00	100.29	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2084	0.00	0.00	238.25	0.00	10.82	0.90	249.97	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2085	0.00	0.00	159.07	0.00	10.40	1.80	171.28	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2086	0.00	0.00	123.42	0.00	29.51	5.41	158.34	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2087	0.00	0.00	140.15	0.00	34.78	8.11	183.05	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2088	0.00	0.00	21.30	0.00	26.94	24.33	72.57	36.22	42.95	404.76	66.28	396.49	283.39	-341.41
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	36.22	45.85	404.76	66.28	396.49	283.39	-341.41
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	36.22	45.85	404.76	66.28	396.49	283.39	-341.41
Salvage Value	0.00	0.00	29.53	0.00	7.12	6.30	42.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1247.35	0.00	368.56	432.79	5281.76	498.95	675.38	11140.80	1775.47	2783.57	4030.00	2551.76

Net Present Value -3904

K19/C31/750MW

TABLE 289
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	252.57	0.00	0.00	24.48	6.66	314.97	1.57	0.00	370.55	103.02	29.26	113.08	125.18
2015	39.48	546.76	0.00	0.00	21.74	10.91	618.88	4.67	0.00	422.34	101.11	33.45	118.89	168.89
2016	10.75	726.88	0.00	0.00	30.88	23.45	791.95	8.63	0.00	437.56	99.27	35.70	122.03	180.55
2017	10.83	881.35	0.00	0.00	46.60	32.83	971.62	13.49	0.00	472.84	97.28	38.30	129.04	208.23
2018	12.89	628.16	0.00	0.00	52.22	183.95	877.22	17.87	0.00	455.96	95.15	39.07	132.28	189.46
2019	13.00	440.82	0.00	0.00	61.87	129.40	645.08	21.10	13.01	491.07	95.09	36.64	132.97	226.37
2020	13.10	182.49	0.00	0.00	0.01	342.80	538.39	23.79	47.98	781.78	102.35	28.69	150.82	499.92
2021	16.59	63.43	0.00	0.00	0.00	0.00	80.02	24.19	46.21	847.19	102.98	31.36	166.88	545.97
2022	184.48	0.00	0.00	0.00	0.00	0.00	184.48	25.11	44.90	850.27	101.85	31.21	171.78	545.44
2023	279.81	0.00	0.00	0.00	0.00	0.00	279.81	26.51	42.92	805.88	98.89	33.32	177.66	496.01
2024	307.13	0.00	0.00	0.00	0.00	0.00	307.13	28.05	41.22	782.40	96.73	36.80	187.36	461.51
2025	313.64	0.00	0.00	0.00	4.24	0.00	317.88	29.64	39.45	739.68	96.68	26.48	170.00	446.52
2026	851.45	0.00	0.00	0.00	4.24	0.00	855.69	33.92	37.57	719.70	94.76	27.24	188.58	409.12
2027	1355.87	0.00	0.00	0.00	51.65	0.00	1407.52	40.95	36.17	665.73	92.87	25.77	181.82	365.27
2028	1219.64	0.00	0.00	0.00	27.03	0.00	1246.66	47.19	34.83	639.62	91.27	26.75	197.83	323.76
2029	872.58	0.00	0.00	0.00	45.58	0.00	918.16	51.78	36.18	617.92	89.65	27.55	219.41	281.31
2030	605.44	0.00	0.00	0.00	79.26	0.00	684.70	55.20	30.95	610.56	88.31	28.09	238.04	256.12
2031	398.41	0.00	0.00	0.00	104.90	0.00	503.31	57.72	44.00	732.90	92.34	32.47	153.36	454.73
2032	147.01	0.00	0.00	0.00	122.87	0.00	269.88	59.07	43.00	978.89	99.64	31.95	142.43	704.86
2033	46.48	0.00	0.00	0.00	0.00	0.00	46.48	59.30	41.68	1042.11	100.07	31.30	156.56	754.18
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	40.76	1010.00	98.28	30.69	160.43	720.60
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	39.05	939.09	96.65	30.72	134.35	677.37
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	38.38	903.15	94.99	31.42	134.89	641.85
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	59.30	37.61	871.50	93.36	31.36	138.64	608.14
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.30	36.66	837.66	91.71	31.28	143.36	571.31
2039	0.00	0.00	133.94	0.00	0.00	0.00	133.94	59.86	39.07	807.16	90.12	31.35	156.05	529.65
2040	0.00	0.00	175.26	0.00	12.08	0.00	187.34	60.69	35.74	805.39	88.81	29.86	172.16	514.57
2041	0.00	0.00	23.33	0.00	0.00	0.00	23.33	60.80	41.92	779.47	86.80	54.09	175.39	463.19
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	61.38	38.52	763.51	85.25	60.22	187.94	430.11
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	62.22	38.02	751.85	83.86	63.33	203.08	401.57
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	62.92	43.27	748.95	82.65	73.16	217.41	375.74
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	64.19	42.80	718.13	80.79	94.71	223.21	319.42
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	64.31	46.35	701.31	79.34	114.88	232.22	274.87
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	44.39	685.39	78.06	120.19	247.38	239.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	43.10	701.61	79.40	109.93	234.27	278.02
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	64.31	45.59	701.61	79.40	109.93	234.27	278.02
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	64.31	42.30	701.61	79.40	109.93	234.27	278.02
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	64.31	44.82	701.61	79.40	109.93	234.27	278.02
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	64.31	41.57	701.61	79.40	109.93	234.27	278.02
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	64.31	41.22	701.61	79.40	109.93	234.27	278.02
2054	0.00	0.00	0.00	0.00	21.98	24.33	46.31	64.31	40.87	701.61	79.40	109.93	234.27	278.02
2055	0.00	0.00	0.00	0.00	0.00	25.23	25.23	64.31	40.54	701.61	79.40	109.93	234.27	278.02
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	57.45	701.61	79.40	109.93	234.27	278.02
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	41.64	701.61	79.40	109.93	234.27	278.02
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	56.83	701.61	79.40	109.93	234.27	278.02
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	43.95	701.61	79.40	109.93	234.27	278.02
2060	0.00	0.00	0.00	0.00	1.05	0.00	1.05	64.31	53.00	701.61	79.40	109.93	234.27	278.02
2061	0.00	0.00	0.00	0.00	1.05	0.00	1.05	64.31	38.66	701.61	79.40	109.93	234.27	278.02
2062	0.00	0.00	0.00	0.00	12.56	0.00	12.56	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2063	0.00	0.00	0.00	0.00	6.28	0.00	6.28	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2064	0.00	0.00	0.00	0.00	24.12	2.75	26.87	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2065	0.00	0.00	0.00	0.00	29.13	5.49	34.62	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2066	0.00	0.00	0.00	0.00	26.48	16.48	42.96	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2067	0.00	0.00	0.00	0.00	42.17	24.72	66.90	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2068	0.00	0.00	0.00	0.00	25.28	74.17	99.45	64.31	66.75	701.61	79.40	109.93	234.27	278.02
2069	0.00	0.00	112.14	0.00	39.89	74.17	226.20	64.31	38.66	701.61	79.40	109.93	234.27	278.02
2070	0.00	0.00	153.46	0.00	0.01	76.92	230.38	64.31	53.00	701.61	79.40	109.93	234.27	278.02
2071	0.00	0.00	23.33	0.00	0.00	0.00	23.33	64.31	40.40	701.61	79.40	109.93	234.27	278.02
2072	0.00	0.00	114.51	0.00	0.00	0.00	114.51	64.31	53.00	701.61	79.40	109.93	234.27	278.02
2073	0.00	0.00	156.70	0.00	0.00	0.00	156.70	64.31	36.63	701.61	79.40	109.93	234.27	278.02
2074	0.00	0.00	139.93	0.00	0.00	0.00	139.93	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2075	0.00	0.00	158.90	0.00	15.27	0.00	174.17	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2076	0.00	0.00	24.15	0.00	3.19	0.00	27.34	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2077	0.00	0.00	0.00	0.00	39.09	0.00	39.09	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2078	0.00	0.00	0.00	0.00	32.83	0.00	32.83	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2079	0.00	0.00	0.00	0.00	35.12	0.00	35.12	64.31	38.66	701.61	79.40	109.93	234.27	278.02
2080	0.00	0.00	0.00	0.00	132.81	0.00	132.81	64.31	51.26	701.61	79.40	109.93	234.27	278.02
2081	0.00	0.00	0.00	0.00	79.78	0.00	79.78	64.31	38.66	701.61	79.40	109.93	234.27	278.02
2082	0.00	0.00	0.00	0.00	92.52	0.00	92.52	64.31	53.00	701.61	79.40	109.93	234.27	278.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.31	37.50	701.61	79.40	109.93	234.27	278.02
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	64.31	53.00	701.61	79.40	109.93	234.27	278.02
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	64.31	37.50	701.61	79.40	109.93	234.27	278.02
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	64.31	53.00	701.61	79.40	109.93	234.27	278.02
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2088	0.00	0.00	0.00	0.00	26.94	24.33	51.27	64.31	35.76	701.61	79.40	109.93	234.27	278.02
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	64.31	38.66	701.61	79.40	109.93	234.27	278.02
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	64.31	38.66	701.61	79.40	109.93	234.27	278.02
Salvage Value	19.27	0.00	9.43	0.00	14.19	6.30	49.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3526.11	3233.06	272.89	0.00	474.00	601.54	8107.60	802.22	634.27	13890.92	1889.73	994.81	3508.59	7497.80

Net Present Value -2046

K19/Gas31/750MW

TABLE 290
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	6.66	283.70	1.42	0.00	370.55	103.02	29.26	113.08	125.18
2015	0.00	546.76	0.00	0.00	21.74	10.91	579.40	4.32	0.00	422.34	101.11	33.45	118.89	168.89
2016	0.00	726.88	0.00	0.00	30.88	23.45	781.20	8.22	0.00	437.56	99.27	35.70	122.03	180.55
2017	0.00	881.35	0.00	0.00	46.60	32.83	960.79	13.03	0.00	472.84	97.28	38.30	129.04	208.23
2018	0.00	628.16	0.00	0.00	52.22	183.95	864.32	17.35	0.00	455.96	95.15	39.07	132.28	189.46
2019	0.00	440.82	0.00	0.00	61.87	129.40	632.08	20.51	13.01	491.07	95.09	36.64	132.97	226.37
2020	0.00	182.49	0.00	0.00	0.01	342.80	525.29	23.13	47.98	781.78	102.35	28.69	150.82	499.92
2021	0.00	63.43	0.00	0.00	0.00	0.00	63.43	23.45	46.21	847.19	102.98	31.36	166.88	545.97
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	44.90	850.18	101.85	31.24	171.78	545.32
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	42.92	806.58	98.89	33.32	177.69	496.68
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	41.22	783.74	96.74	36.82	187.34	462.83
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	39.45	742.96	96.67	26.50	170.82	448.97
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45	37.57	726.22	94.75	27.43	190.63	413.42
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	23.45	36.17	673.97	92.85	25.85	183.66	371.62
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	23.45	34.83	651.74	91.25	26.77	201.75	331.97
2029	0.00	0.00	230.97	0.00	0.00	0.00	230.97	24.50	36.18	627.49	89.70	27.19	219.92	290.68
2030	0.00	0.00	413.35	0.00	24.16	0.00	437.51	26.58	30.95	629.12	89.12	24.05	231.53	284.42
2031	0.00	0.00	189.70	0.00	95.12	0.00	284.83	27.99	37.66	617.26	86.92	56.68	196.46	277.20
2032	0.00	0.00	128.70	0.00	0.00	0.00	128.70	28.63	40.44	603.87	85.34	72.24	205.14	241.15
2033	0.00	0.00	146.14	0.00	0.00	0.00	146.14	29.36	39.27	586.20	83.89	79.20	215.86	207.25
2034	0.00	0.00	22.21	0.00	0.00	0.00	22.21	29.47	42.11	588.27	83.10	86.43	225.76	192.98
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.47	40.58	508.81	80.98	104.37	196.54	126.93
2036	0.00	0.00	230.06	0.00	0.00	0.00	230.06	30.62	39.95	480.27	79.53	114.03	200.55	86.15
2037	0.00	0.00	333.02	0.00	0.00	0.00	333.02	32.29	39.36	461.78	78.20	125.00	209.36	49.22
2038	0.00	0.00	149.45	0.00	80.02	0.00	229.48	33.44	38.79	473.08	78.11	117.86	221.81	55.30
2039	0.00	0.00	11.01	0.00	0.00	0.00	11.01	33.49	48.06	539.29	75.84	242.47	205.66	15.33
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.49	44.62	510.82	73.94	260.94	219.60	-43.66
2041	0.00	0.00	113.71	0.00	0.00	0.00	113.71	34.06	44.09	488.30	72.46	278.19	230.89	-93.24
2042	0.00	0.00	395.50	0.00	0.00	0.00	395.50	36.04	43.58	467.20	71.10	297.63	241.15	-142.67
2043	0.00	0.00	370.91	0.00	0.00	0.00	370.91	37.89	47.08	461.15	70.24	315.69	250.14	-174.91
2044	0.00	0.00	155.84	0.00	80.02	0.00	235.86	39.07	48.34	464.51	69.93	306.17	266.62	-178.21
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	39.13	54.81	539.82	67.95	453.03	236.78	-217.94
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	54.37	518.64	66.73	469.16	248.82	-266.07
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	53.07	495.65	65.47	493.79	257.54	-321.16
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	51.78	518.04	66.72	471.99	247.72	-268.39
2049	0.00	0.00	0.00	0.00	10.82	0.90	11.72	39.13	54.27	518.04	66.72	471.99	247.72	-268.39
2050	0.00	0.00	0.00	0.00	10.40	1.80	12.20	39.13	50.99	518.04	66.72	471.99	247.72	-268.39
2051	0.00	0.00	0.00	0.00	29.51	5.41	34.92	39.13	50.61	518.04	66.72	471.99	247.72	-268.39
2052	0.00	0.00	0.00	0.00	34.78	8.11	42.89	39.13	50.25	518.04	66.72	471.99	247.72	-268.39
2053	0.00	0.00	0.00	0.00	26.94	24.33	51.27	39.13	49.89	518.04	66.72	471.99	247.72	-268.39
2054	0.00	0.00	0.00	0.00	21.98	24.33	46.31	39.13	49.55	518.04	66.72	471.99	247.72	-268.39
2055	0.00	0.00	0.00	0.00	0.00	25.23	25.23	39.13	49.22	518.04	66.72	471.99	247.72	-268.39
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	64.39	518.04	66.72	471.99	247.72	-268.39
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	48.58	518.04	66.72	471.99	247.72	-268.39
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	63.78	518.04	66.72	471.99	247.72	-268.39
2059	0.00	0.00	209.16	0.00	0.00	0.00	209.16	39.13	50.89	518.04	66.72	471.99	247.72	-268.39
2060	0.00	0.00	391.55	0.00	0.00	0.00	391.55	39.13	59.94	518.04	66.72	471.99	247.72	-268.39
2061	0.00	0.00	187.63	0.00	0.00	0.00	187.63	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2062	0.00	0.00	128.70	0.00	0.00	0.00	128.70	39.13	59.94	518.04	66.72	471.99	247.72	-268.39
2063	0.00	0.00	146.14	0.00	0.00	0.00	146.14	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2064	0.00	0.00	22.21	0.00	13.66	2.75	38.62	39.13	59.94	518.04	66.72	471.99	247.72	-268.39
2065	0.00	0.00	0.00	0.00	35.49	5.49	40.99	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2066	0.00	0.00	230.06	0.00	72.71	16.48	319.25	39.13	59.94	518.04	66.72	471.99	247.72	-268.39
2067	0.00	0.00	333.02	0.00	11.82	24.72	369.57	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2068	0.00	0.00	149.45	0.00	25.28	74.17	248.90	39.13	59.94	518.04	66.72	471.99	247.72	-268.39
2069	0.00	0.00	11.01	0.00	39.89	74.17	125.07	39.13	47.34	518.04	66.72	471.99	247.72	-268.39
2070	0.00	0.00	0.00	0.00	0.01	76.92	76.93	39.13	46.18	518.04	66.72	471.99	247.72	-268.39
2071	0.00	0.00	113.71	0.00	0.00	0.00	113.71	39.13	46.18	518.04	66.72	471.99	247.72	-268.39
2072	0.00	0.00	395.50	0.00	0.00	0.00	395.50	39.13	46.18	518.04	66.72	471.99	247.72	-268.39
2073	0.00	0.00	370.91	0.00	60.02	0.00	430.93	39.13	45.31	518.04	66.72	471.99	247.72	-268.39
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2075	0.00	0.00	11.48	0.00	0.00	0.00	11.48	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	39.13	47.34	518.04	66.72	471.99	247.72	-268.39
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2081	0.00	0.00	0.00	0.00	23.78	0.00	23.78	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2084	0.00	0.00	0.00	0.00	10.82	0.90	11.72	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2085	0.00	0.00	0.00	0.00	10.40	1.80	12.20	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2086	0.00	0.00	0.00	0.00	29.51	5.41	34.92	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2087	0.00	0.00	0.00	0.00	34.78	8.11	42.89	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2088	0.00	0.00	0.00	0.00	46.94	24.33	71.28	39.13	44.44	518.04	66.72	471.99	247.72	-268.39
2089	0.00	0.00	0.00	0.00	21.98	24.33	46.31	39.13	47.34	518.04	66.72	471.99	247.72	-268.39
2090	0.00	0.00	0.00	0.00	0.00	25.23	25.23	39.13	47.34	518.04	66.72	471.99	247.72	-268.39
Salvage Value	0.00	0.00	18.17	0.00	7.84	6.30	32.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1192.51	0.00	338.28	601.54	5365.39	509.50	668.78	11651.46	1776.85	2994.53	3826.40	3053.67

Net Present Value -3490

K19/C25/250MW

TABLE 291
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.92	252.57	0.00	0.00	24.48	4.18	313.15	1.58	0.00	370.55	103.02	29.26	113.08	125.18
2015	88.09	546.76	0.00	0.00	21.74	3.13	659.72	4.88	0.00	422.34	101.11	33.45	118.89	168.89
2016	199.23	726.88	0.00	0.00	30.88	5.20	962.18	9.69	0.00	437.56	99.27	35.69	122.05	180.54
2017	235.75	881.35	0.00	0.00	46.60	7.80	1171.50	15.55	0.00	472.28	97.29	38.30	129.07	207.63
2018	283.83	628.16	0.00	0.00	52.22	23.39	987.59	20.48	0.00	451.12	94.57	41.83	134.51	180.21
2019	291.12	440.82	0.00	0.00	66.10	23.39	821.43	24.59	13.01	480.90	94.22	41.57	135.08	210.03
2020	803.86	182.49	0.00	0.00	4.25	24.25	1014.85	29.67	13.22	726.64	102.70	29.62	128.49	465.83
2021	1292.74	63.43	0.00	0.00	51.65	0.00	1407.81	36.71	12.98	770.66	103.41	30.17	135.69	501.39
2022	1162.70	0.00	0.00	0.00	27.03	0.00	1189.73	42.65	13.20	756.76	101.50	31.30	141.61	482.36
2023	831.74	0.00	0.00	0.00	45.58	0.00	877.32	47.04	13.02	738.34	99.29	31.07	155.29	452.70
2024	577.03	0.00	0.00	0.00	79.26	0.00	656.29	50.32	12.98	725.68	96.96	34.25	173.09	421.39
2025	379.67	0.00	0.00	0.00	104.90	0.00	484.57	52.74	27.06	806.08	101.65	30.47	117.58	556.38
2026	140.08	0.00	0.00	0.00	122.87	0.00	262.95	54.06	26.87	1033.24	109.37	29.63	113.01	781.23
2027	44.28	0.00	0.00	0.00	0.00	0.00	44.28	54.28	26.75	1044.22	108.69	28.05	117.09	790.39
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	27.03	1027.13	106.96	29.25	120.43	770.49
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	29.55	1000.67	105.16	29.52	122.93	743.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.57	984.70	103.90	29.20	122.03	729.58
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.40	970.83	102.29	29.83	124.80	713.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.04	940.96	100.69	30.08	125.26	684.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.11	903.41	99.04	30.28	122.06	652.04
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	25.22	872.92	97.40	30.55	124.14	620.84
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	27.29	846.01	95.79	30.81	120.34	599.07
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	54.28	24.39	813.03	94.22	31.27	121.66	565.88
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.28	24.39	778.57	92.65	31.23	123.61	531.09
2038	0.00	0.00	133.16	0.00	0.00	0.00	133.16	54.84	24.39	742.56	91.10	31.25	126.28	493.92
2039	0.00	0.00	174.20	0.00	12.08	0.00	186.28	55.66	27.29	731.22	89.91	29.57	140.28	471.45
2040	0.00	0.00	23.16	0.00	0.00	0.00	23.16	55.78	28.37	709.81	87.88	52.83	146.69	422.42
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.78	27.72	692.70	86.37	59.20	156.36	390.78
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	56.35	27.72	679.10	85.03	62.78	166.41	364.88
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	57.19	27.72	665.84	83.64	62.77	183.52	335.90
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	57.89	33.44	649.37	82.06	95.04	183.58	288.70
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	59.16	36.33	630.36	80.65	104.58	194.55	250.59
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	59.28	37.43	617.40	79.27	118.86	207.46	211.81
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	36.57	598.36	77.87	120.55	227.22	172.71
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.70	615.38	79.26	114.66	209.74	211.70
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	59.28	38.59	615.38	79.26	114.66	209.74	211.70
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	59.28	37.44	615.38	79.26	114.66	209.74	211.70
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	59.28	37.45	615.38	79.26	114.66	209.74	211.70
2052	0.00	0.00	0.00	0.00	34.78	1.93	36.71	59.28	37.45	615.38	79.26	114.66	209.74	211.70
2053	0.00	0.00	0.00	0.00	26.94	5.78	32.72	59.28	37.46	615.38	79.26	114.66	209.74	211.70
2054	0.00	0.00	0.00	0.00	23.02	5.78	28.80	59.28	37.46	615.38	79.26	114.66	209.74	211.70
2055	0.00	0.00	0.00	0.00	1.05	5.99	7.04	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2056	0.00	0.00	0.00	0.00	12.56	0.00	12.56	59.28	51.21	615.38	79.26	114.66	209.74	211.70
2057	0.00	0.00	0.00	0.00	6.28	0.00	6.28	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2058	0.00	0.00	0.00	0.00	10.47	0.00	10.47	59.28	51.21	615.38	79.26	114.66	209.74	211.70
2059	0.00	0.00	0.00	0.00	17.79	0.00	17.79	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2060	0.00	0.00	0.00	0.00	25.12	0.00	25.12	59.28	51.21	615.38	79.26	114.66	209.74	211.70
2061	0.00	0.00	0.00	0.00	30.35	0.00	30.35	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	66.71	615.38	79.26	114.66	209.74	211.70
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2064	0.00	0.00	0.00	0.00	13.66	3.96	17.62	59.28	66.71	615.38	79.26	114.66	209.74	211.70
2065	0.00	0.00	0.00	0.00	11.34	2.71	14.04	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2066	0.00	0.00	0.00	0.00	1.36	3.91	5.28	59.28	66.71	615.38	79.26	114.66	209.74	211.70
2067	0.00	0.00	0.00	0.00	11.82	5.87	17.69	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2068	0.00	0.00	111.36	0.00	25.28	17.61	154.25	59.28	66.71	615.38	79.26	114.66	209.74	211.70
2069	0.00	0.00	152.39	0.00	43.08	17.61	213.08	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2070	0.00	0.00	23.16	0.00	3.20	18.26	44.63	59.28	52.95	615.38	79.26	114.66	209.74	211.70
2071	0.00	0.00	0.00	0.00	39.09	0.00	39.09	59.28	37.46	615.38	79.26	114.66	209.74	211.70
2072	0.00	0.00	114.51	0.00	20.75	0.00	135.26	59.28	52.95	615.38	79.26	114.66	209.74	211.70
2073	0.00	0.00	156.70	0.00	35.12	0.00	191.82	59.28	36.59	615.38	79.26	114.66	209.74	211.70
2074	0.00	0.00	139.93	0.00	73.54	0.00	213.48	59.28	51.21	615.38	79.26	114.66	209.74	211.70
2075	0.00	0.00	158.90	0.00	79.78	0.00	238.68	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2076	0.00	0.00	24.15	0.00	92.52	0.00	116.67	59.28	52.95	615.38	79.26	114.66	209.74	211.70
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	37.46	615.38	79.26	114.66	209.74	211.70
2078	0.00	0.00	0.00	0.00	12.08	0.00	12.08	59.28	52.95	615.38	79.26	114.66	209.74	211.70
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	40.35	615.38	79.26	114.66	209.74	211.70
2080	0.00	0.00	0.00	0.00	71.34	0.00	71.34	59.28	52.95	615.38	79.26	114.66	209.74	211.70
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2084	0.00	0.00	0.00	0.00	10.82	0.21	11.03	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2087	0.00	0.00	0.00	0.00	34.78	1.93	36.71	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2088	0.00	0.00	0.00	0.00	26.94	5.78	32.72	59.28	35.72	615.38	79.26	114.66	209.74	211.70
2089	0.00	0.00	0.00	0.00	21.98	5.78	27.75	59.28	38.62	615.38	79.26	114.66	209.74	211.70
2090	0.00	0.00	0.00	0.00	0.00	5.99	5.99	59.28	38.62	615.38	79.26	114.66	209.74	211.70
Salvage Value	2.58	0.00	9.17	0.00	12.67	1.63	26.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4463.63	3233.06	278.11	0.00	551.66	84.15	8610.60	856.19	426.24	13975.02	1932.80	1034.92	2985.95	8021.34

Net Present Value -1872

K19/Gas24/250MW

TABLE 292
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	252.57	0.00	0.00	24.48	4.18	281.22	1.42	0.00	370.55	103.02	29.26	113.08	125.18
2015	0.00	546.76	0.00	0.00	21.74	3.13	571.63	4.28	0.00	422.34	101.11	33.45	118.89	168.89
2016	0.00	726.88	0.00	0.00	30.88	5.20	762.96	8.09	0.00	437.56	99.27	35.70	122.04	180.54
2017	0.00	881.35	0.00	0.00	46.60	7.80	935.75	12.77	0.00	472.84	97.28	38.30	129.04	208.23
2018	0.00	628.16	0.00	0.00	52.22	23.39	703.76	16.29	0.00	451.89	94.57	41.78	134.42	181.12
2019	0.00	440.82	0.00	0.00	61.87	23.39	526.07	18.92	13.01	482.17	94.21	41.56	135.01	211.40
2020	0.00	182.49	0.36	0.00	0.01	24.25	207.11	19.95	13.22	728.74	102.69	29.64	128.50	467.91
2021	0.00	63.43	0.00	0.00	0.00	0.00	63.43	20.27	12.98	773.97	103.39	30.17	135.56	504.86
2022	0.00	0.00	121.40	0.00	0.00	0.00	121.40	20.77	13.20	766.78	101.95	29.54	140.19	495.10
2023	0.00	0.00	158.10	0.00	12.08	0.00	170.18	21.51	13.02	761.80	100.87	24.80	145.63	490.50
2024	0.00	0.00	20.72	0.00	0.00	0.00	20.72	21.62	16.96	755.52	99.00	40.41	150.59	465.51
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.62	16.74	665.43	96.74	30.85	136.40	401.44
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.62	16.33	638.63	94.45	34.93	145.04	364.21
2027	0.00	0.00	103.13	0.00	0.00	0.00	103.13	22.13	16.35	604.65	92.39	37.90	147.66	326.70
2028	0.00	0.00	143.21	0.00	95.12	0.00	238.33	23.31	16.42	584.48	90.54	43.93	155.53	294.48
2029	0.00	0.00	240.55	0.00	0.00	0.00	240.55	24.51	23.11	570.56	88.80	60.62	162.30	258.84
2030	0.00	0.00	317.15	0.00	0.00	0.00	317.15	26.10	19.18	567.36	87.89	65.39	166.04	248.04
2031	0.00	0.00	142.33	0.00	12.08	0.00	154.41	26.87	19.18	594.09	88.48	56.77	167.67	281.18
2032	0.00	0.00	10.49	0.00	0.00	0.00	10.49	26.93	26.09	628.15	85.94	154.73	144.84	242.64
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.93	26.10	615.42	84.43	164.96	155.06	210.98
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.93	26.10	601.28	82.94	177.41	163.92	177.01
2035	0.00	0.00	228.46	0.00	0.00	0.00	228.46	28.07	25.45	531.45	80.93	178.00	154.75	117.78
2036	0.00	0.00	330.71	0.00	0.00	0.00	330.71	29.72	25.46	504.96	79.45	188.51	159.31	77.70
2037	0.00	0.00	148.41	0.00	0.00	0.00	148.41	30.46	25.46	522.52	79.90	181.31	158.22	103.10
2038	0.00	0.00	244.23	0.00	0.00	0.00	244.23	31.68	32.37	563.28	77.48	295.60	139.67	50.53
2039	0.00	0.00	337.70	0.00	0.00	0.00	337.70	33.37	35.27	547.85	76.09	309.54	156.78	5.44
2040	0.00	0.00	151.55	0.00	80.02	0.00	231.58	34.53	32.37	547.37	75.47	313.97	165.22	-7.29
2041	0.00	0.00	11.17	0.00	0.00	0.00	11.17	34.59	39.30	596.45	73.61	429.09	142.53	-48.79
2042	0.00	0.00	239.89	0.00	0.00	0.00	239.89	35.79	39.30	575.18	71.81	456.48	152.95	-106.06
2043	0.00	0.00	347.26	0.00	0.00	0.00	347.26	37.52	39.30	559.75	70.48	478.16	160.80	-149.69
2044	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.30	41.04	551.98	69.99	478.88	168.72	-165.60
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	38.36	47.96	596.44	67.69	614.78	150.87	-236.90
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	47.96	604.94	67.87	608.91	151.52	-223.36
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	47.10	576.98	65.90	651.31	164.20	-304.43
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	38.36	49.14	592.79	67.15	625.00	155.53	-254.90
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2052	0.00	0.00	99.60	0.00	34.78	1.93	136.31	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2053	0.00	0.00	136.30	0.00	26.94	5.78	169.01	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2054	0.00	0.00	20.72	0.00	21.98	5.78	48.47	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2055	0.00	0.00	0.00	0.00	0.00	5.99	5.99	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2057	0.00	0.00	103.13	0.00	0.00	0.00	103.13	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2058	0.00	0.00	141.13	0.00	12.08	0.00	153.21	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2059	0.00	0.00	240.55	0.00	0.00	0.00	240.55	38.36	49.14	592.79	67.15	625.00	155.53	-254.90
2060	0.00	0.00	317.15	0.00	0.00	0.00	317.15	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2061	0.00	0.00	142.33	0.00	0.00	0.00	142.33	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2062	0.00	0.00	10.49	0.00	0.00	0.00	10.49	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2063	0.00	0.00	0.00	0.00	71.34	2.80	74.15	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2064	0.00	0.00	0.00	0.00	13.66	3.96	17.62	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2065	0.00	0.00	228.46	0.00	11.34	2.71	242.50	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2066	0.00	0.00	330.71	0.00	13.44	3.91	348.06	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2067	0.00	0.00	148.41	0.00	11.82	5.87	166.10	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2068	0.00	0.00	244.23	0.00	25.28	17.61	287.12	38.36	61.73	592.79	67.15	625.00	155.53	-254.90
2069	0.00	0.00	337.70	0.00	39.89	17.61	395.20	38.36	49.14	592.79	67.15	625.00	155.53	-254.90
2070	0.00	0.00	151.55	0.00	0.01	18.26	169.83	38.36	47.98	592.79	67.15	625.00	155.53	-254.90
2071	0.00	0.00	11.17	0.00	0.00	0.00	11.17	38.36	47.98	592.79	67.15	625.00	155.53	-254.90
2072	0.00	0.00	239.89	0.00	0.00	0.00	239.89	38.36	47.98	592.79	67.15	625.00	155.53	-254.90
2073	0.00	0.00	347.26	0.00	0.00	0.00	347.26	38.36	47.11	592.79	67.15	625.00	155.53	-254.90
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2075	0.00	0.00	11.48	0.00	60.02	0.00	71.50	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2078	0.00	0.00	0.00	0.00	23.78	0.00	23.78	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	49.14	592.79	67.15	625.00	155.53	-254.90
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2082	0.00	0.00	99.60	0.00	0.00	0.00	99.60	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2083	0.00	0.00	136.30	0.00	0.00	0.00	136.30	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2084	0.00	0.00	20.72	0.00	10.82	0.21	31.75	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2087	0.00	0.00	103.13	0.00	34.78	1.93	139.84	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2088	0.00	0.00	141.13	0.00	26.94	5.78	173.85	38.36	46.24	592.79	67.15	625.00	155.53	-254.90
2089	0.00	0.00	21.45	0.00	21.98	5.78	49.21	38.36	49.14	592.79	67.15	625.00	155.53	-254.90
2090	0.00	0.00	0.00	0.00	20.01	5.99	26.00	38.36	49.14	592.79	67.15	625.00	155.53	-254.90
Salvage Value	0.00	0.00	31.87	0.00	6.75	1.63	40.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	3233.06	1559.35	0.00	325.94	84.15	5202.50	487.11	445.49	11722.75	1781.44	4090.04	2935.42	2915.85

Net Present Value -3219

K19/C31/250MW

TABLE 293
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	252.57	0.00	0.00	24.48	4.18	312.49	1.58	0.00	370.55	103.02	29.26	113.08	125.18
2015	39.48	546.76	0.00	0.00	21.74	3.13	611.11	4.63	0.00	422.34	101.11	33.45	118.89	168.89
2016	10.75	726.88	0.00	0.00	30.88	5.20	773.70	8.50	0.00	437.56	99.27	35.70	122.04	180.54
2017	10.83	881.35	0.00	0.00	46.60	7.80	946.58	13.23	0.00	472.84	97.28	38.30	129.04	208.23
2018	12.89	628.16	0.00	0.00	52.22	23.39	716.66	16.82	0.00	451.89	94.57	41.78	134.42	181.12
2019	13.00	440.82	0.00	0.00	61.87	23.39	539.07	19.51	13.01	482.17	94.21	41.56	135.01	211.40
2020	13.10	182.49	0.36	0.00	0.01	24.25	220.21	20.61	13.22	728.74	102.69	29.64	128.50	467.91
2021	16.59	63.43	0.00	0.00	0.00	0.00	80.02	21.01	12.98	773.97	103.39	30.17	135.56	504.86
2022	184.48	0.00	121.40	0.00	0.00	0.00	305.88	22.43	13.20	766.61	101.93	29.59	140.24	494.85
2023	279.81	0.00	158.10	0.00	12.08	0.00	449.99	24.57	13.02	760.97	100.84	24.97	145.90	489.25
2024	307.13	0.00	20.72	0.00	0.00	0.00	327.85	26.21	16.96	754.72	98.98	40.67	151.11	463.95
2025	313.64	0.00	0.00	0.00	4.24	0.00	317.88	27.80	16.74	664.08	96.70	31.03	137.19	399.17
2026	851.45	0.00	0.00	0.00	4.24	0.00	855.69	32.08	16.33	636.96	94.44	35.18	145.63	361.71
2027	1355.87	0.00	103.13	0.00	51.65	0.00	1510.65	39.63	16.35	602.15	92.38	38.33	148.28	323.16
2028	1219.64	0.00	141.13	0.00	39.11	0.00	1399.88	46.63	16.42	580.75	90.47	45.08	156.32	288.88
2029	872.58	0.00	21.45	0.00	45.58	0.00	939.61	51.33	23.10	566.42	88.77	61.86	163.65	252.14
2030	605.44	0.00	0.00	0.00	79.26	0.00	684.70	54.75	19.16	594.99	89.84	54.07	157.73	293.36
2031	398.41	0.00	0.00	0.00	104.90	0.00	503.31	57.27	33.47	681.58	92.95	45.27	122.35	421.01
2032	147.01	0.00	0.00	0.00	122.87	0.00	269.88	58.62	33.68	908.51	100.07	43.70	114.94	649.79
2033	46.48	0.00	0.00	0.00	0.00	0.00	46.48	58.85	33.55	939.87	99.99	45.32	122.07	672.49
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	33.76	904.54	98.22	46.43	124.41	635.49
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.93	874.96	96.53	47.09	120.79	610.54
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.88	844.24	94.90	48.27	122.20	578.87
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.71	803.82	93.04	50.05	125.41	535.32
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.35	757.42	91.07	52.15	128.67	485.52
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	35.31	725.39	89.17	57.65	141.25	437.32
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.53	705.43	87.47	65.23	148.68	404.05
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	35.25	684.34	85.82	73.93	157.71	366.89
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	58.85	32.36	682.37	84.97	74.88	164.08	358.44
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.85	32.36	670.32	83.63	74.60	180.25	331.84
2044	0.00	0.00	116.12	0.00	0.00	0.00	116.12	59.43	34.10	649.63	82.07	94.99	183.56	289.01
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	60.70	34.10	630.48	80.65	104.55	194.50	250.78
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	60.82	38.09	617.53	79.27	118.85	207.45	211.96
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	36.57	598.37	77.87	120.55	227.22	172.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.70	615.46	79.26	114.65	209.72	211.82
2049	0.00	0.00	0.00	0.00	10.82	0.21	11.03	60.82	38.59	615.46	79.26	114.65	209.72	211.82
2050	0.00	0.00	0.00	0.00	10.40	0.43	10.83	60.82	35.70	615.46	79.26	114.65	209.72	211.82
2051	0.00	0.00	0.00	0.00	29.51	1.28	30.80	60.82	38.60	615.46	79.26	114.65	209.72	211.82
2052	0.00	0.00	99.60	0.00	34.78	1.93	136.31	60.82	35.71	615.46	79.26	114.65	209.72	211.82
2053	0.00	0.00	136.30	0.00	26.94	5.78	169.01	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2054	0.00	0.00	20.72	0.00	21.98	5.78	48.47	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2055	0.00	0.00	0.00	0.00	0.00	5.99	5.99	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2057	0.00	0.00	103.13	0.00	0.00	0.00	103.13	60.82	37.46	615.46	79.26	114.65	209.72	211.82
2058	0.00	0.00	141.13	0.00	12.08	0.00	153.21	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2059	0.00	0.00	21.45	0.00	0.00	0.00	21.45	60.82	40.35	615.46	79.26	114.65	209.72	211.82
2060	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2061	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	38.62	615.46	79.26	114.65	209.72	211.82
2062	0.00	0.00	0.00	0.00	12.56	0.00	12.56	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2063	0.00	0.00	0.00	0.00	18.36	2.80	21.16	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2064	0.00	0.00	0.00	0.00	24.12	3.96	28.09	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2065	0.00	0.00	0.00	0.00	29.13	2.71	31.84	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2066	0.00	0.00	0.00	0.00	26.48	3.91	30.40	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2067	0.00	0.00	0.00	0.00	42.17	5.87	48.04	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2068	0.00	0.00	0.00	0.00	25.28	17.61	42.89	60.82	66.71	615.46	79.26	114.65	209.72	211.82
2069	0.00	0.00	0.00	0.00	39.89	17.61	57.50	60.82	38.62	615.46	79.26	114.65	209.72	211.82
2070	0.00	0.00	0.00	0.00	0.01	18.26	18.27	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	40.35	615.46	79.26	114.65	209.72	211.82
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	36.59	615.46	79.26	114.65	209.72	211.82
2074	0.00	0.00	116.12	0.00	0.00	0.00	116.12	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2075	0.00	0.00	158.90	0.00	3.19	0.00	162.09	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2076	0.00	0.00	24.15	0.00	3.19	0.00	27.34	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2077	0.00	0.00	0.00	0.00	39.09	0.00	39.09	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2078	0.00	0.00	0.00	0.00	20.75	0.00	20.75	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2079	0.00	0.00	0.00	0.00	35.12	0.00	35.12	60.82	38.62	615.46	79.26	114.65	209.72	211.82
2080	0.00	0.00	0.00	0.00	132.81	0.00	132.81	60.82	51.21	615.46	79.26	114.65	209.72	211.82
2081	0.00	0.00	0.00	0.00	79.78	0.00	79.78	60.82	38.62	615.46	79.26	114.65	209.72	211.82
2082	0.00	0.00	99.60	0.00	92.52	0.00	192.11	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2083	0.00	0.00	136.30	0.00	0.00	0.00	136.30	60.82	37.46	615.46	79.26	114.65	209.72	211.82
2084	0.00	0.00	20.72	0.00	10.82	0.21	31.75	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2085	0.00	0.00	0.00	0.00	10.40	0.43	10.83	60.82	37.46	615.46	79.26	114.65	209.72	211.82
2086	0.00	0.00	0.00	0.00	29.51	1.28	30.80	60.82	52.95	615.46	79.26	114.65	209.72	211.82
2087	0.00	0.00	103.13	0.00	34.78	1.93	139.84	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2088	0.00	0.00	141.13	0.00	26.94	5.78	173.85	60.82	35.72	615.46	79.26	114.65	209.72	211.82
2089	0.00	0.00	21.45	0.00	21.98	5.78	49.21	60.82	38.62	615.46	79.26	114.65	209.72	211.82
2090	0.00	0.00	0.00	0.00	0.00	5.99	5.99	60.82	38.62	615.46	79.26	114.65	209.72	211.82
Salvage Value	19.27	0.00	15.00	0.00	13.93	1.63	49.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3526.11	3233.06	482.96	0.00	483.18	84.15	7809.46	768.50	428.42	12794.67	1889.56	1146.73	3061.09	6697.30

Net Present Value -2309

All Gas

TABLE 294
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	424.74	101.10	33.46	118.80	171.38
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	440.11	99.26	35.68	121.95	183.21
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	480.37	97.64	36.87	127.50	218.35
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	458.44	94.84	40.19	133.19	190.22
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	442.22	92.91	35.62	136.04	177.66
2020	0.00	0.00	120.02	0.00	0.00	0.00	120.02	1.00	0.00	472.97	92.97	28.13	142.16	209.70
2021	0.00	0.00	156.26	0.00	12.08	0.00	168.34	1.74	0.00	464.24	91.22	26.32	154.81	191.89
2022	0.00	0.00	20.43	0.00	0.00	0.00	20.43	1.84	3.98	452.03	88.95	48.91	160.20	153.97
2023	0.00	0.00	100.29	0.00	0.00	0.00	100.29	2.34	3.98	434.04	86.76	60.21	170.77	116.29
2024	0.00	0.00	139.33	0.00	95.12	0.00	234.45	3.50	3.98	425.79	85.29	68.73	179.75	92.02
2025	0.00	0.00	20.86	0.00	0.00	0.00	20.86	3.61	7.98	373.14	84.81	57.58	157.14	73.61
2026	0.00	0.00	102.41	0.00	0.00	0.00	102.41	4.12	7.98	354.21	83.50	59.58	162.05	49.09
2027	0.00	0.00	140.15	0.00	0.00	0.00	140.15	4.82	7.98	332.49	81.64	59.89	180.23	10.73
2028	0.00	0.00	238.87	0.00	0.00	0.00	238.87	6.01	11.97	309.35	79.70	93.39	178.88	-42.62
2029	0.00	0.00	314.95	0.00	0.00	0.00	314.95	7.59	11.97	288.25	78.24	106.18	186.61	-82.77
2030	0.00	0.00	141.34	0.00	12.08	0.00	153.42	8.35	11.98	306.69	79.18	98.82	180.95	-52.25
2031	0.00	0.00	10.41	0.00	0.00	0.00	10.41	8.41	18.90	331.68	76.77	184.33	161.28	-90.71
2032	0.00	0.00	106.79	0.00	0.00	0.00	106.79	8.94	18.90	301.55	74.86	201.65	171.38	-146.35
2033	0.00	0.00	146.14	0.00	80.02	0.00	226.17	10.07	18.90	274.62	73.12	218.99	182.02	-199.51
2034	0.00	0.00	249.08	0.00	0.00	0.00	249.08	11.32	22.90	256.85	71.70	245.64	188.32	-248.82
2035	0.00	0.00	328.41	0.00	0.00	0.00	328.41	12.96	22.90	241.05	70.81	258.09	194.31	-282.16
2036	0.00	0.00	147.38	0.00	0.00	0.00	147.38	13.70	22.90	240.00	70.77	251.03	204.29	-286.09
2037	0.00	0.00	242.53	0.00	0.00	0.00	242.53	14.91	29.82	250.57	68.78	343.09	173.49	-334.79
2038	0.00	0.00	335.35	0.00	0.00	0.00	335.35	16.59	29.82	228.87	67.56	361.36	183.16	-383.20
2039	0.00	0.00	150.50	0.00	0.00	0.00	150.50	17.34	29.83	224.88	67.51	367.02	191.21	-400.85
2040	0.00	0.00	11.09	0.00	0.00	0.00	11.09	17.39	36.75	243.71	65.58	457.65	170.15	-449.67
2041	0.00	0.00	238.22	0.00	0.00	0.00	238.22	18.58	36.76	227.72	63.80	495.09	186.15	-517.32
2042	0.00	0.00	344.84	0.00	0.00	0.00	344.84	20.31	36.76	218.04	62.75	520.95	198.09	-563.76
2043	0.00	0.00	154.76	0.00	80.02	0.00	234.78	21.48	36.76	221.21	62.75	526.23	202.55	-570.32
2044	0.00	0.00	11.40	0.00	0.00	0.00	11.40	21.54	43.68	242.37	61.17	620.70	177.09	-616.58
2045	0.00	0.00	51.43	0.00	0.00	0.00	51.43	21.80	43.68	229.47	59.65	661.24	192.61	-684.02
2046	0.00	0.00	70.39	0.00	0.00	0.00	70.39	22.15	43.68	219.73	58.55	694.78	204.48	-738.07
2047	0.00	0.00	10.70	0.00	0.00	0.00	10.70	22.20	45.13	215.85	57.69	732.22	210.53	-784.59
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.13	221.69	58.63	696.08	202.54	-735.56
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	22.20	45.14	221.69	58.63	696.08	202.54	-735.56
2050	0.00	0.00	98.22	0.00	9.87	0.00	108.08	22.20	45.14	221.69	58.63	696.08	202.54	-735.56
2051	0.00	0.00	134.41	0.00	9.87	0.00	144.27	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2052	0.00	0.00	20.43	0.00	9.87	0.00	30.30	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2053	0.00	0.00	100.29	0.00	0.00	0.00	100.29	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2054	0.00	0.00	137.25	0.00	0.00	0.00	137.25	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2055	0.00	0.00	20.86	0.00	0.00	0.00	20.86	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2056	0.00	0.00	102.41	0.00	12.08	0.00	114.49	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2057	0.00	0.00	140.15	0.00	0.00	0.00	140.15	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2058	0.00	0.00	238.87	0.00	0.00	0.00	238.87	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2059	0.00	0.00	314.95	0.00	71.34	0.00	386.29	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2060	0.00	0.00	141.34	0.00	0.00	0.00	141.34	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2061	0.00	0.00	10.41	0.00	0.00	0.00	10.41	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2062	0.00	0.00	106.79	0.00	0.00	0.00	106.79	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2063	0.00	0.00	146.14	0.00	0.00	0.00	146.14	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2064	0.00	0.00	249.08	0.00	0.00	0.00	249.08	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2065	0.00	0.00	328.41	0.00	12.08	0.00	340.49	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2066	0.00	0.00	147.38	0.00	0.00	0.00	147.38	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2067	0.00	0.00	242.53	0.00	0.00	0.00	242.53	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2068	0.00	0.00	335.35	0.00	60.02	0.00	395.37	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2069	0.00	0.00	150.50	0.00	0.00	0.00	150.50	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2070	0.00	0.00	11.09	0.00	0.00	0.00	11.09	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2071	0.00	0.00	238.22	0.00	0.00	0.00	238.22	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2072	0.00	0.00	344.84	0.00	0.00	0.00	344.84	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2073	0.00	0.00	154.76	0.00	0.00	0.00	154.76	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2074	0.00	0.00	11.40	0.00	23.78	0.00	35.18	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2075	0.00	0.00	51.43	0.00	0.00	0.00	51.43	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2076	0.00	0.00	70.39	0.00	0.00	0.00	70.39	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2077	0.00	0.00	10.70	0.00	0.00	0.00	10.70	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2078	0.00	0.00	0.00	0.00	60.02	0.00	60.02	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2080	0.00	0.00	98.22	0.00	0.00	0.00	98.22	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2081	0.00	0.00	134.41	0.00	0.00	0.00	134.41	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2082	0.00	0.00	20.43	0.00	0.00	0.00	20.43	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2083	0.00	0.00	100.29	0.00	20.01	0.00	120.30	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2084	0.00	0.00	137.25	0.00	9.87	0.00	147.12	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2085	0.00	0.00	20.86	0.00	9.87	0.00	30.73	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2086	0.00	0.00	102.41	0.00	9.87	0.00	112.28	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2087	0.00	0.00	140.15	0.00	9.87	0.00	150.02	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2088	0.00	0.00	21.30	0.00	0.00	0.00	21.30	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.20	45.15	221.69	58.63	696.08	202.54	-735.56
Salvage Value	0.00	0.00	51.90	0.00	3.28	0.00	55.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1993.71	0.00	182.81	0.00	2239.47	181.03	343.48	6899.48	1625.85	4899.33	3385.54	-3011.24

Net Present Value -5775

Wind/Gas

TABLE 295
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	424.74	101.10	33.46	118.82	171.36
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	440.11	99.26	35.68	121.98	183.19
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	480.42	97.64	36.87	127.52	218.38
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	458.44	94.84	40.19	133.19	190.22
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	442.22	92.91	35.62	136.04	177.66
2020	0.00	0.00	0.00	12.81	20.76	0.00	33.57	0.68	0.00	467.41	92.50	30.33	143.54	201.03
2021	0.00	0.00	0.36	391.21	34.60	0.00	426.17	2.81	0.00	458.63	90.76	29.14	155.72	183.00
2022	0.00	0.00	0.00	398.53	41.80	0.00	440.33	5.01	6.21	468.67	89.13	29.23	157.40	192.91
2023	0.00	0.00	222.39	385.72	21.87	0.00	629.98	8.05	12.42	465.62	86.65	33.43	163.08	182.46
2024	0.00	0.00	296.35	7.32	34.41	0.00	338.09	9.63	18.63	472.29	84.88	33.70	167.49	186.22
2025	0.00	0.00	41.72	6.41	6.66	0.00	54.80	9.91	26.60	433.94	84.97	39.38	138.73	170.88
2026	0.00	0.00	102.41	195.61	16.75	0.00	314.77	11.48	26.60	423.21	83.97	37.64	142.74	158.85
2027	0.00	0.00	142.23	199.27	121.74	0.00	463.23	13.79	29.70	405.41	81.60	46.24	150.66	126.91
2028	0.00	0.00	21.30	199.27	36.89	0.00	257.46	15.07	36.81	399.13	79.86	59.96	155.96	103.36
2029	0.00	0.00	104.58	199.27	37.03	0.00	340.87	16.78	39.91	387.99	78.28	65.10	161.54	83.08
2030	0.00	0.00	143.12	199.27	37.03	0.00	379.41	18.68	43.02	390.56	77.36	68.24	162.82	82.14
2031	0.00	0.00	127.80	199.27	37.03	0.00	364.10	20.50	50.10	395.51	76.15	80.92	166.57	71.88
2032	0.00	0.00	145.13	199.27	117.05	0.00	461.45	22.80	53.22	391.38	75.05	81.66	172.23	62.44
2033	0.00	0.00	22.06	199.27	37.03	0.00	258.35	24.09	60.32	400.11	74.40	87.00	175.72	62.98
2034	0.00	0.00	108.29	199.27	37.03	0.00	344.59	25.82	63.43	383.57	72.60	102.40	180.19	28.38
2035	0.00	0.00	148.20	199.27	37.03	0.00	384.49	27.74	66.55	366.94	70.94	110.48	188.92	-3.40
2036	0.00	0.00	132.34	199.27	37.03	0.00	368.63	29.58	73.63	360.22	69.59	126.97	193.64	-29.97
2037	0.00	0.00	150.28	199.27	37.03	0.00	386.57	31.52	76.75	349.02	68.31	134.53	200.66	-54.48
2038	0.00	0.00	134.20	199.27	37.03	0.00	370.49	33.37	83.84	348.56	67.29	148.24	206.24	-73.21
2039	0.00	0.00	152.39	199.27	117.05	0.00	468.71	35.71	86.95	342.00	66.15	148.68	226.59	-99.42
2040	0.00	0.00	23.16	212.08	37.03	0.00	272.27	37.07	94.06	348.60	65.36	157.44	235.74	-109.93
2041	0.00	0.00	113.71	590.48	37.03	0.00	741.22	40.78	97.17	331.10	63.85	189.02	233.01	-154.78
2042	0.00	0.00	155.61	597.80	37.03	0.00	790.44	44.73	100.27	316.84	62.49	202.23	243.43	-191.31
2043	0.00	0.00	138.96	584.98	36.75	0.00	760.70	48.54	107.36	310.62	61.33	223.64	250.09	-224.44
2044	0.00	0.00	157.80	206.59	35.92	0.00	400.30	50.54	110.47	304.97	60.42	232.49	258.14	-246.07
2045	0.00	0.00	75.42	205.67	33.69	0.00	314.79	52.11	117.57	301.13	59.34	246.14	271.35	-275.71
2046	0.00	0.00	70.39	388.46	30.36	0.00	489.21	54.56	120.68	294.68	58.31	247.68	290.99	-302.30
2047	0.00	0.00	10.70	202.93	20.27	0.00	233.90	55.73	125.23	286.48	57.27	256.12	295.43	-322.33
2048	0.00	0.00	0.00	199.27	10.41	0.00	209.68	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2049	0.00	0.00	0.00	199.27	10.00	0.00	209.27	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2050	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2051	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2052	0.00	0.00	0.00	199.27	9.87	0.00	209.13	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2053	0.00	0.00	200.59	199.27	0.00	0.00	399.85	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2054	0.00	0.00	274.50	199.27	0.00	0.00	473.77	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2055	0.00	0.00	41.72	199.27	5.19	0.00	246.18	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2056	0.00	0.00	102.41	199.27	8.65	0.00	310.33	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2057	0.00	0.00	140.15	199.27	10.52	0.00	349.94	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2058	0.00	0.00	21.30	199.27	5.88	0.00	226.45	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2059	0.00	0.00	104.58	199.27	27.14	0.00	330.98	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2060	0.00	0.00	143.12	212.08	2.92	0.00	358.11	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2061	0.00	0.00	127.80	590.48	4.67	0.00	722.95	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2062	0.00	0.00	145.13	597.80	78.10	0.00	821.03	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2063	0.00	0.00	22.06	584.98	9.26	0.00	616.30	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2064	0.00	0.00	108.29	206.59	9.26	0.00	324.14	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2065	0.00	0.00	148.20	205.67	9.26	0.00	363.13	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2066	0.00	0.00	132.34	388.46	9.26	0.00	530.06	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2067	0.00	0.00	150.28	202.93	69.27	0.00	422.48	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2068	0.00	0.00	134.20	199.27	9.26	0.00	342.72	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2069	0.00	0.00	152.39	199.27	9.26	0.00	360.91	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2070	0.00	0.00	23.16	199.27	24.83	0.00	247.26	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2071	0.00	0.00	113.71	199.27	35.21	0.00	348.18	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2072	0.00	0.00	155.61	199.27	40.53	0.00	395.41	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2073	0.00	0.00	138.96	199.27	25.24	0.00	363.47	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2074	0.00	0.00	157.80	199.27	76.55	0.00	433.61	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2075	0.00	0.00	75.42	199.27	13.01	0.00	287.69	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2076	0.00	0.00	70.39	199.27	21.34	0.00	290.99	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2077	0.00	0.00	10.70	199.27	52.89	0.00	262.86	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2078	0.00	0.00	0.00	199.27	36.75	0.00	236.02	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2079	0.00	0.00	0.00	199.27	36.33	0.00	235.60	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2080	0.00	0.00	0.00	212.08	35.78	0.00	247.86	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2081	0.00	0.00	0.00	590.48	34.11	0.00	624.59	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2082	0.00	0.00	0.00	597.80	52.36	0.00	650.16	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2083	0.00	0.00	200.59	584.98	30.27	0.00	815.84	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2084	0.00	0.00	274.50	206.59	37.50	0.00	518.59	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2085	0.00	0.00	41.72	205.67	37.22	0.00	284.62	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2086	0.00	0.00	102.41	388.46	35.55	0.00	526.43	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2087	0.00	0.00	140.15	202.93	33.89	0.00	376.97	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2088	0.00	0.00	21.30	199.27	15.69	0.00	236.26	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2089	0.00	0.00	0.00	192.86	27.92	0.00	220.78	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
2090	0.00	0.00	0.00	3.66	0.14	0.00	3.80	55.73	125.23	294.10	58.30	249.98	285.92	-300.11
Salvage Value	0.00	0.00	30.14	70.48	14.94	0.00	115.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	1435.66	3453.82	557.04	0.00	5509.47	430.90	974.12	7953.44	1622.30	2069.86	3731.41	529.87

Net Present Value -6385

K22/Gas

TABLE 296
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	105.39	0.00	0.00	9.87	0.00	115.25	0.58	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	34.73	0.00	0.00	11.07	0.00	45.80	0.81	0.00	424.74	101.10	33.46	118.80	171.38
2016	0.00	37.30	0.00	0.00	11.18	0.00	48.48	1.05	0.00	439.57	99.26	35.69	121.95	182.66
2017	0.00	243.59	0.00	0.00	32.53	0.00	276.12	2.43	0.00	479.01	97.65	36.90	127.57	216.89
2018	0.00	475.71	0.00	0.00	11.62	0.00	487.33	4.86	0.00	455.49	94.85	40.21	133.34	187.10
2019	0.00	760.82	0.00	0.00	20.24	0.00	781.05	8.77	0.00	439.20	92.92	35.63	136.18	174.47
2020	0.00	855.73	0.00	0.00	36.83	0.00	892.55	13.23	0.00	460.61	92.33	31.28	144.58	192.42
2021	0.00	696.05	0.00	0.00	52.24	0.00	748.29	16.97	0.00	455.59	90.71	29.74	157.97	177.18
2022	0.00	405.11	0.00	0.00	61.87	0.00	466.98	19.31	13.01	464.15	90.68	33.82	145.91	193.74
2023	0.00	188.58	0.00	0.00	0.01	0.00	188.60	20.25	13.22	614.31	96.36	33.27	129.56	355.13
2024	0.00	65.35	0.00	0.00	0.00	0.00	65.35	20.58	12.93	639.16	96.21	37.58	138.59	366.78
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	20.58	13.15	609.25	96.20	26.20	121.14	365.71
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.58	12.97	588.51	94.34	26.53	127.00	340.64
2027	0.00	0.00	124.94	0.00	0.00	0.00	124.94	21.09	12.93	543.47	92.50	25.38	123.64	301.95
2028	0.00	0.00	162.99	0.00	12.08	0.00	175.07	21.86	12.69	517.98	90.96	26.46	128.16	272.40
2029	0.00	0.00	21.45	0.00	0.00	0.00	21.45	21.97	16.24	511.19	90.13	33.37	129.75	257.95
2030	0.00	0.00	105.31	0.00	0.00	0.00	105.31	22.49	16.24	495.06	88.36	41.36	136.54	228.79
2031	0.00	0.00	368.37	0.00	95.12	0.00	463.49	24.80	16.28	482.53	86.70	48.50	145.12	202.22
2032	0.00	0.00	343.51	0.00	0.00	0.00	343.51	26.52	22.98	468.37	85.09	65.31	152.26	165.71
2033	0.00	0.00	144.33	0.00	12.08	0.00	156.41	27.30	19.04	482.76	85.28	57.50	155.79	184.20
2034	0.00	0.00	10.63	0.00	0.00	0.00	10.63	27.35	25.96	517.73	82.86	155.78	133.37	145.73
2035	0.00	0.00	228.46	0.00	0.00	0.00	228.46	28.50	25.96	490.60	80.80	170.84	143.59	95.37
2036	0.00	0.00	330.71	0.00	0.00	0.00	330.71	30.15	25.96	474.05	79.28	185.11	151.54	58.11
2037	0.00	0.00	148.41	0.00	0.00	0.00	148.41	30.89	25.97	490.32	79.73	175.52	151.70	83.38
2038	0.00	0.00	244.23	0.00	0.00	0.00	244.23	32.11	32.23	525.38	77.36	283.38	133.10	31.54
2039	0.00	0.00	337.70	0.00	0.00	0.00	337.70	33.80	32.24	510.69	76.00	298.12	149.87	-13.29
2040	0.00	0.00	151.55	0.00	80.02	0.00	231.58	34.96	32.24	513.59	75.52	300.98	157.57	-20.48
2041	0.00	0.00	11.17	0.00	0.00	0.00	11.17	35.02	39.16	555.23	73.54	413.18	135.15	-66.65
2042	0.00	0.00	239.89	0.00	0.00	0.00	239.89	36.22	42.06	534.04	71.74	441.58	145.77	-125.04
2043	0.00	0.00	347.26	0.00	0.00	0.00	347.26	37.95	39.16	519.13	70.40	463.47	154.11	-168.85
2044	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.73	39.16	516.26	70.04	463.55	161.07	-178.40
2045	0.00	0.00	11.48	0.00	0.00	0.00	11.48	38.79	46.09	566.49	68.44	581.66	138.84	-222.45
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.09	549.59	67.20	602.92	148.70	-269.23
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	47.84	533.90	65.84	632.59	158.54	-323.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	47.84	550.00	67.16	605.72	148.69	-271.58
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	47.84	550.00	67.16	605.72	148.69	-271.58
2050	0.00	0.00	0.00	0.00	10.40	0.00	10.40	38.79	46.97	550.00	67.16	605.72	148.69	-271.58
2051	0.00	0.00	0.00	0.00	10.47	0.00	10.47	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2052	0.00	0.00	0.00	0.00	10.48	0.00	10.48	38.79	49.00	550.00	67.16	605.72	148.69	-271.58
2053	0.00	0.00	0.00	0.00	0.57	0.00	0.57	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2054	0.00	0.00	0.00	0.00	18.78	0.00	18.78	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2055	0.00	0.00	0.00	0.00	24.92	0.00	24.92	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2056	0.00	0.00	0.00	0.00	26.94	0.00	26.94	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2057	0.00	0.00	103.13	0.00	21.98	0.00	125.11	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2058	0.00	0.00	141.13	0.00	0.00	0.00	141.13	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2059	0.00	0.00	21.45	0.00	0.00	0.00	21.45	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2060	0.00	0.00	105.31	0.00	0.00	0.00	105.31	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2061	0.00	0.00	366.29	0.00	0.00	0.00	366.29	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2062	0.00	0.00	343.51	0.00	0.00	0.00	343.51	38.79	49.00	550.00	67.16	605.72	148.69	-271.58
2063	0.00	0.00	144.33	0.00	12.08	0.00	156.41	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2064	0.00	0.00	10.63	0.00	0.00	0.00	10.63	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2065	0.00	0.00	228.46	0.00	0.67	0.00	229.13	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2066	0.00	0.00	330.71	0.00	72.05	0.00	402.76	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2067	0.00	0.00	148.41	0.00	22.05	0.00	170.46	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2068	0.00	0.00	244.23	0.00	23.13	0.00	267.36	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2069	0.00	0.00	337.70	0.00	1.45	0.00	339.15	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2070	0.00	0.00	151.55	0.00	11.91	0.00	163.46	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2071	0.00	0.00	11.17	0.00	25.30	0.00	36.47	38.79	61.60	550.00	67.16	605.72	148.69	-271.58
2072	0.00	0.00	239.89	0.00	39.89	0.00	279.78	38.79	49.00	550.00	67.16	605.72	148.69	-271.58
2073	0.00	0.00	347.26	0.00	0.01	0.00	347.27	38.79	47.84	550.00	67.16	605.72	148.69	-271.58
2074	0.00	0.00	155.84	0.00	0.00	0.00	155.84	38.79	47.84	550.00	67.16	605.72	148.69	-271.58
2075	0.00	0.00	11.48	0.00	60.02	0.00	71.50	38.79	47.84	550.00	67.16	605.72	148.69	-271.58
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.97	550.00	67.16	605.72	148.69	-271.58
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2081	0.00	0.00	0.00	0.00	23.78	0.00	23.78	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	49.00	550.00	67.16	605.72	148.69	-271.58
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2087	0.00	0.00	103.13	0.00	9.87	0.00	113.00	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2088	0.00	0.00	141.13	0.00	0.00	0.00	141.13	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2089	0.00	0.00	21.45	0.00	0.00	0.00	21.45	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
2090	0.00	0.00	0.00	0.00	20.01	0.00	20.01	38.79	46.10	550.00	67.16	605.72	148.69	-271.58
Salvage Value	0.00	0.00	28.36	0.00	5.11	0.00	33.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2931.58	1457.36	0.00	298.13	0.00	4687.07	437.47	393.87	10243.67	1751.77	3843.68	2806.28	1841.94

Net Present Value: -3676

K22/C29

TABLE 297
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	105.39	0.00	0.00	9.87	0.00	146.52	0.73	0.00	371.50	103.01	29.23	113.00	126.25
2015	40.00	34.73	0.00	0.00	11.07	0.00	85.80	1.16	0.00	424.74	101.10	33.46	118.80	171.38
2016	11.28	37.30	0.00	0.00	11.18	0.00	59.76	1.46	0.00	439.57	99.26	35.69	121.95	182.66
2017	12.04	243.59	0.00	0.00	32.53	0.00	288.16	2.90	0.00	479.01	97.65	36.90	127.57	216.89
2018	12.13	475.71	0.00	0.00	11.62	0.00	499.46	5.40	0.00	455.49	94.85	40.21	133.34	187.10
2019	14.53	760.82	0.00	0.00	20.24	0.00	795.59	9.38	0.00	439.20	92.92	35.63	136.18	174.47
2020	184.88	855.73	0.00	0.00	36.83	0.00	1077.44	14.76	0.00	460.62	92.33	31.28	144.59	192.42
2021	278.78	696.05	0.00	0.00	52.24	0.00	1027.06	19.90	0.00	455.29	90.71	29.75	158.24	176.60
2022	302.41	405.11	0.00	0.00	61.87	0.00	769.39	23.75	13.01	463.78	90.69	33.78	146.18	193.13
2023	308.82	188.58	0.00	0.00	4.25	0.00	501.66	26.25	13.22	612.97	96.35	33.35	129.67	353.60
2024	838.38	65.35	0.00	0.00	4.24	0.00	907.97	30.79	12.93	636.46	96.20	37.59	138.68	363.98
2025	1335.05	0.00	0.00	0.00	51.65	0.00	1386.70	37.73	13.15	605.89	96.22	26.24	121.30	362.12
2026	1200.91	0.00	0.00	0.00	27.03	0.00	1227.94	43.87	12.97	584.35	94.34	26.60	127.30	336.10
2027	859.18	0.00	0.00	0.00	45.58	0.00	904.76	48.39	12.93	541.31	92.74	24.37	123.64	300.56
2028	596.14	0.00	0.00	0.00	79.26	0.00	675.40	51.77	12.69	508.52	90.85	26.78	129.38	261.51
2029	392.30	0.00	0.00	0.00	104.90	0.00	497.20	54.25	26.56	667.23	94.61	30.71	115.02	426.89
2030	144.76	0.00	0.00	0.00	122.87	0.00	267.62	55.59	26.78	886.24	101.77	29.87	105.64	648.96
2031	45.77	0.00	0.00	0.00	0.00	0.00	45.77	55.82	26.68	917.59	101.47	30.54	110.95	674.63
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	29.59	886.19	99.81	30.19	111.94	644.25
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.48	851.29	98.21	30.18	109.62	613.29
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.44	824.43	96.62	30.82	111.58	585.41
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	25.27	793.49	95.08	31.03	112.29	555.10
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	55.82	24.90	760.41	93.54	30.98	113.35	522.54
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.82	24.97	726.99	92.02	31.14	115.18	488.65
2038	0.00	0.00	133.16	0.00	0.00	0.00	133.16	56.38	24.43	694.62	90.51	31.19	118.63	454.29
2039	0.00	0.00	174.20	0.00	12.08	0.00	186.28	57.20	27.15	683.42	89.16	30.55	135.63	428.08
2040	0.00	0.00	23.16	0.00	0.00	0.00	23.16	57.32	28.24	667.83	87.44	54.39	138.07	387.93
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.32	28.24	650.99	85.98	60.70	146.48	357.83
2042	0.00	0.00	114.55	0.00	0.00	0.00	114.55	57.89	31.13	637.74	84.58	62.59	160.16	330.41
2043	0.00	0.00	156.70	0.00	12.08	0.00	168.78	58.73	28.24	621.63	83.11	63.79	176.98	297.75
2044	0.00	0.00	139.93	0.00	0.00	0.00	139.93	59.43	32.22	606.64	81.65	98.38	173.42	253.18
2045	0.00	0.00	160.98	0.00	95.12	0.00	256.10	60.70	31.56	593.06	80.40	105.42	184.15	223.10
2046	0.00	0.00	24.15	0.00	0.00	0.00	24.15	60.82	35.56	610.71	80.04	104.38	194.08	232.20
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.30	567.06	77.84	139.72	200.84	148.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.30	590.28	79.43	116.51	193.03	201.32
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	40.20	590.28	79.43	116.51	193.03	201.32
2050	0.00	0.00	0.00	0.00	10.40	0.00	10.40	60.82	36.44	590.28	79.43	116.51	193.03	201.32
2051	0.00	0.00	0.00	0.00	10.47	0.00	10.47	60.82	35.57	590.28	79.43	116.51	193.03	201.32
2052	0.00	0.00	0.00	0.00	10.48	0.00	10.48	60.82	38.48	590.28	79.43	116.51	193.03	201.32
2053	0.00	0.00	0.00	0.00	0.57	0.00	0.57	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2054	0.00	0.00	0.00	0.00	18.78	0.00	18.78	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2055	0.00	0.00	0.00	0.00	24.92	0.00	24.92	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2056	0.00	0.00	0.00	0.00	26.94	0.00	26.94	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2057	0.00	0.00	0.00	0.00	21.98	0.00	21.98	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2058	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2059	0.00	0.00	0.00	0.00	1.05	0.00	1.05	60.82	53.98	590.28	79.43	116.51	193.03	201.32
2060	0.00	0.00	0.00	0.00	12.56	0.00	12.56	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2061	0.00	0.00	0.00	0.00	6.28	0.00	6.28	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2062	0.00	0.00	0.00	0.00	10.47	0.00	10.47	60.82	38.48	590.28	79.43	116.51	193.03	201.32
2063	0.00	0.00	0.00	0.00	17.79	0.00	17.79	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2064	0.00	0.00	0.00	0.00	25.12	0.00	25.12	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2065	0.00	0.00	0.00	0.00	31.02	0.00	31.02	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2066	0.00	0.00	0.00	0.00	0.71	0.00	0.71	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2067	0.00	0.00	0.00	0.00	22.05	0.00	22.05	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2068	0.00	0.00	111.36	0.00	11.05	0.00	122.41	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2069	0.00	0.00	152.39	0.00	1.45	0.00	153.84	60.82	53.98	590.28	79.43	116.51	193.03	201.32
2070	0.00	0.00	23.16	0.00	11.91	0.00	35.07	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2071	0.00	0.00	0.00	0.00	25.30	0.00	25.30	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2072	0.00	0.00	114.51	0.00	39.89	0.00	154.40	60.82	53.98	590.28	79.43	116.51	193.03	201.32
2073	0.00	0.00	156.70	0.00	3.20	0.00	159.90	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2074	0.00	0.00	139.93	0.00	15.27	0.00	155.20	60.82	52.82	590.28	79.43	116.51	193.03	201.32
2075	0.00	0.00	158.90	0.00	39.09	0.00	197.99	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2076	0.00	0.00	24.15	0.00	20.75	0.00	44.90	60.82	51.95	590.28	79.43	116.51	193.03	201.32
2077	0.00	0.00	0.00	0.00	35.12	0.00	35.12	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2078	0.00	0.00	0.00	0.00	73.54	0.00	73.54	60.82	51.08	590.28	79.43	116.51	193.03	201.32
2079	0.00	0.00	0.00	0.00	79.78	0.00	79.78	60.82	38.48	590.28	79.43	116.51	193.03	201.32
2080	0.00	0.00	0.00	0.00	163.86	0.00	163.86	60.82	52.82	590.28	79.43	116.51	193.03	201.32
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	55.71	590.28	79.43	116.51	193.03	201.32
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	37.32	590.28	79.43	116.51	193.03	201.32
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	52.82	590.28	79.43	116.51	193.03	201.32
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.59	590.28	79.43	116.51	193.03	201.32
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	38.48	590.28	79.43	116.51	193.03	201.32
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.82	35.59	590.28	79.43	116.51	193.03	201.32
Salvage Value	13.46	0.00	9.17	0.00	11.80	0.00	34.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3813.51	2931.58	278.11	0.00	480.15	0.00	7503.35	743.12	364.53	11787.81	1869.66	1037.11	2873.54	6007.50

Net Present Value: -2603

SCGT/C26

TABLE 298
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	371.50	103.01	29.23	113.00	126.25
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	424.74	101.10	33.46	118.81	171.37
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	440.11	99.26	35.68	121.95	183.21
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	480.41	97.64	36.87	127.53	218.36
2018	237.84	0.00	0.36	0.00	0.00	0.00	238.20	3.51	0.00	457.85	94.84	40.21	133.23	189.57
2019	286.35	0.00	0.00	0.00	0.00	0.00	286.35	4.94	0.00	441.28	92.91	35.63	136.08	176.67
2020	293.68	0.00	120.02	0.00	0.00	0.00	413.70	6.90	0.00	471.23	92.94	28.29	142.27	207.74
2021	811.02	0.00	156.22	0.00	12.08	0.00	979.32	11.68	0.00	462.55	91.19	26.65	155.37	189.35
2022	1304.42	0.00	20.43	0.00	0.80	0.00	1325.66	18.31	3.98	450.34	88.97	49.53	160.89	150.95
2023	1173.36	0.00	0.00	0.00	1.61	0.00	1174.96	24.19	3.98	430.30	86.62	62.59	171.97	109.13
2024	839.47	0.00	0.00	0.00	3.21	0.00	842.68	28.40	3.98	425.28	85.46	68.14	179.67	92.01
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	31.35	3.98	380.27	85.97	42.27	161.10	90.92
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	33.28	18.29	485.12	89.91	32.16	128.20	234.85
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	33.99	18.51	694.82	97.70	29.76	116.04	451.33
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	34.21	18.21	730.34	97.71	32.59	127.35	472.70
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.43	697.83	95.99	33.58	129.60	438.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.26	669.84	94.81	33.12	124.96	416.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	18.21	642.07	92.84	36.08	130.55	382.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.97	598.13	90.95	38.41	130.92	337.86
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.54	569.09	89.03	45.12	136.36	298.58
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.54	554.92	87.47	52.08	145.18	270.19
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.21	17.58	541.41	86.17	57.93	150.97	246.34
2036	0.00	0.00	109.81	0.00	0.00	0.00	109.81	34.76	20.30	534.51	85.10	58.51	160.21	230.69
2037	0.00	0.00	150.32	0.00	12.08	0.00	162.40	35.57	17.41	519.38	83.60	59.55	177.26	198.95
2038	0.00	0.00	22.84	0.00	0.00	0.00	22.84	35.69	21.39	505.83	82.11	91.92	175.48	156.33
2039	0.00	0.00	112.14	0.00	0.00	0.00	112.14	36.25	21.39	493.13	80.85	99.84	191.62	120.82
2040	0.00	0.00	155.53	0.00	95.12	0.00	250.66	37.49	21.39	483.39	79.52	99.23	213.12	91.52
2041	0.00	0.00	137.04	0.00	0.00	0.00	137.04	38.18	25.39	465.64	77.87	140.10	212.67	35.00
2042	0.00	0.00	155.61	0.00	0.00	0.00	155.61	38.95	24.73	447.67	76.54	157.67	220.50	-7.04
2043	0.00	0.00	138.96	0.00	0.00	0.00	138.96	39.65	28.71	438.44	75.23	176.69	234.75	-48.24
2044	0.00	0.00	157.80	0.00	80.02	0.00	237.82	40.84	28.71	424.19	73.94	179.05	259.56	-88.35
2045	0.00	0.00	23.99	0.00	0.00	0.00	23.99	40.96	32.72	413.09	72.61	245.68	243.96	-149.16
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	35.62	399.92	71.44	271.10	251.50	-194.12
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.73	386.31	70.13	276.12	280.64	-240.58
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.73	399.78	71.39	264.30	258.70	-194.62
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.74	399.78	71.39	264.30	258.70	-194.62
2050	0.00	0.00	98.22	0.00	9.87	0.00	108.08	40.96	32.75	399.78	71.39	264.30	258.70	-194.62
2051	0.00	0.00	134.41	0.00	9.87	0.00	144.27	40.96	34.49	399.78	71.39	264.30	258.70	-194.62
2052	0.00	0.00	20.43	0.00	9.87	0.00	30.30	40.96	34.50	399.78	71.39	264.30	258.70	-194.62
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	399.78	71.39	264.30	258.70	-194.62
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	399.78	71.39	264.30	258.70	-194.62
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	399.78	71.39	264.30	258.70	-194.62
2056	0.00	0.00	0.00	0.00	12.08	0.00	12.08	40.96	35.65	399.78	71.39	264.30	258.70	-194.62
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2066	0.00	0.00	109.81	0.00	0.00	0.00	109.81	40.96	35.65	399.78	71.39	264.30	258.70	-194.62
2067	0.00	0.00	150.28	0.00	0.00	0.00	150.28	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2068	0.00	0.00	22.84	0.00	0.00	0.00	22.84	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2069	0.00	0.00	112.14	0.00	0.00	0.00	112.14	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2070	0.00	0.00	153.46	0.00	0.00	0.00	153.46	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2071	0.00	0.00	137.04	0.00	0.00	0.00	137.04	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2072	0.00	0.00	155.61	0.00	12.88	0.00	168.50	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2073	0.00	0.00	138.96	0.00	1.61	0.00	140.57	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2074	0.00	0.00	157.80	0.00	3.21	0.00	161.01	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2075	0.00	0.00	23.99	0.00	78.57	0.00	102.56	40.96	48.25	399.78	71.39	264.30	258.70	-194.62
2076	0.00	0.00	0.00	0.00	3.21	0.00	3.21	40.96	35.65	399.78	71.39	264.30	258.70	-194.62
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	49.99	399.78	71.39	264.30	258.70	-194.62
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	34.50	399.78	71.39	264.30	258.70	-194.62
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	40.96	49.99	399.78	71.39	264.30	258.70	-194.62
2080	0.00	0.00	98.22	0.00	0.00	0.00	98.22	40.96	34.50	399.78	71.39	264.30	258.70	-194.62
2081	0.00	0.00	134.41	0.00	0.00	0.00	134.41	40.96	49.99	399.78	71.39	264.30	258.70	-194.62
2082	0.00	0.00	20.43	0.00	0.00	0.00	20.43	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	35.65	399.78	71.39	264.30	258.70	-194.62
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
2090	0.00	0.00	0.00	0.00	23.78	0.00	23.78	40.96	32.76	399.78	71.39	264.30	258.70	-194.62
Salvage Value	5.25	0.00	15.02	0.00	3.74	0.00	24.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	640.88	0.00	116.89	0.00	5144.03	500.32	293.52	9672.78	1780.93	1889.33	3441.45	2561.07

Net Present Value: -3377

CCGT/C26

TABLE 299
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	371.50	103.01	29.23	113.00	126.25
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	424.74	101.10	33.46	118.81	171.37
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	440.11	99.26	35.68	121.95	183.21
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	480.41	97.64	36.87	127.53	218.36
2018	237.84	0.00	0.36	0.00	0.00	0.00	238.20	3.51	0.00	457.85	94.84	40.21	133.23	189.57
2019	286.35	0.00	204.33	0.00	0.00	0.00	490.68	5.96	0.00	441.28	92.91	35.63	136.08	176.67
2020	293.68	0.00	317.59	0.00	0.00	0.00	611.27	8.91	0.00	471.23	92.94	28.29	142.27	207.74
2021	811.02	0.00	154.55	0.00	12.08	0.00	977.65	13.68	0.00	472.78	91.95	23.51	152.56	204.76
2022	1304.42	0.00	9.78	0.00	0.80	0.00	1315.01	20.26	6.91	495.57	89.49	96.71	129.09	180.28
2023	1173.36	0.00	0.00	0.00	1.61	0.00	1174.96	26.13	6.91	487.20	87.45	111.41	137.47	150.87
2024	839.47	0.00	0.00	0.00	3.21	0.00	842.68	30.35	6.91	487.65	86.47	118.58	142.25	140.36
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	33.30	6.91	441.54	86.16	100.17	133.41	121.81
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	35.23	21.22	534.19	89.84	85.89	110.67	247.80
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	35.94	21.44	738.19	97.68	75.36	101.60	463.55
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	36.16	21.14	775.63	97.85	77.37	110.84	489.56
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.36	746.97	96.13	84.82	110.17	455.85
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.19	707.30	94.01	92.30	109.97	411.02
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	21.14	718.76	93.98	87.96	106.33	430.50
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.90	663.30	91.11	99.32	110.49	362.38
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.47	636.05	89.47	105.36	111.03	330.19
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.47	612.09	87.47	116.09	118.05	290.48
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	20.51	598.50	86.01	124.77	123.24	264.48
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.16	23.23	581.50	84.38	136.86	130.25	230.00
2037	0.00	0.00	110.58	0.00	0.00	0.00	110.58	36.71	20.34	579.37	83.66	141.12	133.42	221.17
2038	0.00	0.00	151.38	0.00	12.08	0.00	163.45	37.53	20.34	571.45	82.47	143.76	145.62	199.60
2039	0.00	0.00	23.00	0.00	0.00	0.00	23.00	37.64	24.32	555.47	80.71	172.56	157.53	144.68
2040	0.00	0.00	112.92	0.00	0.00	0.00	112.92	38.21	24.32	541.30	79.28	184.55	167.42	110.04
2041	0.00	0.00	156.61	0.00	95.12	0.00	251.73	39.46	24.32	527.29	77.98	192.58	179.89	76.84
2042	0.00	0.00	138.00	0.00	0.00	0.00	138.00	40.15	27.66	517.65	76.65	209.35	193.41	38.25
2043	0.00	0.00	156.70	0.00	0.00	0.00	156.70	40.93	27.66	498.50	75.25	237.04	194.15	-7.93
2044	0.00	0.00	23.82	0.00	0.00	0.00	23.82	41.05	31.64	484.88	73.94	261.61	202.58	-53.25
2045	0.00	0.00	116.93	0.00	0.00	0.00	116.93	41.64	31.64	469.64	72.62	269.60	221.57	-94.14
2046	0.00	0.00	160.02	0.00	80.02	0.00	240.04	42.84	34.55	461.69	71.73	268.75	239.28	-118.06
2047	0.00	0.00	24.32	0.00	0.00	0.00	24.32	42.96	35.65	436.96	70.15	322.51	233.47	-189.16
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.66	456.10	71.50	286.95	231.44	-133.79
2049	0.00	0.00	204.33	0.00	9.87	0.00	214.20	42.96	35.66	456.10	71.50	286.95	231.44	-133.79
2050	0.00	0.00	295.78	0.00	9.87	0.00	305.65	42.96	35.66	456.10	71.50	286.95	231.44	-133.79
2051	0.00	0.00	132.74	0.00	9.87	0.00	142.60	42.96	37.41	456.10	71.50	286.95	231.44	-133.79
2052	0.00	0.00	9.78	0.00	9.87	0.00	19.65	42.96	37.41	456.10	71.50	286.95	231.44	-133.79
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.42	456.10	71.50	286.95	231.44	-133.79
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	456.10	71.50	286.95	231.44	-133.79
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	456.10	71.50	286.95	231.44	-133.79
2056	0.00	0.00	0.00	0.00	12.08	0.00	12.08	42.96	38.58	456.10	71.50	286.95	231.44	-133.79
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	38.58	456.10	71.50	286.95	231.44	-133.79
2067	0.00	0.00	110.58	0.00	0.00	0.00	110.58	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2068	0.00	0.00	151.33	0.00	0.00	0.00	151.33	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2069	0.00	0.00	23.00	0.00	0.00	0.00	23.00	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2070	0.00	0.00	112.92	0.00	0.00	0.00	112.92	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2071	0.00	0.00	154.53	0.00	0.00	0.00	154.53	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2072	0.00	0.00	138.00	0.00	0.80	0.00	138.80	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2073	0.00	0.00	156.70	0.00	13.69	0.00	170.39	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2074	0.00	0.00	23.82	0.00	3.21	0.00	27.03	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2075	0.00	0.00	116.93	0.00	7.23	0.00	124.16	42.96	51.18	456.10	71.50	286.95	231.44	-133.79
2076	0.00	0.00	160.02	0.00	74.56	0.00	234.57	42.96	38.58	456.10	71.50	286.95	231.44	-133.79
2077	0.00	0.00	24.32	0.00	0.00	0.00	24.32	42.96	52.92	456.10	71.50	286.95	231.44	-133.79
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	37.43	456.10	71.50	286.95	231.44	-133.79
2079	0.00	0.00	204.33	0.00	0.00	0.00	204.33	42.96	52.92	456.10	71.50	286.95	231.44	-133.79
2080	0.00	0.00	295.78	0.00	0.00	0.00	295.78	42.96	37.43	456.10	71.50	286.95	231.44	-133.79
2081	0.00	0.00	132.74	0.00	60.02	0.00	192.76	42.96	52.92	456.10	71.50	286.95	231.44	-133.79
2082	0.00	0.00	9.78	0.00	0.00	0.00	9.78	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	38.58	456.10	71.50	286.95	231.44	-133.79
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	35.69	456.10	71.50	286.95	231.44	-133.79
Salvage Value	5.25	0.00	23.69	0.00	3.34	0.00	32.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	994.61	0.00	113.12	0.00	5493.99	528.43	328.31	10441.82	1783.74	2526.44	3062.03	3069.62

Net Present Value: -3281

Wind/C26

TABLE 300
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.27	62.96	0.00	0.00	9.87	0.00	104.09	0.52	0.00	371.50	103.01	29.23	113.00	126.25
2015	40.00	0.00	0.00	0.00	9.87	0.00	49.87	0.77	0.00	424.74	101.10	33.46	118.82	171.36
2016	88.58	0.00	0.00	0.00	9.87	0.00	98.44	1.26	0.00	440.11	99.26	35.68	121.98	183.19
2017	200.90	0.00	0.00	0.00	9.87	0.00	210.77	2.32	0.00	480.42	97.64	36.87	127.52	218.38
2018	237.84	0.00	0.00	0.00	0.00	0.00	237.84	3.51	0.00	457.85	94.84	40.21	133.22	189.58
2019	286.35	0.00	0.00	0.00	0.00	0.00	286.35	4.94	0.00	441.28	92.91	35.63	136.09	176.66
2020	293.68	0.00	0.00	12.81	20.76	0.00	327.25	6.57	0.00	466.18	92.51	30.30	143.59	199.78
2021	811.02	0.00	0.00	391.21	34.60	0.00	1236.83	12.76	0.00	457.68	90.76	29.26	156.43	181.23
2022	1304.42	0.00	0.00	398.53	42.32	0.00	1745.28	21.48	6.21	467.11	89.13	29.19	158.75	190.04
2023	1173.36	0.00	0.00	385.72	22.37	0.00	1581.44	29.39	12.42	464.11	86.67	33.30	164.49	179.65
2024	839.47	0.00	0.00	7.32	10.13	0.00	856.92	33.68	18.63	468.43	84.78	34.04	170.99	178.62
2025	582.47	0.00	0.00	0.00	7.23	0.00	589.70	36.62	18.63	418.10	84.70	22.38	179.19	131.83
2026	383.30	0.00	0.00	0.00	3.21	0.00	386.51	38.56	32.93	560.78	88.67	26.58	127.31	318.21
2027	141.44	0.00	0.00	0.00	0.00	0.00	141.44	39.26	33.15	771.27	96.44	24.01	113.53	537.29
2028	44.72	0.00	0.00	0.00	0.00	0.00	44.72	39.49	32.86	799.11	96.24	26.17	123.68	553.02
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	33.07	768.49	94.59	26.56	126.14	521.19
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.90	747.48	93.54	25.94	123.30	504.69
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.85	731.40	92.11	26.86	126.01	486.42
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	39.49	32.61	697.64	90.72	26.79	124.82	455.31
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.49	32.18	656.63	89.22	26.67	121.58	419.16
2034	0.00	0.00	130.10	0.00	0.00	0.00	130.10	40.03	32.18	624.16	87.77	26.83	123.42	386.14
2035	0.00	0.00	170.00	0.00	12.08	0.00	182.08	40.83	32.22	612.80	86.76	24.83	129.15	372.06
2036	0.00	0.00	132.34	0.00	0.00	0.00	132.34	41.49	38.93	588.86	84.68	46.18	135.78	322.22
2037	0.00	0.00	150.32	0.00	12.08	0.00	162.40	42.30	36.03	572.06	83.22	52.13	145.21	291.50
2038	0.00	0.00	22.84	0.00	0.00	0.00	22.84	42.42	40.02	563.55	81.96	67.77	151.76	262.06
2039	0.00	0.00	112.14	0.00	0.00	0.00	112.14	42.98	40.02	554.81	80.79	66.79	172.96	234.26
2040	0.00	0.00	155.53	12.81	95.12	0.00	263.47	44.29	40.02	533.18	79.11	86.16	179.06	188.85
2041	0.00	0.00	137.04	391.21	0.00	0.00	528.25	46.93	44.02	520.54	77.72	105.47	188.40	148.94
2042	0.00	0.00	155.61	398.53	0.00	0.00	554.15	49.70	43.36	505.54	76.43	110.34	202.90	115.87
2043	0.00	0.00	138.96	385.72	0.00	0.00	524.68	52.32	47.34	495.75	75.13	123.31	219.88	77.43
2044	0.00	0.00	157.80	7.32	80.02	0.00	245.15	53.55	47.34	474.30	73.77	155.30	217.55	27.67
2045	0.00	0.00	23.99	0.00	0.00	0.00	23.99	53.67	51.35	461.81	72.50	181.26	226.30	-18.25
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	54.25	446.54	71.25	185.00	248.48	-58.18
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.36	432.68	70.00	187.83	275.31	-100.47
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.36	447.01	71.25	184.70	250.03	-58.97
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.37	447.01	71.25	184.70	250.03	-58.97
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.38	447.01	71.25	184.70	250.03	-58.97
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	53.12	447.01	71.25	184.70	250.03	-58.97
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	53.13	447.01	71.25	184.70	250.03	-58.97
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	447.01	71.25	184.70	250.03	-58.97
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	447.01	71.25	184.70	250.03	-58.97
2055	0.00	0.00	0.00	0.00	5.19	0.00	5.19	53.67	53.13	447.01	71.25	184.70	250.03	-58.97
2056	0.00	0.00	0.00	0.00	8.65	0.00	8.65	53.67	54.28	447.01	71.25	184.70	250.03	-58.97
2057	0.00	0.00	0.00	0.00	10.38	0.00	10.38	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2058	0.00	0.00	0.00	0.00	5.19	0.00	5.19	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2059	0.00	0.00	0.00	0.00	1.73	0.00	1.73	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2060	0.00	0.00	0.00	12.81	0.00	0.00	12.81	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2061	0.00	0.00	0.00	391.21	0.00	0.00	391.21	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2062	0.00	0.00	0.00	398.53	0.00	0.00	398.53	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2063	0.00	0.00	0.00	385.72	0.00	0.00	385.72	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2064	0.00	0.00	108.29	7.32	0.00	0.00	115.61	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2065	0.00	0.00	148.20	0.00	0.00	0.00	148.20	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2066	0.00	0.00	132.34	0.00	0.00	0.00	132.34	53.67	54.28	447.01	71.25	184.70	250.03	-58.97
2067	0.00	0.00	150.28	0.00	0.00	0.00	150.28	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2068	0.00	0.00	22.84	0.00	0.00	0.00	22.84	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2069	0.00	0.00	112.14	0.00	0.00	0.00	112.14	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2070	0.00	0.00	153.46	0.00	27.65	0.00	181.11	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2071	0.00	0.00	137.04	0.00	25.95	0.00	162.99	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2072	0.00	0.00	155.61	0.00	44.02	0.00	199.63	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2073	0.00	0.00	138.96	0.00	17.18	0.00	156.14	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2074	0.00	0.00	157.80	0.00	8.40	0.00	166.20	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2075	0.00	0.00	23.99	0.00	78.57	0.00	102.56	53.67	66.88	447.01	71.25	184.70	250.03	-58.97
2076	0.00	0.00	0.00	0.00	3.21	0.00	3.21	53.67	54.28	447.01	71.25	184.70	250.03	-58.97
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	68.62	447.01	71.25	184.70	250.03	-58.97
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	53.13	447.01	71.25	184.70	250.03	-58.97
2079	0.00	0.00	0.00	0.00	60.02	0.00	60.02	53.67	68.62	447.01	71.25	184.70	250.03	-58.97
2080	0.00	0.00	0.00	12.81	0.00	0.00	12.81	53.67	53.13	447.01	71.25	184.70	250.03	-58.97
2081	0.00	0.00	0.00	391.21	0.00	0.00	391.21	53.67	68.62	447.01	71.25	184.70	250.03	-58.97
2082	0.00	0.00	0.00	398.53	0.00	0.00	398.53	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2083	0.00	0.00	0.00	385.72	0.00	0.00	385.72	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2084	0.00	0.00	0.00	7.32	9.87	0.00	17.19	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	54.28	447.01	71.25	184.70	250.03	-58.97
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
2090	0.00	0.00	0.00	0.00	23.78	0.00	23.78	53.67	51.39	447.01	71.25	184.70	250.03	-58.97
Salvage Value	5.25	0.00	11.73	17.84	5.41	0.00	40.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	4323.30	62.96	518.88	1245.51	204.97	0.00	6355.62	609.68	505.89	10428.25	1774.80	1386.08	3309.98	3957.39

Net Present Value -3514

K19/C25/750MW (WPS Sale &Inv)

TABLE 301
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	3.03	253.83	1.27	0.00	364.56	103.02	29.28	113.53	118.72
2015	85.21	447.43	0.00	0.00	16.99	5.38	555.01	4.04	0.00	413.65	101.12	33.46	118.97	160.10
2016	169.37	590.03	0.00	0.00	22.47	13.57	795.44	8.02	0.00	428.98	99.29	35.73	122.25	171.72
2017	194.90	712.98	0.00	0.00	31.91	19.70	959.49	12.82	0.00	462.21	97.29	38.28	129.29	197.36
2018	232.72	501.27	0.00	0.00	31.33	82.84	848.16	17.06	0.00	445.05	95.17	39.19	132.50	178.19
2019	236.47	357.48	0.00	0.00	39.66	67.68	701.30	20.57	13.01	480.30	95.11	36.60	133.23	215.35
2020	649.94	145.55	0.00	0.00	2.55	128.14	926.17	25.20	44.86	756.52	102.37	28.66	152.47	473.02
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	30.81	42.99	827.24	102.99	31.25	168.19	524.82
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	35.54	41.65	829.91	101.84	31.26	173.13	523.69
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	39.00	39.80	790.64	99.52	30.86	178.60	481.65
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	41.52	38.24	763.84	97.28	34.06	188.22	444.29
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	43.34	50.89	855.29	101.86	30.07	140.66	582.70
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	44.26	49.35	1117.88	110.03	29.97	141.70	836.18
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	44.43	47.92	1163.28	109.94	29.33	156.05	867.97
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	46.91	1147.49	108.29	30.29	159.74	849.16
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	48.20	1118.41	106.38	30.36	164.14	817.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	43.02	1097.70	105.05	29.79	162.19	800.67
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	41.70	1085.00	103.41	30.41	167.48	783.71
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	40.22	1049.25	101.75	30.53	166.57	750.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	39.21	1014.85	99.97	30.57	169.43	714.87
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	38.27	983.15	98.26	30.85	173.62	680.43
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	39.54	949.83	96.59	30.61	165.64	656.99
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	36.10	889.62	94.98	31.21	140.18	623.26
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	44.43	35.57	849.88	93.37	31.37	140.13	585.02
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.43	35.06	815.58	91.71	31.35	145.38	547.13
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	44.68	37.47	784.32	90.11	31.31	158.29	504.62
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	45.06	34.09	802.79	88.82	29.86	174.75	509.36
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	45.12	36.95	781.57	86.80	54.09	177.83	462.84
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	45.37	36.51	764.98	85.25	60.22	189.93	429.58
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	45.75	36.07	753.10	83.86	63.33	204.86	401.03
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	46.06	41.37	749.82	82.65	73.16	218.92	375.08
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	46.67	43.86	719.12	80.79	94.71	224.62	319.00
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.73	44.56	702.32	79.34	114.88	233.62	274.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	43.31	686.72	78.06	120.19	249.06	239.41
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	42.07	702.72	79.40	109.93	235.77	277.63
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	46.73	44.61	702.72	79.40	109.93	235.77	277.63
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	46.73	43.11	702.72	79.40	109.93	235.77	277.63
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	46.73	42.78	702.72	79.40	109.93	235.77	277.63
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	46.73	42.46	702.72	79.40	109.93	235.77	277.63
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	46.73	42.15	702.72	79.40	109.93	235.77	277.63
2054	0.00	0.00	0.00	0.00	13.81	14.60	28.41	46.73	41.84	702.72	79.40	109.93	235.77	277.63
2055	0.00	0.00	0.00	0.00	0.63	15.14	15.77	46.73	42.71	702.72	79.40	109.93	235.77	277.63
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.73	55.02	702.72	79.40	109.93	235.77	277.63
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	46.73	39.25	702.72	79.40	109.93	235.77	277.63
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	46.73	54.48	702.72	79.40	109.93	235.77	277.63
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	46.73	41.62	702.72	79.40	109.93	235.77	277.63
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	46.73	51.26	702.72	79.40	109.93	235.77	277.63
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	66.75	702.72	79.40	109.93	235.77	277.63
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	46.73	66.75	702.72	79.40	109.93	235.77	277.63
2065	0.00	0.00	0.00	0.00	6.80	3.30	10.10	46.73	38.66	702.72	79.40	109.93	235.77	277.63
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	46.73	66.75	702.72	79.40	109.93	235.77	277.63
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	46.73	66.75	702.72	79.40	109.93	235.77	277.63
2069	0.00	0.00	50.82	0.00	25.85	44.50	121.17	46.73	38.66	702.72	79.40	109.93	235.77	277.63
2070	0.00	0.00	69.13	0.00	1.92	46.15	117.20	46.73	53.00	702.72	79.40	109.93	235.77	277.63
2071	0.00	0.00	10.44	0.00	23.45	0.00	33.90	46.73	37.50	702.72	79.40	109.93	235.77	277.63
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	46.73	53.00	702.72	79.40	109.93	235.77	277.63
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	46.73	36.63	702.72	79.40	109.93	235.77	277.63
2074	0.00	0.00	61.55	0.00	36.88	0.00	98.43	46.73	51.26	702.72	79.40	109.93	235.77	277.63
2075	0.00	0.00	69.47	0.00	54.62	0.00	124.09	46.73	38.66	702.72	79.40	109.93	235.77	277.63
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	46.73	53.00	702.72	79.40	109.93	235.77	277.63
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	37.50	702.72	79.40	109.93	235.77	277.63
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	46.73	53.00	702.72	79.40	109.93	235.77	277.63
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	40.40	702.72	79.40	109.93	235.77	277.63
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	46.73	53.00	702.72	79.40	109.93	235.77	277.63
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	46.73	38.66	702.72	79.40	109.93	235.77	277.63
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	46.73	35.76	702.72	79.40	109.93	235.77	277.63
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	46.73	38.66	702.72	79.40	109.93	235.77	277.63
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	46.73	38.66	702.72	79.40	109.93	235.77	277.63
Salvage Value	2.09	0.00	4.18	0.00	7.90	3.78	17.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	128.59	0.00	347.09	270.30	6973.03	695.12	651.85	15184.50	1940.75	999.17	3426.92	8817.66

Net Present Value 498

K19/C25/750MW

TABLE 302
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	4.28	255.09	1.28	0.00	370.55	103.02	29.26	113.08	125.18
2015	85.21	447.43	0.00	0.00	16.99	6.89	556.52	4.06	0.00	422.34	101.11	33.45	118.89	168.89
2016	169.37	590.03	0.00	0.00	22.47	14.21	796.09	8.04	0.00	437.56	99.27	35.69	122.05	180.54
2017	194.90	712.98	0.00	0.00	31.91	19.70	959.49	12.84	0.00	472.28	97.29	38.30	129.07	207.63
2018	232.72	501.27	0.00	0.00	31.33	118.44	883.77	17.25	0.00	455.27	95.16	39.08	132.35	188.68
2019	236.47	357.48	0.00	0.00	39.66	80.56	714.18	20.83	13.01	489.90	95.10	36.58	132.98	225.24
2020	649.94	145.55	0.00	0.00	2.55	228.41	1026.44	25.96	47.98	779.75	102.36	28.63	151.05	497.71
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	31.57	46.21	844.33	102.99	31.43	167.26	542.65
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	36.30	44.90	846.10	101.84	31.26	172.05	540.95
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	39.76	42.92	807.81	99.51	30.86	177.32	500.11
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	42.28	41.22	781.22	97.27	34.13	187.03	462.78
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	44.10	53.76	873.69	101.85	30.13	138.22	603.50
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	45.02	52.09	1129.78	110.04	30.11	135.74	853.88
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	45.19	50.55	1164.32	109.96	29.10	141.73	883.54
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	49.42	1150.03	108.30	30.26	144.59	866.88
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	50.61	1124.07	106.38	30.33	149.29	838.07
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	45.33	1107.06	105.05	29.79	148.17	824.04
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	43.90	1099.59	103.40	30.54	153.55	812.10
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	42.32	1068.02	101.75	30.59	153.29	782.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	41.21	1036.95	99.99	30.51	155.76	750.70
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	40.19	1009.85	98.28	30.70	160.49	720.39
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	41.37	940.27	96.66	30.91	134.50	678.19
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	37.85	903.13	94.99	31.25	134.74	642.16
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	45.19	37.25	870.89	93.35	31.29	138.56	607.69
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.19	36.67	837.56	91.71	31.29	143.38	571.18
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	45.45	39.01	807.05	90.11	31.37	156.04	529.54
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	45.82	35.57	805.38	88.81	29.87	172.16	514.55
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	45.88	38.37	779.48	86.80	54.09	175.43	463.15
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	46.13	37.86	763.51	85.25	60.22	187.99	430.06
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	46.51	37.36	751.85	83.86	63.33	203.13	401.52
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	46.82	42.61	748.95	82.65	73.16	217.40	375.75
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	47.43	45.04	718.13	80.79	94.71	223.22	319.41
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	47.49	45.69	701.31	79.34	114.88	232.20	274.90
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	44.39	685.39	78.06	120.19	247.41	239.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	43.10	701.61	79.40	109.93	234.28	278.01
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	47.49	45.59	701.61	79.40	109.93	234.28	278.01
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	47.49	44.04	701.61	79.40	109.93	234.28	278.01
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	47.49	43.67	701.61	79.40	109.93	234.28	278.01
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	47.49	43.30	701.61	79.40	109.93	234.28	278.01
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	47.49	42.95	701.61	79.40	109.93	234.28	278.01
2054	0.00	0.00	0.00	0.00	13.81	14.60	28.41	47.49	42.61	701.61	79.40	109.93	234.28	278.01
2055	0.00	0.00	0.00	0.00	0.63	15.14	15.77	47.49	43.43	701.61	79.40	109.93	234.28	278.01
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	47.49	55.71	701.61	79.40	109.93	234.28	278.01
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	47.49	39.90	701.61	79.40	109.93	234.28	278.01
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	47.49	55.10	701.61	79.40	109.93	234.28	278.01
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	47.49	42.21	701.61	79.40	109.93	234.28	278.01
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	47.49	51.26	701.61	79.40	109.93	234.28	278.01
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	66.75	701.61	79.40	109.93	234.28	278.01
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	47.49	66.75	701.61	79.40	109.93	234.28	278.01
2065	0.00	0.00	0.00	0.00	6.80	3.30	10.10	47.49	38.66	701.61	79.40	109.93	234.28	278.01
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	47.49	66.75	701.61	79.40	109.93	234.28	278.01
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	47.49	66.75	701.61	79.40	109.93	234.28	278.01
2069	0.00	0.00	50.82	0.00	25.85	44.50	121.17	47.49	38.66	701.61	79.40	109.93	234.28	278.01
2070	0.00	0.00	69.13	0.00	1.92	46.15	117.20	47.49	53.00	701.61	79.40	109.93	234.28	278.01
2071	0.00	0.00	10.44	0.00	23.45	0.00	33.90	47.49	37.50	701.61	79.40	109.93	234.28	278.01
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	47.49	53.00	701.61	79.40	109.93	234.28	278.01
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	47.49	36.63	701.61	79.40	109.93	234.28	278.01
2074	0.00	0.00	61.55	0.00	36.88	0.00	98.43	47.49	51.26	701.61	79.40	109.93	234.28	278.01
2075	0.00	0.00	69.47	0.00	54.62	0.00	124.09	47.49	38.66	701.61	79.40	109.93	234.28	278.01
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	47.49	53.00	701.61	79.40	109.93	234.28	278.01
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	37.50	701.61	79.40	109.93	234.28	278.01
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	47.49	53.00	701.61	79.40	109.93	234.28	278.01
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	40.40	701.61	79.40	109.93	234.28	278.01
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	47.49	53.00	701.61	79.40	109.93	234.28	278.01
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	47.49	38.66	701.61	79.40	109.93	234.28	278.01
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	47.49	35.76	701.61	79.40	109.93	234.28	278.01
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	47.49	38.66	701.61	79.40	109.93	234.28	278.01
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	47.49	38.66	701.61	79.40	109.93	234.28	278.01
Salvage Value	2.09	0.00	4.18	0.00	7.90	3.78	17.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	128.59	0.00	347.09	387.48	7090.21	706.95	680.39	15367.95	1940.74	999.22	3343.29	9084.70

Net Present Value 607

K19/Gas25/750MW (WPS Sale & INV)

TABLE 303
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	3.03	223.47	1.12	0.00	364.56	103.02	29.28	113.53	118.72
2015	0.00	447.43	0.00	0.00	16.99	5.38	469.80	3.47	0.00	413.66	101.13	33.45	118.95	160.13
2016	0.00	590.03	0.00	0.00	22.47	13.57	626.07	6.60	0.00	428.91	99.29	35.71	122.15	171.76
2017	0.00	712.98	0.00	0.00	31.91	19.70	764.59	10.42	0.00	462.61	97.29	38.26	129.22	197.84
2018	0.00	501.27	0.00	0.00	31.33	82.84	615.44	13.50	0.00	445.76	95.17	39.11	132.43	179.05
2019	0.00	357.48	0.00	0.00	37.12	67.68	462.29	15.81	13.01	481.48	95.11	36.58	133.15	216.64
2020	0.00	145.55	0.00	0.00	0.01	128.14	273.69	17.18	44.86	758.40	102.36	28.63	152.29	475.13
2021	0.00	50.36	0.36	0.00	0.00	0.00	50.72	17.43	42.99	830.65	102.99	31.24	167.98	528.44
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.43	41.65	833.60	101.84	31.18	172.82	527.76
2023	0.00	0.00	71.82	0.00	0.00	0.00	71.82	17.68	39.80	790.92	98.99	32.92	178.35	480.65
2024	0.00	0.00	139.90	0.00	6.75	0.00	146.65	18.30	38.24	768.61	96.93	35.95	186.82	448.92
2025	0.00	0.00	80.45	0.00	53.19	0.00	133.64	18.96	40.58	725.50	96.66	34.96	162.81	431.07
2026	0.00	0.00	60.45	0.00	0.00	0.00	60.45	19.26	42.81	731.63	95.34	41.92	175.53	418.84
2027	0.00	0.00	68.23	0.00	0.00	0.00	68.23	19.60	41.52	708.23	93.36	41.18	189.99	383.69
2028	0.00	0.00	10.31	0.00	0.00	0.00	10.31	19.66	44.28	685.25	91.01	62.65	197.71	333.88
2029	0.00	0.00	50.31	0.00	0.00	0.00	50.31	19.91	45.74	664.07	89.20	69.60	208.70	296.58
2030	0.00	0.00	68.44	0.00	44.75	0.00	113.18	20.47	40.62	659.33	88.11	76.39	215.77	279.06
2031	0.00	0.00	60.75	0.00	0.00	0.00	60.75	20.78	43.47	673.10	87.76	83.93	220.70	280.71
2032	0.00	0.00	68.58	0.00	0.00	0.00	68.58	21.12	42.36	642.64	85.35	101.55	233.84	221.90
2033	0.00	0.00	10.36	0.00	0.00	0.00	10.36	21.17	45.27	629.83	83.81	121.72	243.58	180.73
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	44.22	625.09	83.08	129.57	249.61	162.84
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	42.77	550.54	80.94	122.97	240.72	105.91
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	42.23	480.16	79.48	123.85	207.82	69.00
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	41.71	451.52	78.06	135.61	211.18	26.68
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.17	41.21	448.03	77.32	134.44	225.61	10.66
2039	0.00	0.00	102.19	0.00	0.00	0.00	102.19	21.68	43.61	415.11	75.37	164.76	235.77	-60.79
2040	0.00	0.00	147.04	0.00	0.00	0.00	147.04	22.42	40.24	409.05	74.03	183.11	245.48	-93.56
2041	0.00	0.00	65.60	0.00	6.75	0.00	72.35	22.78	39.77	429.29	74.32	182.79	244.29	-72.11
2042	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.80	46.24	494.70	72.04	293.56	237.16	-108.05
2043	0.00	0.00	51.02	0.00	0.00	0.00	51.02	23.06	45.80	464.20	70.29	316.40	250.55	-173.05
2044	0.00	0.00	69.40	0.00	44.75	0.00	114.15	23.63	47.12	434.84	68.66	340.82	262.67	-237.31
2045	0.00	0.00	32.97	0.00	0.00	0.00	32.97	23.79	50.71	419.44	67.35	373.39	272.38	-293.69
2046	0.00	0.00	30.59	0.00	0.00	0.00	30.59	23.95	50.31	401.49	66.14	399.88	282.79	-347.32
2047	0.00	0.00	4.62	0.00	0.00	0.00	4.62	23.97	50.50	393.34	65.35	416.21	295.00	-383.22
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	49.26	404.76	66.28	396.49	283.39	-341.41
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	23.97	51.80	404.76	66.28	396.49	283.39	-341.41
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	23.97	48.56	404.76	66.28	396.49	283.39	-341.41
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	23.97	48.23	404.76	66.28	396.49	283.39	-341.41
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	23.97	47.91	404.76	66.28	396.49	283.39	-341.41
2053	0.00	0.00	50.01	0.00	16.16	14.60	80.77	23.97	47.60	404.76	66.28	396.49	283.39	-341.41
2054	0.00	0.00	118.09	0.00	13.19	14.60	145.87	23.97	47.29	404.76	66.28	396.49	283.39	-341.41
2055	0.00	0.00	78.38	0.00	0.00	15.14	93.52	23.97	47.00	404.76	66.28	396.49	283.39	-341.41
2056	0.00	0.00	60.45	0.00	0.00	0.00	60.45	23.97	62.21	404.76	66.28	396.49	283.39	-341.41
2057	0.00	0.00	68.23	0.00	0.00	0.00	68.23	23.97	46.44	404.76	66.28	396.49	283.39	-341.41
2058	0.00	0.00	10.31	0.00	0.00	0.00	10.31	23.97	61.67	404.76	66.28	396.49	283.39	-341.41
2059	0.00	0.00	50.31	0.00	6.75	0.00	57.06	23.97	48.81	404.76	66.28	396.49	283.39	-341.41
2060	0.00	0.00	68.44	0.00	39.89	0.00	108.33	23.97	58.45	404.76	66.28	396.49	283.39	-341.41
2061	0.00	0.00	60.75	0.00	0.00	0.00	60.75	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2062	0.00	0.00	68.58	0.00	0.00	0.00	68.58	23.97	58.45	404.76	66.28	396.49	283.39	-341.41
2063	0.00	0.00	10.36	0.00	0.00	0.00	10.36	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2064	0.00	0.00	0.00	0.00	8.19	1.65	9.84	23.97	58.45	404.76	66.28	396.49	283.39	-341.41
2065	0.00	0.00	0.00	0.00	40.36	3.30	43.66	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2066	0.00	0.00	0.00	0.00	0.82	9.89	10.71	23.97	58.45	404.76	66.28	396.49	283.39	-341.41
2067	0.00	0.00	0.00	0.00	7.09	14.83	21.93	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	23.97	58.45	404.76	66.28	396.49	283.39	-341.41
2069	0.00	0.00	102.19	0.00	23.93	44.50	170.63	23.97	45.85	404.76	66.28	396.49	283.39	-341.41
2070	0.00	0.00	147.04	0.00	0.01	46.15	193.20	23.97	44.69	404.76	66.28	396.49	283.39	-341.41
2071	0.00	0.00	65.60	0.00	0.00	0.00	65.60	23.97	44.69	404.76	66.28	396.49	283.39	-341.41
2072	0.00	0.00	4.80	0.00	0.00	0.00	4.80	23.97	44.69	404.76	66.28	396.49	283.39	-341.41
2073	0.00	0.00	51.02	0.00	0.00	0.00	51.02	23.97	43.82	404.76	66.28	396.49	283.39	-341.41
2074	0.00	0.00	69.40	0.00	0.00	0.00	69.40	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2075	0.00	0.00	32.97	0.00	13.30	0.00	46.27	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2076	0.00	0.00	30.59	0.00	6.75	0.00	37.34	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2077	0.00	0.00	4.62	0.00	0.00	0.00	4.62	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	23.97	45.85	404.76	66.28	396.49	283.39	-341.41
2080	0.00	0.00	0.00	0.00	11.19	0.00	11.19	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2083	0.00	0.00	50.01	0.00	0.00	0.00	50.01	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2084	0.00	0.00	118.09	0.00	10.44	0.54	129.07	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2085	0.00	0.00	78.38	0.00	10.19	1.08	89.64	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2086	0.00	0.00	60.45	0.00	21.65	3.24	85.35	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2087	0.00	0.00	68.23	0.00	24.82	4.87	97.92	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2088	0.00	0.00	10.31	0.00	16.16	14.60	41.07	23.97	42.95	404.76	66.28	396.49	283.39	-341.41
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	23.97	45.85	404.76	66.28	396.49	283.39	-341.41
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	23.97	45.85	404.76	66.28	396.49	283.39	-341.41
Salvage Value	0.00	0.00	13.83	0.00	4.53	3.78	22.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	603.69	0.00	232.96	270.30	3719.40	357.06	675.38	11140.80	1775.47	2783.57	4030.00	2551.76

Net Present Value -2200

K19/C31/750MW

TABLE 304
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	201.82	0.00	0.00	18.63	4.28	254.46	1.27	0.00	370.55	103.02	29.26	113.08	125.18
2015	37.44	447.43	0.00	0.00	16.99	6.89	508.74	3.82	0.00	422.34	101.11	33.45	118.89	168.89
2016	10.52	590.03	0.00	0.00	22.47	14.21	637.24	7.00	0.00	437.56	99.27	35.70	122.03	180.55
2017	10.55	712.98	0.00	0.00	31.91	19.70	775.14	10.88	0.00	472.84	97.28	38.30	129.04	208.23
2018	12.50	501.27	0.00	0.00	31.33	118.44	663.55	14.20	0.00	455.96	95.15	39.07	132.28	189.46
2019	12.54	357.48	0.00	0.00	37.12	80.56	487.70	16.63	13.01	491.07	95.09	36.64	132.97	226.37
2020	12.58	145.55	0.00	0.00	0.01	228.41	386.54	18.57	47.98	781.78	102.35	28.69	150.82	499.92
2021	15.86	50.36	0.00	0.00	0.00	0.00	66.22	18.90	46.21	847.19	102.98	31.36	166.88	545.97
2022	149.25	0.00	0.00	0.00	0.00	0.00	149.25	19.64	44.90	850.27	101.85	31.21	171.78	545.44
2023	229.26	0.00	0.00	0.00	0.00	0.00	229.26	20.79	42.92	805.88	98.89	33.32	177.66	496.01
2024	245.84	0.00	0.00	0.00	0.00	0.00	245.84	22.02	41.22	782.40	96.73	36.80	187.36	461.51
2025	248.58	0.00	0.00	0.00	2.54	0.00	251.12	23.28	39.45	739.68	96.68	26.48	170.00	446.52
2026	669.49	0.00	0.00	0.00	2.54	0.00	672.03	26.64	37.57	719.70	94.76	27.24	188.58	409.12
2027	1059.04	0.00	0.00	0.00	30.99	0.00	1090.03	32.09	36.17	665.73	92.87	25.77	181.82	365.27
2028	948.10	0.00	0.00	0.00	16.22	0.00	964.31	36.91	34.83	639.62	91.27	26.75	197.83	323.76
2029	675.08	0.00	0.00	0.00	27.35	0.00	702.43	40.42	36.18	617.92	89.65	27.55	219.41	281.31
2030	466.18	0.00	0.00	0.00	47.55	0.00	513.73	42.99	30.95	610.56	88.31	28.09	238.04	256.12
2031	305.31	0.00	0.00	0.00	62.94	0.00	368.25	44.83	44.00	732.90	92.34	32.47	153.36	454.73
2032	112.12	0.00	0.00	0.00	73.72	0.00	185.84	45.76	43.00	978.89	99.64	31.95	142.43	704.86
2033	35.28	0.00	0.00	0.00	0.00	0.00	35.28	45.93	41.68	1042.11	100.07	31.30	156.56	754.18
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	40.76	1010.00	98.28	30.69	160.43	720.60
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	39.05	939.09	96.65	30.72	134.35	677.37
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	38.38	903.15	94.99	31.42	134.89	641.85
2037	0.00	0.00	0.36	0.00	0.00	0.00	0.36	45.93	37.61	871.50	93.36	31.36	138.64	608.14
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.93	36.66	837.66	91.71	31.28	143.36	571.31
2039	0.00	0.00	72.62	0.00	0.00	0.00	72.62	46.19	39.07	807.16	90.12	31.35	156.05	529.65
2040	0.00	0.00	90.93	0.00	6.75	0.00	97.69	46.57	35.74	805.39	88.81	29.86	172.16	514.57
2041	0.00	0.00	10.44	0.00	0.00	0.00	10.44	46.62	41.92	779.47	86.80	54.09	175.39	463.19
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	46.88	38.52	763.51	85.25	60.22	187.94	430.11
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	47.26	38.02	751.85	83.86	63.33	203.08	401.57
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	47.56	43.27	748.95	82.65	73.16	217.41	375.74
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	48.18	42.80	718.13	80.79	94.71	223.21	319.42
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	48.23	46.35	701.31	79.34	114.88	232.22	274.87
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	44.39	685.39	78.06	120.19	247.38	239.77
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	43.10	701.61	79.40	109.93	234.27	278.02
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	48.23	45.59	701.61	79.40	109.93	234.27	278.02
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	48.23	42.30	701.61	79.40	109.93	234.27	278.02
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	48.23	44.82	701.61	79.40	109.93	234.27	278.02
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	48.23	41.57	701.61	79.40	109.93	234.27	278.02
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	48.23	41.22	701.61	79.40	109.93	234.27	278.02
2054	0.00	0.00	0.00	0.00	13.19	14.60	27.78	48.23	40.87	701.61	79.40	109.93	234.27	278.02
2055	0.00	0.00	0.00	0.00	0.00	15.14	15.14	48.23	40.54	701.61	79.40	109.93	234.27	278.02
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	57.45	701.61	79.40	109.93	234.27	278.02
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	41.64	701.61	79.40	109.93	234.27	278.02
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	56.83	701.61	79.40	109.93	234.27	278.02
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	43.95	701.61	79.40	109.93	234.27	278.02
2060	0.00	0.00	0.00	0.00	0.63	0.00	0.63	48.23	53.00	701.61	79.40	109.93	234.27	278.02
2061	0.00	0.00	0.00	0.00	0.63	0.00	0.63	48.23	38.66	701.61	79.40	109.93	234.27	278.02
2062	0.00	0.00	0.00	0.00	7.54	0.00	7.54	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2063	0.00	0.00	0.00	0.00	3.77	0.00	3.77	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2064	0.00	0.00	0.00	0.00	14.47	1.65	16.12	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2065	0.00	0.00	0.00	0.00	17.48	3.30	20.77	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2066	0.00	0.00	0.00	0.00	15.89	9.89	25.78	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2067	0.00	0.00	0.00	0.00	25.30	14.83	40.14	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2068	0.00	0.00	0.00	0.00	15.17	44.50	59.67	48.23	66.75	701.61	79.40	109.93	234.27	278.02
2069	0.00	0.00	50.82	0.00	23.93	44.50	119.25	48.23	38.66	701.61	79.40	109.93	234.27	278.02
2070	0.00	0.00	69.13	0.00	0.01	46.15	115.28	48.23	53.00	701.61	79.40	109.93	234.27	278.02
2071	0.00	0.00	10.44	0.00	0.00	0.00	10.44	48.23	40.40	701.61	79.40	109.93	234.27	278.02
2072	0.00	0.00	50.97	0.00	0.00	0.00	50.97	48.23	53.00	701.61	79.40	109.93	234.27	278.02
2073	0.00	0.00	69.33	0.00	0.00	0.00	69.33	48.23	36.63	701.61	79.40	109.93	234.27	278.02
2074	0.00	0.00	61.55	0.00	0.00	0.00	61.55	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2075	0.00	0.00	69.47	0.00	8.67	0.00	78.14	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2076	0.00	0.00	10.50	0.00	1.91	0.00	12.41	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2077	0.00	0.00	0.00	0.00	23.45	0.00	23.45	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2078	0.00	0.00	0.00	0.00	19.20	0.00	19.20	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2079	0.00	0.00	0.00	0.00	21.07	0.00	21.07	48.23	38.66	701.61	79.40	109.93	234.27	278.02
2080	0.00	0.00	0.00	0.00	76.77	0.00	76.77	48.23	51.26	701.61	79.40	109.93	234.27	278.02
2081	0.00	0.00	0.00	0.00	47.87	0.00	47.87	48.23	38.66	701.61	79.40	109.93	234.27	278.02
2082	0.00	0.00	0.00	0.00	55.51	0.00	55.51	48.23	53.00	701.61	79.40	109.93	234.27	278.02
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.23	37.50	701.61	79.40	109.93	234.27	278.02
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	48.23	53.00	701.61	79.40	109.93	234.27	278.02
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	48.23	37.50	701.61	79.40	109.93	234.27	278.02
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	48.23	53.00	701.61	79.40	109.93	234.27	278.02
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2088	0.00	0.00	0.00	0.00	16.16	14.60	30.76	48.23	35.76	701.61	79.40	109.93	234.27	278.02
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	48.23	38.66	701.61	79.40	109.93	234.27	278.02
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	48.23	38.66	701.61	79.40	109.93	234.27	278.02
Salvage Value	15.21	0.00	4.18	0.00	8.81	3.78	31.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	2783.06	2612.45	128.59	0.00	300.62	387.48	6212.19	617.20	634.27	13890.92	1889.73	994.81	3508.59	7497.80

Net Present Value 34

K19/Gas31/750MW

TABLE 305
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	4.28	224.73	1.12	0.00	370.55	103.02	29.26	113.08	125.18
2015	0.00	447.43	0.00	0.00	16.99	6.89	471.30	3.48	0.00	422.34	101.11	33.45	118.89	168.89
2016	0.00	590.03	0.00	0.00	22.47	14.21	626.72	6.61	0.00	437.56	99.27	35.70	122.03	180.55
2017	0.00	712.98	0.00	0.00	31.91	19.70	764.59	10.44	0.00	472.84	97.28	38.30	129.04	208.23
2018	0.00	501.27	0.00	0.00	31.33	118.44	651.05	13.69	0.00	455.96	95.15	39.07	132.28	189.46
2019	0.00	357.48	0.00	0.00	37.12	80.56	475.16	16.07	13.01	491.07	95.09	36.64	132.97	226.37
2020	0.00	145.55	0.00	0.00	0.01	228.41	373.96	17.94	47.98	781.78	102.35	28.69	150.82	499.92
2021	0.00	50.36	0.00	0.00	0.00	0.00	50.36	18.19	46.21	847.19	102.98	31.36	166.88	545.97
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	44.90	850.18	101.85	31.24	171.78	545.32
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	42.92	806.58	98.89	33.32	177.69	496.68
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	41.22	783.74	96.74	36.82	187.34	462.83
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	39.45	742.96	96.67	26.50	170.82	448.97
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.19	37.57	726.22	94.75	27.43	190.63	413.42
2027	0.00	0.00	0.36	0.00	0.00	0.00	0.36	18.19	36.17	673.97	92.85	25.85	183.66	371.62
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.19	34.83	651.74	91.25	26.77	201.75	331.97
2029	0.00	0.00	122.43	0.00	0.00	0.00	122.43	18.69	36.18	627.49	89.70	27.19	219.92	290.68
2030	0.00	0.00	209.04	0.00	13.51	0.00	222.55	19.70	30.95	629.12	89.12	24.05	231.53	284.42
2031	0.00	0.00	91.26	0.00	53.19	0.00	144.45	20.41	37.66	617.26	86.92	56.68	196.46	277.20
2032	0.00	0.00	60.81	0.00	0.00	0.00	60.81	20.71	40.44	603.87	85.34	72.24	205.14	241.15
2033	0.00	0.00	68.64	0.00	0.00	0.00	68.64	21.06	39.27	586.20	83.89	79.20	215.86	207.25
2034	0.00	0.00	10.37	0.00	0.00	0.00	10.37	21.11	42.11	588.27	83.10	86.43	225.76	192.98
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.11	40.58	508.81	80.98	104.37	196.54	126.93
2036	0.00	0.00	101.88	0.00	0.00	0.00	101.88	21.62	39.95	480.27	79.53	114.03	200.55	86.15
2037	0.00	0.00	146.60	0.00	0.00	0.00	146.60	22.35	39.36	461.78	78.20	125.00	209.36	49.22
2038	0.00	0.00	65.40	0.00	44.75	0.00	110.14	22.90	38.79	473.08	78.11	117.86	221.81	55.30
2039	0.00	0.00	4.79	0.00	0.00	0.00	4.79	22.92	48.06	539.29	75.84	242.47	205.66	15.33
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.92	44.62	510.82	73.94	260.94	219.60	-43.66
2041	0.00	0.00	50.92	0.00	0.00	0.00	50.92	23.18	44.09	488.30	72.46	278.19	230.89	-93.24
2042	0.00	0.00	171.76	0.00	0.00	0.00	171.76	24.04	43.58	467.20	71.10	297.63	241.15	-142.67
2043	0.00	0.00	157.95	0.00	0.00	0.00	157.95	24.83	47.08	461.15	70.24	315.69	250.14	-174.91
2044	0.00	0.00	65.79	0.00	44.75	0.00	110.54	25.38	48.34	464.51	69.93	306.17	266.62	-178.21
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	25.40	54.81	539.82	67.95	453.03	236.78	-217.94
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	54.37	518.64	66.73	469.16	248.82	-266.07
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	53.07	495.65	65.47	493.79	257.54	-321.16
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	51.78	518.04	66.72	471.99	247.72	-268.39
2049	0.00	0.00	0.00	0.00	10.44	0.54	10.98	25.40	54.27	518.04	66.72	471.99	247.72	-268.39
2050	0.00	0.00	0.00	0.00	10.19	1.08	11.27	25.40	50.99	518.04	66.72	471.99	247.72	-268.39
2051	0.00	0.00	0.00	0.00	21.65	3.24	24.90	25.40	50.61	518.04	66.72	471.99	247.72	-268.39
2052	0.00	0.00	0.00	0.00	24.82	4.87	29.68	25.40	50.25	518.04	66.72	471.99	247.72	-268.39
2053	0.00	0.00	0.00	0.00	16.16	14.60	30.76	25.40	49.89	518.04	66.72	471.99	247.72	-268.39
2054	0.00	0.00	0.00	0.00	13.19	14.60	27.78	25.40	49.55	518.04	66.72	471.99	247.72	-268.39
2055	0.00	0.00	0.00	0.00	0.00	15.14	15.14	25.40	49.22	518.04	66.72	471.99	247.72	-268.39
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	64.39	518.04	66.72	471.99	247.72	-268.39
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	48.58	518.04	66.72	471.99	247.72	-268.39
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	63.78	518.04	66.72	471.99	247.72	-268.39
2059	0.00	0.00	100.62	0.00	0.00	0.00	100.62	25.40	50.89	518.04	66.72	471.99	247.72	-268.39
2060	0.00	0.00	187.24	0.00	0.00	0.00	187.24	25.40	59.94	518.04	66.72	471.99	247.72	-268.39
2061	0.00	0.00	89.19	0.00	0.00	0.00	89.19	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2062	0.00	0.00	60.81	0.00	0.00	0.00	60.81	25.40	59.94	518.04	66.72	471.99	247.72	-268.39
2063	0.00	0.00	68.64	0.00	0.00	0.00	68.64	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2064	0.00	0.00	10.37	0.00	8.19	1.65	20.21	25.40	59.94	518.04	66.72	471.99	247.72	-268.39
2065	0.00	0.00	0.00	0.00	20.31	3.30	23.61	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2066	0.00	0.00	101.88	0.00	40.71	9.89	152.48	25.40	59.94	518.04	66.72	471.99	247.72	-268.39
2067	0.00	0.00	146.60	0.00	7.09	14.83	168.53	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2068	0.00	0.00	65.40	0.00	15.17	44.50	125.07	25.40	59.94	518.04	66.72	471.99	247.72	-268.39
2069	0.00	0.00	4.79	0.00	23.93	44.50	73.23	25.40	47.34	518.04	66.72	471.99	247.72	-268.39
2070	0.00	0.00	0.00	0.00	0.01	46.15	46.16	25.40	46.18	518.04	66.72	471.99	247.72	-268.39
2071	0.00	0.00	50.92	0.00	0.00	0.00	50.92	25.40	46.18	518.04	66.72	471.99	247.72	-268.39
2072	0.00	0.00	171.76	0.00	0.00	0.00	171.76	25.40	46.18	518.04	66.72	471.99	247.72	-268.39
2073	0.00	0.00	157.95	0.00	33.56	0.00	191.51	25.40	45.31	518.04	66.72	471.99	247.72	-268.39
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2075	0.00	0.00	4.82	0.00	0.00	0.00	4.82	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	25.40	47.34	518.04	66.72	471.99	247.72	-268.39
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2081	0.00	0.00	0.00	0.00	13.30	0.00	13.30	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2084	0.00	0.00	0.00	0.00	10.44	0.54	10.98	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2085	0.00	0.00	0.00	0.00	10.19	1.08	11.27	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2086	0.00	0.00	0.00	0.00	21.65	3.24	24.90	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2087	0.00	0.00	0.00	0.00	24.82	4.87	29.68	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2088	0.00	0.00	0.00	0.00	27.35	14.60	41.95	25.40	44.44	518.04	66.72	471.99	247.72	-268.39
2089	0.00	0.00	0.00	0.00	13.19	14.60	27.78	25.40	47.34	518.04	66.72	471.99	247.72	-268.39
2090	0.00	0.00	0.00	0.00	0.00	15.14	15.14	25.40	47.34	518.04	66.72	471.99	247.72	-268.39
Salvage Value	0.00	0.00	7.91	0.00	4.93	3.78	16.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	555.55	0.00	216.03	387.48	3771.51	364.12	668.78	11651.46	1776.85	2994.53	3826.40	3053.67

Net Present Value -1751

K19/C25/250MW

TABLE 306
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.36	201.82	0.00	0.00	18.63	3.79	254.59	1.29	0.00	370.55	103.02	29.26	113.08	125.18
2015	85.21	447.43	0.00	0.00	16.99	2.35	551.98	4.05	0.00	422.34	101.11	33.45	118.89	168.89
2016	169.37	590.03	0.00	0.00	22.47	2.85	784.72	7.97	0.00	437.56	99.27	35.69	122.05	180.54
2017	194.90	712.98	0.00	0.00	31.91	4.27	944.06	12.69	0.00	472.28	97.29	38.30	129.07	207.63
2018	232.72	501.27	0.00	0.00	31.33	12.81	778.14	16.58	0.00	451.12	94.57	41.83	134.51	180.21
2019	236.47	357.48	0.00	0.00	39.66	12.81	646.43	19.81	13.01	480.90	94.22	41.57	135.08	210.03
2020	649.94	145.55	0.00	0.00	2.55	13.28	811.32	23.87	13.22	726.64	102.70	29.62	128.49	465.83
2021	1040.36	50.36	0.00	0.00	30.99	0.00	1121.71	29.48	12.98	770.66	103.41	30.17	135.69	501.39
2022	931.37	0.00	0.00	0.00	16.22	0.00	947.59	34.22	13.20	756.76	101.50	31.30	141.61	482.36
2023	663.17	0.00	0.00	0.00	27.35	0.00	690.52	37.67	13.02	738.34	99.29	31.07	155.29	452.70
2024	457.95	0.00	0.00	0.00	47.55	0.00	505.51	40.20	12.98	725.68	96.96	34.25	173.09	421.39
2025	299.92	0.00	0.00	0.00	62.94	0.00	362.86	42.01	27.06	806.08	101.65	30.47	117.58	556.38
2026	110.14	0.00	0.00	0.00	73.72	0.00	183.87	42.93	26.87	1033.24	109.37	29.63	113.01	781.23
2027	34.66	0.00	0.00	0.00	0.00	0.00	34.66	43.10	26.75	1044.22	108.69	28.05	117.09	790.39
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	27.03	1027.13	106.96	29.25	120.43	770.49
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	29.55	1000.67	105.16	29.52	122.93	743.06
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.57	984.70	103.90	29.20	122.03	729.58
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.40	970.83	102.29	29.83	124.80	713.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.04	940.96	100.69	30.08	125.26	684.93
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.11	903.41	99.04	30.28	122.06	652.04
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	25.22	872.92	97.40	30.55	124.14	620.84
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	27.29	846.01	95.79	30.81	120.34	599.07
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	43.10	24.39	813.03	94.22	31.27	121.66	565.88
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.10	24.39	778.57	92.65	31.23	123.61	531.09
2038	0.00	0.00	72.57	0.00	0.00	0.00	72.57	43.36	24.39	742.56	91.10	31.25	126.28	493.92
2039	0.00	0.00	90.86	0.00	6.75	0.00	97.62	43.74	27.29	731.22	89.91	29.57	140.28	471.45
2040	0.00	0.00	10.43	0.00	0.00	0.00	10.43	43.79	28.37	709.81	87.88	52.83	146.69	422.42
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.79	27.72	692.70	86.37	59.20	156.36	390.78
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	44.04	27.72	679.10	85.03	62.78	166.41	364.88
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	44.42	27.72	665.84	83.64	62.77	183.52	335.90
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	44.73	33.44	649.37	82.06	95.04	183.58	288.70
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	45.35	36.33	630.36	80.65	104.58	194.55	250.59
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	45.40	37.43	617.40	79.27	118.86	207.46	211.81
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	36.57	598.36	77.87	120.55	227.22	172.71
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.70	615.38	79.26	114.66	209.74	211.70
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	45.40	38.59	615.38	79.26	114.66	209.74	211.70
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	45.40	37.44	615.38	79.26	114.66	209.74	211.70
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	45.40	37.45	615.38	79.26	114.66	209.74	211.70
2052	0.00	0.00	0.00	0.00	24.82	1.05	25.87	45.40	37.45	615.38	79.26	114.66	209.74	211.70
2053	0.00	0.00	0.00	0.00	16.16	3.16	19.33	45.40	37.46	615.38	79.26	114.66	209.74	211.70
2054	0.00	0.00	0.00	0.00	13.81	3.16	16.98	45.40	37.46	615.38	79.26	114.66	209.74	211.70
2055	0.00	0.00	0.00	0.00	0.63	3.28	3.91	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2056	0.00	0.00	0.00	0.00	7.54	0.00	7.54	45.40	51.21	615.38	79.26	114.66	209.74	211.70
2057	0.00	0.00	0.00	0.00	3.77	0.00	3.77	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2058	0.00	0.00	0.00	0.00	6.28	0.00	6.28	45.40	51.21	615.38	79.26	114.66	209.74	211.70
2059	0.00	0.00	0.00	0.00	10.68	0.00	10.68	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2060	0.00	0.00	0.00	0.00	15.07	0.00	15.07	45.40	51.21	615.38	79.26	114.66	209.74	211.70
2061	0.00	0.00	0.00	0.00	18.21	0.00	18.21	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	66.71	615.38	79.26	114.66	209.74	211.70
2063	0.00	0.00	0.00	0.00	0.00	2.80	2.80	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2064	0.00	0.00	0.00	0.00	8.19	3.67	11.86	45.40	66.71	615.38	79.26	114.66	209.74	211.70
2065	0.00	0.00	0.00	0.00	6.80	2.12	8.92	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2066	0.00	0.00	0.00	0.00	0.82	2.14	2.96	45.40	66.71	615.38	79.26	114.66	209.74	211.70
2067	0.00	0.00	0.00	0.00	7.09	3.21	10.31	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2068	0.00	0.00	50.76	0.00	15.17	9.64	75.58	45.40	66.71	615.38	79.26	114.66	209.74	211.70
2069	0.00	0.00	69.06	0.00	25.85	9.64	104.55	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2070	0.00	0.00	10.43	0.00	1.92	10.00	22.36	45.40	52.95	615.38	79.26	114.66	209.74	211.70
2071	0.00	0.00	0.00	0.00	23.45	0.00	23.45	45.40	37.46	615.38	79.26	114.66	209.74	211.70
2072	0.00	0.00	50.97	0.00	12.45	0.00	63.42	45.40	52.95	615.38	79.26	114.66	209.74	211.70
2073	0.00	0.00	69.33	0.00	21.07	0.00	90.40	45.40	36.59	615.38	79.26	114.66	209.74	211.70
2074	0.00	0.00	61.55	0.00	43.63	0.00	105.18	45.40	51.21	615.38	79.26	114.66	209.74	211.70
2075	0.00	0.00	69.47	0.00	47.87	0.00	117.34	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2076	0.00	0.00	10.50	0.00	55.51	0.00	66.01	45.40	52.95	615.38	79.26	114.66	209.74	211.70
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	37.46	615.38	79.26	114.66	209.74	211.70
2078	0.00	0.00	0.00	0.00	6.75	0.00	6.75	45.40	52.95	615.38	79.26	114.66	209.74	211.70
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.35	615.38	79.26	114.66	209.74	211.70
2080	0.00	0.00	0.00	0.00	39.89	0.00	39.89	45.40	52.95	615.38	79.26	114.66	209.74	211.70
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2084	0.00	0.00	0.00	0.00	10.44	0.12	10.55	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2087	0.00	0.00	0.00	0.00	24.82	1.05	25.87	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2088	0.00	0.00	0.00	0.00	16.16	3.16	19.33	45.40	35.72	615.38	79.26	114.66	209.74	211.70
2089	0.00	0.00	0.00	0.00	13.19	3.16	16.35	45.40	38.62	615.38	79.26	114.66	209.74	211.70
2090	0.00	0.00	0.00	0.00	0.00	3.28	3.28	45.40	38.62	615.38	79.26	114.66	209.74	211.70
Salvage Value	2.09	0.00	4.07	0.00	7.89	0.96	15.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3614.60	2612.45	131.57	0.00	347.21	49.75	6755.57	674.30	426.24	13975.02	1932.80	1034.92	2985.95	8021.34

Net Present Value 165

K19/Gas24/250MW

TABLE 307
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	201.82	0.00	0.00	18.63	3.79	224.23	1.14	0.00	370.55	103.02	29.26	113.08	125.18
2015	0.00	447.43	0.00	0.00	16.99	2.35	466.77	3.47	0.00	422.34	101.11	33.45	118.89	168.89
2016	0.00	590.03	0.00	0.00	22.47	2.85	615.35	6.55	0.00	437.56	99.27	35.70	122.04	180.54
2017	0.00	712.98	0.00	0.00	31.91	4.27	749.16	10.29	0.00	472.84	97.28	38.30	129.04	208.23
2018	0.00	501.27	0.00	0.00	31.33	12.81	545.41	13.02	0.00	451.89	94.57	41.78	134.42	181.12
2019	0.00	357.48	0.00	0.00	37.12	12.81	407.41	15.06	13.01	482.17	94.21	41.56	135.01	211.40
2020	0.00	145.55	0.36	0.00	0.01	13.28	159.20	15.85	13.22	728.74	102.69	29.64	128.50	467.91
2021	0.00	50.36	0.00	0.00	0.00	0.00	50.36	16.10	12.98	773.97	103.39	30.17	135.56	504.86
2022	0.00	0.00	71.77	0.00	0.00	0.00	71.77	16.35	13.20	766.78	101.95	29.54	140.19	495.10
2023	0.00	0.00	89.77	0.00	6.75	0.00	96.52	16.73	13.02	761.80	100.87	24.80	145.63	490.50
2024	0.00	0.00	10.27	0.00	0.00	0.00	10.27	16.78	16.96	755.52	99.00	40.41	150.59	465.51
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	16.78	16.74	665.43	96.74	30.85	136.40	401.44
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.78	16.33	638.63	94.45	34.93	145.04	364.21
2027	0.00	0.00	50.21	0.00	0.00	0.00	50.21	17.03	16.35	604.65	92.39	37.90	147.66	326.70
2028	0.00	0.00	70.38	0.00	53.19	0.00	123.57	17.63	16.42	584.48	90.54	43.93	155.53	294.48
2029	0.00	0.00	111.49	0.00	0.00	0.00	111.49	18.19	23.11	570.56	88.80	60.62	162.30	258.84
2030	0.00	0.00	145.58	0.00	0.00	0.00	145.58	18.92	19.18	567.36	87.89	65.39	166.04	248.04
2031	0.00	0.00	64.94	0.00	6.75	0.00	71.70	19.28	19.18	594.09	88.48	56.77	167.67	281.18
2032	0.00	0.00	4.76	0.00	0.00	0.00	4.76	19.30	26.09	628.15	85.94	154.73	144.84	242.64
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	26.10	615.42	84.43	164.96	155.06	210.98
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	26.10	601.28	82.94	177.41	163.92	177.01
2035	0.00	0.00	101.78	0.00	0.00	0.00	101.78	19.81	25.45	531.45	80.93	178.00	154.75	117.78
2036	0.00	0.00	146.46	0.00	0.00	0.00	146.46	20.54	25.46	504.96	79.45	188.51	159.31	77.70
2037	0.00	0.00	65.33	0.00	0.00	0.00	65.33	20.87	25.46	522.52	79.90	181.31	158.22	103.10
2038	0.00	0.00	106.87	0.00	0.00	0.00	106.87	21.40	32.37	563.28	77.48	295.60	139.67	50.53
2039	0.00	0.00	146.90	0.00	0.00	0.00	146.90	22.14	35.27	547.85	76.09	309.54	156.78	5.44
2040	0.00	0.00	65.53	0.00	44.75	0.00	110.28	22.69	32.37	547.37	75.47	313.97	165.22	-7.29
2041	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.71	39.30	596.45	73.61	429.09	142.53	-48.79
2042	0.00	0.00	102.50	0.00	0.00	0.00	102.50	23.23	39.30	575.18	71.81	456.48	152.95	-106.06
2043	0.00	0.00	147.49	0.00	0.00	0.00	147.49	23.96	39.30	559.75	70.48	478.16	160.80	-149.69
2044	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.29	41.04	551.98	69.99	478.88	168.72	-165.60
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	24.32	47.96	596.44	67.69	614.78	150.87	-236.90
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	47.96	604.94	67.87	608.91	151.52	-223.36
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	47.10	576.98	65.90	651.31	164.20	-304.43
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	24.32	49.14	592.79	67.15	625.00	155.53	-254.90
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2052	0.00	0.00	49.96	0.00	24.82	1.05	75.83	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2053	0.00	0.00	67.96	0.00	16.16	3.16	87.29	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2054	0.00	0.00	10.27	0.00	13.19	3.16	26.62	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2055	0.00	0.00	0.00	0.00	0.00	3.28	3.28	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2057	0.00	0.00	50.21	0.00	0.00	0.00	50.21	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2058	0.00	0.00	68.30	0.00	6.75	0.00	75.06	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2059	0.00	0.00	111.49	0.00	0.00	0.00	111.49	24.32	49.14	592.79	67.15	625.00	155.53	-254.90
2060	0.00	0.00	145.58	0.00	0.00	0.00	145.58	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2061	0.00	0.00	64.94	0.00	0.00	0.00	64.94	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2062	0.00	0.00	4.76	0.00	0.00	0.00	4.76	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2063	0.00	0.00	0.00	0.00	39.89	2.80	42.69	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2064	0.00	0.00	0.00	0.00	8.19	3.67	11.86	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2065	0.00	0.00	101.78	0.00	6.80	2.12	110.70	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2066	0.00	0.00	146.46	0.00	7.57	2.14	156.17	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2067	0.00	0.00	65.33	0.00	7.09	3.21	75.64	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2068	0.00	0.00	106.87	0.00	15.17	9.64	131.69	24.32	61.73	592.79	67.15	625.00	155.53	-254.90
2069	0.00	0.00	146.90	0.00	23.93	9.64	180.48	24.32	49.14	592.79	67.15	625.00	155.53	-254.90
2070	0.00	0.00	65.53	0.00	0.01	10.00	75.54	24.32	47.98	592.79	67.15	625.00	155.53	-254.90
2071	0.00	0.00	4.80	0.00	0.00	0.00	4.80	24.32	47.98	592.79	67.15	625.00	155.53	-254.90
2072	0.00	0.00	102.50	0.00	0.00	0.00	102.50	24.32	47.98	592.79	67.15	625.00	155.53	-254.90
2073	0.00	0.00	147.49	0.00	0.00	0.00	147.49	24.32	47.11	592.79	67.15	625.00	155.53	-254.90
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2075	0.00	0.00	4.82	0.00	33.56	0.00	38.38	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2078	0.00	0.00	0.00	0.00	13.30	0.00	13.30	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	49.14	592.79	67.15	625.00	155.53	-254.90
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2082	0.00	0.00	49.96	0.00	0.00	0.00	49.96	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2083	0.00	0.00	67.96	0.00	0.00	0.00	67.96	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2084	0.00	0.00	10.27	0.00	10.44	0.12	20.82	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2087	0.00	0.00	50.21	0.00	24.82	1.05	76.08	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2088	0.00	0.00	68.30	0.00	16.16	3.16	87.63	24.32	46.24	592.79	67.15	625.00	155.53	-254.90
2089	0.00	0.00	10.32	0.00	13.19	3.16	26.67	24.32	49.14	592.79	67.15	625.00	155.53	-254.90
2090	0.00	0.00	0.00	0.00	11.19	3.28	14.47	24.32	49.14	592.79	67.15	625.00	155.53	-254.90
Salvage Value	0.00	0.00	14.46	0.00	4.32	0.96	19.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2612.45	726.87	0.00	209.14	49.75	3598.20	343.78	445.49	11722.75	1781.44	4090.04	2935.42	2915.85

Net Present Value -1472

K19/C31/250MW

TABLE 308
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.80	2.80	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	201.82	0.00	0.00	18.63	3.79	253.97	1.28	0.00	370.55	103.02	29.26	113.08	125.18
2015	37.44	447.43	0.00	0.00	16.99	2.35	504.20	3.80	0.00	422.34	101.11	33.45	118.89	168.89
2016	10.52	590.03	0.00	0.00	22.47	2.85	625.87	6.93	0.00	437.56	99.27	35.70	122.04	180.54
2017	10.55	712.98	0.00	0.00	31.91	4.27	759.71	10.73	0.00	472.84	97.28	38.30	129.04	208.23
2018	12.50	501.27	0.00	0.00	31.33	12.81	557.92	13.52	0.00	451.89	94.57	41.78	134.42	181.12
2019	12.54	357.48	0.00	0.00	37.12	12.81	419.95	15.62	13.01	482.17	94.21	41.56	135.01	211.40
2020	12.58	145.55	0.36	0.00	0.01	13.28	171.78	16.48	13.22	728.74	102.69	29.64	128.50	467.91
2021	15.86	50.36	0.00	0.00	0.00	0.00	66.22	16.81	12.98	773.97	103.39	30.17	135.56	504.86
2022	149.25	0.00	71.77	0.00	0.00	0.00	221.02	17.81	13.20	766.61	101.93	29.59	140.24	494.85
2023	229.26	0.00	89.77	0.00	6.75	0.00	325.78	19.33	13.02	760.97	100.84	24.97	145.90	489.25
2024	245.84	0.00	10.27	0.00	0.00	0.00	256.11	20.61	16.96	754.72	98.98	40.67	151.11	463.95
2025	248.58	0.00	0.00	0.00	2.54	0.00	251.12	21.86	16.74	664.08	96.70	31.03	137.19	399.17
2026	669.49	0.00	0.00	0.00	2.54	0.00	672.03	25.22	16.33	636.96	94.44	35.18	145.63	361.71
2027	1059.04	0.00	50.21	0.00	30.99	0.00	1140.24	30.92	16.35	602.15	92.38	38.33	148.28	323.16
2028	948.10	0.00	68.30	0.00	22.97	0.00	1039.37	36.12	16.42	580.75	90.47	45.08	156.32	288.88
2029	675.08	0.00	10.32	0.00	27.35	0.00	712.75	39.68	23.10	566.42	88.77	61.86	163.65	252.14
2030	466.18	0.00	0.00	0.00	47.55	0.00	513.73	42.25	19.16	594.99	89.84	54.07	157.73	293.36
2031	305.31	0.00	0.00	0.00	62.94	0.00	368.25	44.09	33.47	681.58	92.95	45.27	122.35	421.01
2032	112.12	0.00	0.00	0.00	73.72	0.00	185.84	45.02	33.68	908.51	100.07	43.70	114.94	649.79
2033	35.28	0.00	0.00	0.00	0.00	0.00	35.28	45.20	33.55	939.87	99.99	45.32	122.07	672.49
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	33.76	904.54	98.22	46.43	124.41	635.49
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.93	874.96	96.53	47.09	120.79	610.54
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.88	844.24	94.90	48.27	122.20	578.87
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.71	803.82	93.04	50.05	125.41	535.32
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.35	757.42	91.07	52.15	128.67	485.52
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	35.31	725.39	89.17	57.65	141.25	437.32
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.53	705.43	87.47	65.23	148.68	404.05
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	35.25	684.34	85.82	73.93	157.71	366.89
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	45.20	32.36	682.37	84.97	74.88	164.08	358.44
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.20	32.36	670.32	83.63	74.60	180.25	331.84
2044	0.00	0.00	51.07	0.00	0.00	0.00	51.07	45.46	34.10	649.63	82.07	94.99	183.56	289.01
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	46.07	34.10	630.48	80.65	104.55	194.50	250.78
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.12	38.09	617.53	79.27	118.85	207.45	211.96
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	36.57	598.37	77.87	120.55	227.22	172.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	35.70	615.46	79.26	114.65	209.72	211.82
2049	0.00	0.00	0.00	0.00	10.44	0.12	10.55	46.12	38.59	615.46	79.26	114.65	209.72	211.82
2050	0.00	0.00	0.00	0.00	10.19	0.23	10.42	46.12	35.70	615.46	79.26	114.65	209.72	211.82
2051	0.00	0.00	0.00	0.00	21.65	0.70	22.36	46.12	38.60	615.46	79.26	114.65	209.72	211.82
2052	0.00	0.00	49.96	0.00	24.82	1.05	75.83	46.12	35.71	615.46	79.26	114.65	209.72	211.82
2053	0.00	0.00	67.96	0.00	16.16	3.16	87.29	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2054	0.00	0.00	10.27	0.00	13.19	3.16	26.62	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2055	0.00	0.00	0.00	0.00	0.00	3.28	3.28	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2057	0.00	0.00	50.21	0.00	0.00	0.00	50.21	46.12	37.46	615.46	79.26	114.65	209.72	211.82
2058	0.00	0.00	68.30	0.00	6.75	0.00	75.06	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2059	0.00	0.00	10.32	0.00	0.00	0.00	10.32	46.12	40.35	615.46	79.26	114.65	209.72	211.82
2060	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2061	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.12	38.62	615.46	79.26	114.65	209.72	211.82
2062	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2063	0.00	0.00	0.00	0.00	10.52	2.80	13.33	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2064	0.00	0.00	0.00	0.00	14.47	3.67	18.14	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2065	0.00	0.00	0.00	0.00	17.48	2.12	19.59	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2066	0.00	0.00	0.00	0.00	15.89	2.14	18.03	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2067	0.00	0.00	0.00	0.00	25.30	3.21	28.52	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2068	0.00	0.00	0.00	0.00	15.17	9.64	24.81	46.12	66.71	615.46	79.26	114.65	209.72	211.82
2069	0.00	0.00	0.00	0.00	23.93	9.64	33.58	46.12	38.62	615.46	79.26	114.65	209.72	211.82
2070	0.00	0.00	0.00	0.00	0.01	10.00	10.01	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	40.35	615.46	79.26	114.65	209.72	211.82
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.12	36.59	615.46	79.26	114.65	209.72	211.82
2074	0.00	0.00	51.07	0.00	0.00	0.00	51.07	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2075	0.00	0.00	69.47	0.00	1.91	0.00	71.39	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2076	0.00	0.00	10.50	0.00	1.91	0.00	12.41	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2077	0.00	0.00	0.00	0.00	23.45	0.00	23.45	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2078	0.00	0.00	0.00	0.00	12.45	0.00	12.45	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2079	0.00	0.00	0.00	0.00	21.07	0.00	21.07	46.12	38.62	615.46	79.26	114.65	209.72	211.82
2080	0.00	0.00	0.00	0.00	76.77	0.00	76.77	46.12	51.21	615.46	79.26	114.65	209.72	211.82
2081	0.00	0.00	0.00	0.00	47.87	0.00	47.87	46.12	38.62	615.46	79.26	114.65	209.72	211.82
2082	0.00	0.00	49.96	0.00	55.51	0.00	105.47	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2083	0.00	0.00	67.96	0.00	0.00	0.00	67.96	46.12	37.46	615.46	79.26	114.65	209.72	211.82
2084	0.00	0.00	10.27	0.00	10.44	0.12	20.82	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2085	0.00	0.00	0.00	0.00	10.19	0.23	10.42	46.12	37.46	615.46	79.26	114.65	209.72	211.82
2086	0.00	0.00	0.00	0.00	21.65	0.70	22.36	46.12	52.95	615.46	79.26	114.65	209.72	211.82
2087	0.00	0.00	50.21	0.00	24.82	1.05	76.08	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2088	0.00	0.00	68.30	0.00	16.16	3.16	87.63	46.12	35.72	615.46	79.26	114.65	209.72	211.82
2089	0.00	0.00	10.32	0.00	13.19	3.16	26.67	46.12	38.62	615.46	79.26	114.65	209.72	211.82
2090	0.00	0.00	0.00	0.00	0.00	3.28	3.28	46.12	38.62	615.46	79.26	114.65	209.72	211.82
Salvage Value	15.21	0.00	7.17	0.00	8.66	0.96	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	2783.06	2612.45	248.80	0.00	305.75	49.75	5999.80	593.18	428.42	12794.67	1889.56	1146.73	3061.09	6697.30

Net Present Value -324

All Gas

TABLE 309
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	424.74	101.10	33.46	118.80	171.38
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	440.11	99.26	35.68	121.95	183.21
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	480.37	97.64	36.87	127.50	218.35
2018	0.00	0.00	0.36	0.00	0.00	0.00	0.36	0.51	0.00	458.44	94.84	40.19	133.19	190.22
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	442.22	92.91	35.62	136.04	177.66
2020	0.00	0.00	71.67	0.00	0.00	0.00	71.67	0.76	0.00	472.97	92.97	28.13	142.16	209.70
2021	0.00	0.00	89.68	0.00	6.75	0.00	96.43	1.13	0.00	464.24	91.22	26.32	154.81	191.89
2022	0.00	0.00	10.25	0.00	0.00	0.00	10.25	1.19	3.98	452.03	88.95	48.91	160.20	153.97
2023	0.00	0.00	50.01	0.00	0.00	0.00	50.01	1.44	3.98	434.04	86.76	60.21	170.77	116.29
2024	0.00	0.00	70.11	0.00	53.19	0.00	123.29	2.04	3.98	425.79	85.29	68.73	179.75	92.02
2025	0.00	0.00	10.28	0.00	0.00	0.00	10.28	2.09	7.98	373.14	84.81	57.58	157.14	73.61
2026	0.00	0.00	50.16	0.00	0.00	0.00	50.16	2.34	7.98	354.21	83.50	59.58	162.05	49.09
2027	0.00	0.00	68.23	0.00	0.00	0.00	68.23	2.69	7.98	332.49	81.64	59.89	180.23	10.73
2028	0.00	0.00	111.38	0.00	0.00	0.00	111.38	3.24	11.97	309.35	79.70	93.39	178.88	-42.62
2029	0.00	0.00	145.44	0.00	0.00	0.00	145.44	3.97	11.97	288.25	78.24	106.18	186.61	-82.77
2030	0.00	0.00	64.88	0.00	6.75	0.00	71.63	4.33	11.98	306.69	79.18	98.82	180.95	-52.25
2031	0.00	0.00	4.75	0.00	0.00	0.00	4.75	4.35	18.90	331.68	76.77	184.33	161.28	-90.71
2032	0.00	0.00	50.46	0.00	0.00	0.00	50.46	4.60	18.90	301.55	74.86	201.65	171.38	-146.35
2033	0.00	0.00	68.64	0.00	44.75	0.00	113.39	5.17	18.90	274.62	73.12	218.99	182.02	-199.51
2034	0.00	0.00	112.05	0.00	0.00	0.00	112.05	5.73	22.90	256.85	71.70	245.64	188.32	-248.82
2035	0.00	0.00	146.31	0.00	0.00	0.00	146.31	6.46	22.90	241.05	70.81	258.09	194.31	-282.16
2036	0.00	0.00	65.27	0.00	0.00	0.00	65.27	6.79	22.90	240.00	70.77	251.03	204.29	-286.09
2037	0.00	0.00	106.77	0.00	0.00	0.00	106.77	7.32	29.82	250.57	68.78	343.09	173.49	-334.79
2038	0.00	0.00	146.75	0.00	0.00	0.00	146.75	8.06	29.82	228.87	67.56	361.36	183.16	-383.20
2039	0.00	0.00	65.46	0.00	0.00	0.00	65.46	8.38	29.83	224.88	67.51	367.02	191.21	-400.85
2040	0.00	0.00	4.79	0.00	0.00	0.00	4.79	8.41	36.75	243.71	65.58	457.65	170.15	-449.67
2041	0.00	0.00	102.39	0.00	0.00	0.00	102.39	8.92	36.76	227.72	63.80	495.09	186.15	-517.32
2042	0.00	0.00	147.34	0.00	0.00	0.00	147.34	9.66	36.76	218.04	62.75	520.95	198.09	-563.76
2043	0.00	0.00	65.73	0.00	44.75	0.00	110.47	10.21	36.76	221.21	62.75	526.23	202.55	-570.32
2044	0.00	0.00	4.81	0.00	0.00	0.00	4.81	10.23	43.68	242.37	61.17	620.70	177.09	-616.58
2045	0.00	0.00	22.49	0.00	0.00	0.00	22.49	10.34	43.68	229.47	59.65	661.24	192.61	-684.02
2046	0.00	0.00	30.59	0.00	0.00	0.00	30.59	10.50	43.68	219.73	58.55	694.78	204.48	-738.07
2047	0.00	0.00	4.62	0.00	0.00	0.00	4.62	10.52	45.13	215.85	57.69	732.22	210.53	-784.59
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.13	221.69	58.63	696.08	202.54	-735.56
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	10.52	45.14	221.69	58.63	696.08	202.54	-735.56
2050	0.00	0.00	49.86	0.00	9.87	0.00	59.72	10.52	45.14	221.69	58.63	696.08	202.54	-735.56
2051	0.00	0.00	67.83	0.00	9.87	0.00	77.69	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2052	0.00	0.00	10.25	0.00	9.87	0.00	20.11	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2053	0.00	0.00	50.01	0.00	0.00	0.00	50.01	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2054	0.00	0.00	68.03	0.00	0.00	0.00	68.03	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2055	0.00	0.00	10.28	0.00	0.00	0.00	10.28	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2056	0.00	0.00	50.16	0.00	6.75	0.00	56.91	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2057	0.00	0.00	68.23	0.00	0.00	0.00	68.23	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2058	0.00	0.00	111.38	0.00	0.00	0.00	111.38	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2059	0.00	0.00	145.44	0.00	39.89	0.00	185.33	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2060	0.00	0.00	64.88	0.00	0.00	0.00	64.88	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2061	0.00	0.00	4.75	0.00	0.00	0.00	4.75	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2062	0.00	0.00	50.46	0.00	0.00	0.00	50.46	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2063	0.00	0.00	68.64	0.00	0.00	0.00	68.64	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2064	0.00	0.00	112.05	0.00	0.00	0.00	112.05	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2065	0.00	0.00	146.31	0.00	6.75	0.00	153.06	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2066	0.00	0.00	65.27	0.00	0.00	0.00	65.27	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2067	0.00	0.00	106.77	0.00	0.00	0.00	106.77	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2068	0.00	0.00	146.75	0.00	33.56	0.00	180.31	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2069	0.00	0.00	65.46	0.00	0.00	0.00	65.46	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2070	0.00	0.00	4.79	0.00	0.00	0.00	4.79	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2071	0.00	0.00	102.39	0.00	0.00	0.00	102.39	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2072	0.00	0.00	147.34	0.00	0.00	0.00	147.34	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2073	0.00	0.00	65.73	0.00	0.00	0.00	65.73	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2074	0.00	0.00	4.81	0.00	13.30	0.00	18.11	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2075	0.00	0.00	22.49	0.00	0.00	0.00	22.49	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2076	0.00	0.00	30.59	0.00	0.00	0.00	30.59	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2077	0.00	0.00	4.62	0.00	0.00	0.00	4.62	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2078	0.00	0.00	0.00	0.00	33.56	0.00	33.56	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2080	0.00	0.00	49.86	0.00	0.00	0.00	49.86	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2081	0.00	0.00	67.83	0.00	0.00	0.00	67.83	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2082	0.00	0.00	10.25	0.00	0.00	0.00	10.25	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2083	0.00	0.00	50.01	0.00	11.19	0.00	61.20	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2084	0.00	0.00	68.03	0.00	9.87	0.00	77.89	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2085	0.00	0.00	10.28	0.00	9.87	0.00	20.14	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2086	0.00	0.00	50.16	0.00	9.87	0.00	60.02	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2087	0.00	0.00	68.23	0.00	9.87	0.00	78.10	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2088	0.00	0.00	10.31	0.00	0.00	0.00	10.31	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	45.15	221.69	58.63	696.08	202.54	-735.56
Salvage Value	0.00	0.00	32.44	0.00	2.22	0.00	34.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	933.02	0.00	121.40	0.00	1117.38	90.46	343.48	6899.48	1625.85	4899.33	3385.54	-3011.24

Net Present Value: -4563

Wind/Gas

TABLE 310
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	62.96	0.00	0.00	9.87	0.00	72.82	0.36	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.41	0.00	424.74	101.10	33.46	118.82	171.36
2016	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.46	0.00	440.11	99.26	35.68	121.98	183.19
2017	0.00	0.00	0.00	0.00	9.87	0.00	9.87	0.51	0.00	480.42	97.64	36.87	127.52	218.38
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	458.44	94.84	40.19	133.19	190.22
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	442.22	92.91	35.62	136.04	177.66
2020	0.00	0.00	0.00	7.06	10.56	0.00	17.62	0.60	0.00	467.41	92.50	30.33	143.54	201.03
2021	0.00	0.00	0.36	215.62	17.59	0.00	233.57	1.77	0.00	458.63	90.76	29.14	155.72	183.00
2022	0.00	0.00	0.00	219.66	21.25	0.00	240.91	2.97	6.21	468.67	89.13	29.23	157.40	192.91
2023	0.00	0.00	121.83	212.59	11.12	0.00	345.54	4.59	12.42	465.62	86.65	33.43	163.08	182.46
2024	0.00	0.00	157.91	4.04	18.72	0.00	180.67	5.38	18.63	472.29	84.88	33.70	167.49	186.22
2025	0.00	0.00	20.56	3.53	3.39	0.00	27.48	5.52	26.60	433.94	84.97	39.38	138.73	170.88
2026	0.00	0.00	50.16	107.81	8.52	0.00	166.49	6.35	26.60	423.21	83.97	37.64	142.74	158.85
2027	0.00	0.00	70.31	109.83	66.72	0.00	246.86	7.58	29.70	405.41	81.60	46.24	150.66	126.91
2028	0.00	0.00	10.31	109.83	18.76	0.00	138.89	8.27	36.81	399.13	79.86	59.96	155.96	103.36
2029	0.00	0.00	50.31	109.83	18.83	0.00	178.96	9.17	39.91	387.99	78.28	65.10	161.54	83.08
2030	0.00	0.00	68.44	109.83	18.83	0.00	197.09	10.15	43.02	390.56	77.36	68.24	162.82	82.14
2031	0.00	0.00	60.75	109.83	18.83	0.00	189.41	11.10	50.10	395.51	76.15	80.92	166.57	71.88
2032	0.00	0.00	68.58	109.83	63.57	0.00	241.98	12.31	53.22	391.38	75.05	81.66	172.23	62.44
2033	0.00	0.00	10.36	109.83	18.83	0.00	139.02	13.00	60.32	400.11	74.40	87.00	175.72	62.98
2034	0.00	0.00	50.56	109.83	18.83	0.00	179.22	13.90	63.43	383.57	72.60	102.40	180.19	28.38
2035	0.00	0.00	68.78	109.83	18.83	0.00	197.44	14.89	66.55	366.94	70.94	110.48	188.92	-3.40
2036	0.00	0.00	61.06	109.83	18.83	0.00	189.71	15.84	73.63	360.22	69.59	126.97	193.64	-29.97
2037	0.00	0.00	68.92	109.83	18.83	0.00	197.57	16.82	76.75	349.02	68.31	134.53	200.66	-54.48
2038	0.00	0.00	61.18	109.83	18.83	0.00	189.83	17.77	83.84	348.56	67.29	148.24	206.24	-73.21
2039	0.00	0.00	69.06	109.83	63.57	0.00	242.46	18.99	86.95	342.00	66.15	148.68	226.59	-99.42
2040	0.00	0.00	10.43	116.89	18.83	0.00	146.15	19.72	94.06	348.60	65.36	157.44	235.74	-109.93
2041	0.00	0.00	50.92	325.45	18.83	0.00	395.19	21.69	97.17	331.10	63.85	189.02	233.01	-154.78
2042	0.00	0.00	69.26	329.48	18.83	0.00	417.57	23.78	100.27	316.84	62.49	202.23	243.43	-191.31
2043	0.00	0.00	61.48	322.42	18.69	0.00	402.59	25.79	107.36	310.62	61.33	223.64	250.09	-224.44
2044	0.00	0.00	69.40	113.86	18.26	0.00	201.53	26.80	110.47	304.97	60.42	232.49	258.14	-246.07
2045	0.00	0.00	32.97	113.36	17.13	0.00	163.47	27.62	117.57	301.13	59.34	246.14	271.35	-275.71
2046	0.00	0.00	30.59	214.11	15.44	0.00	260.13	28.92	120.68	294.68	58.31	247.68	290.99	-302.30
2047	0.00	0.00	4.62	111.85	10.31	0.00	126.78	29.55	125.23	286.48	57.27	256.12	295.43	-322.33
2048	0.00	0.00	0.00	109.83	5.30	0.00	115.12	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2049	0.00	0.00	0.00	109.83	9.94	0.00	119.76	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2050	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2051	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2052	0.00	0.00	0.00	109.83	9.87	0.00	119.69	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2053	0.00	0.00	100.02	109.83	0.00	0.00	209.85	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2054	0.00	0.00	136.06	109.83	0.00	0.00	245.89	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2055	0.00	0.00	20.56	109.83	2.64	0.00	133.02	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2056	0.00	0.00	50.16	109.83	4.40	0.00	164.38	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2057	0.00	0.00	68.23	109.83	5.35	0.00	183.41	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2058	0.00	0.00	10.31	109.83	2.99	0.00	123.13	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2059	0.00	0.00	50.31	109.83	15.02	0.00	175.16	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2060	0.00	0.00	68.44	116.89	1.48	0.00	186.81	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2061	0.00	0.00	60.75	325.45	2.38	0.00	388.58	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2062	0.00	0.00	68.58	329.48	43.33	0.00	441.38	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2063	0.00	0.00	10.36	322.42	4.71	0.00	337.49	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2064	0.00	0.00	50.56	113.86	4.71	0.00	169.13	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2065	0.00	0.00	68.78	113.36	4.71	0.00	186.85	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2066	0.00	0.00	61.06	214.11	4.71	0.00	279.87	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2067	0.00	0.00	68.92	111.85	38.27	0.00	219.03	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2068	0.00	0.00	61.18	109.83	4.71	0.00	175.71	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2069	0.00	0.00	69.06	109.83	4.71	0.00	183.59	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2070	0.00	0.00	10.43	109.83	12.62	0.00	132.89	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2071	0.00	0.00	50.92	109.83	17.90	0.00	178.65	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2072	0.00	0.00	69.26	109.83	20.61	0.00	199.70	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2073	0.00	0.00	61.48	109.83	12.84	0.00	184.15	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2074	0.00	0.00	69.40	109.83	41.96	0.00	221.19	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2075	0.00	0.00	32.97	109.83	6.61	0.00	149.41	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2076	0.00	0.00	30.59	109.83	10.85	0.00	151.27	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2077	0.00	0.00	4.62	109.83	28.10	0.00	142.55	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2078	0.00	0.00	0.00	109.83	18.69	0.00	128.51	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2079	0.00	0.00	0.00	109.83	18.47	0.00	128.30	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2080	0.00	0.00	0.00	116.89	18.19	0.00	135.08	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2081	0.00	0.00	0.00	325.45	17.34	0.00	342.79	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2082	0.00	0.00	0.00	329.48	27.64	0.00	357.12	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2083	0.00	0.00	100.02	322.42	15.39	0.00	437.83	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2084	0.00	0.00	136.06	113.86	23.92	0.00	273.84	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2085	0.00	0.00	20.56	113.36	23.77	0.00	157.69	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2086	0.00	0.00	50.16	214.11	22.93	0.00	287.19	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2087	0.00	0.00	68.23	111.85	22.08	0.00	202.16	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2088	0.00	0.00	10.31	109.83	7.98	0.00	128.12	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2089	0.00	0.00	0.00	106.30	15.21	0.00	121.51	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
2090	0.00	0.00	0.00	2.02	0.07	0.00	2.09	29.55	125.23	294.10	58.30	249.98	285.92	-300.11
Salvage Value	0.00	0.00	14.26	38.84	8.17	0.00	61.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	62.96	696.56	1903.61	311.61	0.00	2974.73	232.04	974.12	7953.44	1622.30	2069.86	3731.41	529.87

Net Present Value -3651

K22/Gas

TABLE 311
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	99.88	0.00	0.00	9.87	0.00	109.75	0.55	0.00	371.50	103.01	29.23	113.00	126.25
2015	0.00	29.84	0.00	0.00	10.59	0.00	40.42	0.75	0.00	424.74	101.10	33.46	118.80	171.38
2016	0.00	25.92	0.00	0.00	10.65	0.00	36.57	0.93	0.00	439.57	99.26	35.69	121.95	182.66
2017	0.00	192.79	0.00	0.00	23.47	0.00	216.26	2.01	0.00	479.01	97.65	36.90	127.57	216.89
2018	0.00	374.90	0.00	0.00	6.97	0.00	381.87	3.92	0.00	455.49	94.85	40.21	133.34	187.10
2019	0.00	609.71	0.00	0.00	12.14	0.00	621.85	7.03	0.00	439.20	92.92	35.63	136.18	174.47
2020	0.00	677.02	0.00	0.00	22.10	0.00	699.12	10.53	0.00	460.61	92.33	31.28	144.58	192.42
2021	0.00	551.85	0.00	0.00	31.34	0.00	583.20	13.45	0.00	455.59	90.71	29.74	157.97	177.18
2022	0.00	319.56	0.00	0.00	37.12	0.00	356.68	15.23	13.01	464.15	90.68	33.82	145.91	193.74
2023	0.00	148.13	0.00	0.00	0.01	0.00	148.14	15.97	13.22	614.31	96.36	33.27	129.56	355.13
2024	0.00	51.07	0.00	0.00	0.00	0.00	51.07	16.22	12.93	639.16	96.21	37.58	138.59	366.78
2025	0.00	0.00	0.36	0.00	0.00	0.00	0.36	16.22	13.15	609.25	96.20	26.20	121.14	365.71
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.22	12.97	588.51	94.34	26.53	127.00	340.64
2027	0.00	0.00	72.02	0.00	0.00	0.00	72.02	16.48	12.93	543.47	92.50	25.38	123.64	301.95
2028	0.00	0.00	90.15	0.00	6.75	0.00	96.91	16.85	12.69	517.98	90.96	26.46	128.16	272.40
2029	0.00	0.00	10.32	0.00	0.00	0.00	10.32	16.90	16.24	511.19	90.13	33.37	129.75	257.95
2030	0.00	0.00	50.36	0.00	0.00	0.00	50.36	17.15	16.24	495.06	88.36	41.36	136.54	228.79
2031	0.00	0.00	171.96	0.00	53.19	0.00	225.15	18.27	16.28	482.53	86.70	48.50	145.12	202.22
2032	0.00	0.00	156.22	0.00	0.00	0.00	156.22	19.05	22.98	468.37	85.09	65.31	152.26	165.71
2033	0.00	0.00	65.07	0.00	6.75	0.00	71.83	19.41	19.04	482.76	85.28	57.50	155.79	184.20
2034	0.00	0.00	4.77	0.00	0.00	0.00	4.77	19.43	25.96	517.73	82.86	155.78	133.37	145.73
2035	0.00	0.00	101.78	0.00	0.00	0.00	101.78	19.94	25.96	490.60	80.80	170.84	143.59	95.37
2036	0.00	0.00	146.46	0.00	0.00	0.00	146.46	20.67	25.96	474.05	79.28	185.11	151.54	58.11
2037	0.00	0.00	65.33	0.00	0.00	0.00	65.33	21.00	25.97	490.32	79.73	175.52	151.70	83.38
2038	0.00	0.00	106.87	0.00	0.00	0.00	106.87	21.54	32.23	525.38	77.36	283.38	133.10	31.54
2039	0.00	0.00	146.90	0.00	0.00	0.00	146.90	22.27	32.24	510.69	76.00	298.12	149.87	-13.29
2040	0.00	0.00	65.53	0.00	44.75	0.00	110.28	22.82	32.24	513.59	75.52	300.98	157.57	-20.48
2041	0.00	0.00	4.80	0.00	0.00	0.00	4.80	22.85	39.16	555.23	73.54	413.18	135.15	-66.65
2042	0.00	0.00	102.50	0.00	0.00	0.00	102.50	23.36	42.06	534.04	71.74	441.58	145.77	-125.04
2043	0.00	0.00	147.49	0.00	0.00	0.00	147.49	24.10	39.16	519.13	70.40	463.47	154.11	-168.85
2044	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.42	39.16	516.26	70.04	463.55	161.07	-178.40
2045	0.00	0.00	4.82	0.00	0.00	0.00	4.82	24.45	46.09	566.49	68.44	581.66	138.84	-222.45
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.09	549.59	67.20	602.92	148.70	-269.23
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	47.84	533.90	65.84	632.59	158.54	-323.06
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	47.84	550.00	67.16	605.72	148.69	-271.58
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	47.84	550.00	67.16	605.72	148.69	-271.58
2050	0.00	0.00	0.00	0.00	10.18	0.00	10.18	24.45	46.97	550.00	67.16	605.72	148.69	-271.58
2051	0.00	0.00	0.00	0.00	10.23	0.00	10.23	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2052	0.00	0.00	0.00	0.00	10.24	0.00	10.24	24.45	49.00	550.00	67.16	605.72	148.69	-271.58
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2054	0.00	0.00	0.00	0.00	11.27	0.00	11.27	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2055	0.00	0.00	0.00	0.00	14.95	0.00	14.95	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2056	0.00	0.00	0.00	0.00	16.16	0.00	16.16	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2057	0.00	0.00	50.21	0.00	13.19	0.00	63.39	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2058	0.00	0.00	68.30	0.00	0.00	0.00	68.30	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2059	0.00	0.00	10.32	0.00	0.00	0.00	10.32	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2060	0.00	0.00	50.36	0.00	0.00	0.00	50.36	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2061	0.00	0.00	169.88	0.00	0.00	0.00	169.88	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2062	0.00	0.00	156.22	0.00	0.00	0.00	156.22	24.45	49.00	550.00	67.16	605.72	148.69	-271.58
2063	0.00	0.00	65.07	0.00	6.75	0.00	71.83	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2064	0.00	0.00	4.77	0.00	0.00	0.00	4.77	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2065	0.00	0.00	101.78	0.00	0.40	0.00	102.18	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2066	0.00	0.00	146.46	0.00	40.32	0.00	186.77	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2067	0.00	0.00	65.33	0.00	13.23	0.00	78.56	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2068	0.00	0.00	106.87	0.00	13.38	0.00	120.26	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2069	0.00	0.00	146.90	0.00	0.87	0.00	147.77	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2070	0.00	0.00	65.53	0.00	7.14	0.00	72.67	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2071	0.00	0.00	4.80	0.00	15.18	0.00	19.98	24.45	61.60	550.00	67.16	605.72	148.69	-271.58
2072	0.00	0.00	102.50	0.00	23.93	0.00	126.43	24.45	49.00	550.00	67.16	605.72	148.69	-271.58
2073	0.00	0.00	147.49	0.00	0.01	0.00	147.49	24.45	47.84	550.00	67.16	605.72	148.69	-271.58
2074	0.00	0.00	65.79	0.00	0.00	0.00	65.79	24.45	47.84	550.00	67.16	605.72	148.69	-271.58
2075	0.00	0.00	4.82	0.00	33.56	0.00	38.38	24.45	47.84	550.00	67.16	605.72	148.69	-271.58
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.97	550.00	67.16	605.72	148.69	-271.58
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2081	0.00	0.00	0.00	0.00	13.30	0.00	13.30	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	49.00	550.00	67.16	605.72	148.69	-271.58
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2087	0.00	0.00	50.21	0.00	9.87	0.00	60.07	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2088	0.00	0.00	68.30	0.00	0.00	0.00	68.30	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2089	0.00	0.00	10.32	0.00	0.00	0.00	10.32	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
2090	0.00	0.00	0.00	0.00	11.19	0.00	11.19	24.45	46.10	550.00	67.16	605.72	148.69	-271.58
Salvage Value	0.00	0.00	12.64	0.00	3.33	0.00	15.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	0.00	2338.90	668.65	0.00	192.87	0.00	3200.43	304.94	393.87	10243.67	1751.77	3843.68	2806.28	1841.94

Net Present Value: -2057

K22/C29

TABLE 312
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	99.88	0.00	0.00	9.87	0.00	139.48	0.70	0.00	371.50	103.01	29.23	113.00	126.25
2015	37.96	29.84	0.00	0.00	10.59	0.00	78.38	1.09	0.00	424.74	101.10	33.46	118.80	171.38
2016	11.04	25.92	0.00	0.00	10.65	0.00	47.61	1.33	0.00	439.57	99.26	35.69	121.95	182.66
2017	11.73	192.79	0.00	0.00	23.47	0.00	227.98	2.47	0.00	479.01	97.65	36.90	127.57	216.89
2018	11.76	374.90	0.00	0.00	6.97	0.00	393.63	4.44	0.00	455.49	94.85	40.21	133.34	187.10
2019	14.03	609.71	0.00	0.00	12.14	0.00	635.88	7.61	0.00	439.20	92.92	35.63	136.18	174.47
2020	151.48	677.02	0.00	0.00	22.10	0.00	850.59	11.87	0.00	460.62	92.33	31.28	144.59	192.42
2021	231.02	551.85	0.00	0.00	31.34	0.00	814.22	15.94	0.00	455.29	90.71	29.75	158.24	176.60
2022	244.38	319.56	0.00	0.00	37.12	0.00	601.07	18.94	13.01	463.78	90.69	33.78	146.18	193.13
2023	247.11	148.13	0.00	0.00	2.55	0.00	397.78	20.93	13.22	612.97	96.35	33.35	129.67	353.60
2024	665.53	51.07	0.00	0.00	2.54	0.00	719.14	24.53	12.93	636.46	96.20	37.59	138.68	363.98
2025	1052.78	0.00	0.00	0.00	30.99	0.00	1083.77	29.95	13.15	605.89	96.22	26.24	121.30	362.12
2026	942.49	0.00	0.00	0.00	16.22	0.00	958.71	34.74	12.97	584.35	94.34	26.60	127.30	336.10
2027	671.09	0.00	0.00	0.00	27.35	0.00	698.44	38.23	12.93	541.31	92.74	24.37	123.64	300.56
2028	463.42	0.00	0.00	0.00	47.55	0.00	510.97	40.79	12.69	508.52	90.85	26.78	129.38	261.51
2029	303.50	0.00	0.00	0.00	62.94	0.00	366.44	42.62	26.56	667.23	94.61	30.71	115.02	426.89
2030	111.46	0.00	0.00	0.00	73.72	0.00	185.18	43.55	26.78	886.24	101.77	29.87	105.64	648.96
2031	35.07	0.00	0.00	0.00	0.00	0.00	35.07	43.72	26.68	917.59	101.47	30.54	110.95	674.63
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	29.59	886.19	99.81	30.19	111.94	644.25
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.48	851.29	98.21	30.18	109.62	613.29
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.44	824.43	96.62	30.82	111.58	585.41
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	25.27	793.49	95.08	31.03	112.29	555.10
2036	0.00	0.00	0.36	0.00	0.00	0.00	0.36	43.72	24.90	760.41	93.54	30.98	113.35	522.54
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.72	24.97	726.99	92.02	31.14	115.18	488.65
2038	0.00	0.00	72.57	0.00	0.00	0.00	72.57	43.98	24.43	694.62	90.51	31.19	118.63	454.29
2039	0.00	0.00	90.86	0.00	6.75	0.00	97.62	44.35	27.15	683.42	89.16	30.55	135.63	428.08
2040	0.00	0.00	10.43	0.00	0.00	0.00	10.43	44.41	28.24	667.83	87.44	54.39	138.07	387.93
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	28.24	650.99	85.98	60.70	146.48	357.83
2042	0.00	0.00	51.01	0.00	0.00	0.00	51.01	44.66	31.13	637.74	84.58	62.59	160.16	330.41
2043	0.00	0.00	69.33	0.00	6.75	0.00	76.09	45.04	28.24	621.63	83.11	63.79	176.98	297.75
2044	0.00	0.00	61.55	0.00	0.00	0.00	61.55	45.35	32.22	606.64	81.65	98.38	173.42	253.18
2045	0.00	0.00	71.55	0.00	53.19	0.00	124.74	45.96	31.56	593.06	80.40	105.42	184.15	223.10
2046	0.00	0.00	10.50	0.00	0.00	0.00	10.50	46.02	35.56	610.71	80.04	104.38	194.08	232.20
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.30	567.06	77.84	139.72	200.84	148.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.30	590.28	79.43	116.51	193.03	201.32
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	40.20	590.28	79.43	116.51	193.03	201.32
2050	0.00	0.00	0.00	0.00	10.18	0.00	10.18	46.02	36.44	590.28	79.43	116.51	193.03	201.32
2051	0.00	0.00	0.00	0.00	10.23	0.00	10.23	46.02	35.57	590.28	79.43	116.51	193.03	201.32
2052	0.00	0.00	0.00	0.00	10.24	0.00	10.24	46.02	38.48	590.28	79.43	116.51	193.03	201.32
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2054	0.00	0.00	0.00	0.00	11.27	0.00	11.27	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2055	0.00	0.00	0.00	0.00	14.95	0.00	14.95	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2056	0.00	0.00	0.00	0.00	16.16	0.00	16.16	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2057	0.00	0.00	0.00	0.00	13.19	0.00	13.19	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2058	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2059	0.00	0.00	0.00	0.00	0.63	0.00	0.63	46.02	53.98	590.28	79.43	116.51	193.03	201.32
2060	0.00	0.00	0.00	0.00	7.54	0.00	7.54	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2061	0.00	0.00	0.00	0.00	3.77	0.00	3.77	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2062	0.00	0.00	0.00	0.00	6.28	0.00	6.28	46.02	38.48	590.28	79.43	116.51	193.03	201.32
2063	0.00	0.00	0.00	0.00	10.68	0.00	10.68	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2064	0.00	0.00	0.00	0.00	15.07	0.00	15.07	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2065	0.00	0.00	0.00	0.00	18.61	0.00	18.61	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2066	0.00	0.00	0.00	0.00	0.43	0.00	0.43	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2067	0.00	0.00	0.00	0.00	13.23	0.00	13.23	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2068	0.00	0.00	50.76	0.00	6.63	0.00	57.40	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2069	0.00	0.00	69.06	0.00	0.87	0.00	69.93	46.02	53.98	590.28	79.43	116.51	193.03	201.32
2070	0.00	0.00	10.43	0.00	7.14	0.00	17.58	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2071	0.00	0.00	0.00	0.00	15.18	0.00	15.18	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2072	0.00	0.00	50.97	0.00	23.93	0.00	74.90	46.02	53.98	590.28	79.43	116.51	193.03	201.32
2073	0.00	0.00	69.33	0.00	1.92	0.00	71.25	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2074	0.00	0.00	61.55	0.00	8.67	0.00	70.21	46.02	52.82	590.28	79.43	116.51	193.03	201.32
2075	0.00	0.00	69.47	0.00	23.45	0.00	92.92	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2076	0.00	0.00	10.50	0.00	12.45	0.00	22.95	46.02	51.95	590.28	79.43	116.51	193.03	201.32
2077	0.00	0.00	0.00	0.00	21.07	0.00	21.07	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2078	0.00	0.00	0.00	0.00	43.63	0.00	43.63	46.02	51.08	590.28	79.43	116.51	193.03	201.32
2079	0.00	0.00	0.00	0.00	47.87	0.00	47.87	46.02	38.48	590.28	79.43	116.51	193.03	201.32
2080	0.00	0.00	0.00	0.00	95.40	0.00	95.40	46.02	52.82	590.28	79.43	116.51	193.03	201.32
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	55.71	590.28	79.43	116.51	193.03	201.32
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	37.32	590.28	79.43	116.51	193.03	201.32
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	52.82	590.28	79.43	116.51	193.03	201.32
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	35.59	590.28	79.43	116.51	193.03	201.32
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	38.48	590.28	79.43	116.51	193.03	201.32
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.02	35.59	590.28	79.43	116.51	193.03	201.32
Salvage Value	10.71	0.00	4.07	0.00	7.38	0.00	22.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3033.41	2338.90	131.57	0.00	304.30	0.00	5808.18	577.37	364.53	11787.81	1869.66	1037.11	2873.54	6007.50

Net Present Value: -743

SCGT/C26

TABLE 313
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	371.50	103.01	29.23	113.00	126.25
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	424.74	101.10	33.46	118.81	171.37
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	440.11	99.26	35.68	121.95	183.21
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	480.41	97.64	36.87	127.53	218.36
2018	195.48	0.00	0.36	0.00	0.00	0.00	195.84	3.11	0.00	457.85	94.84	40.21	133.23	189.57
2019	233.41	0.00	0.00	0.00	0.00	0.00	233.41	4.28	0.00	441.28	92.91	35.63	136.08	176.67
2020	237.17	0.00	71.67	0.00	0.00	0.00	308.84	5.71	0.00	471.23	92.94	28.29	142.27	207.74
2021	651.87	0.00	89.63	0.00	6.75	0.00	748.25	9.35	0.00	462.55	91.19	26.65	155.37	189.35
2022	1043.45	0.00	10.25	0.00	0.48	0.00	1054.18	14.62	3.98	450.34	88.97	49.53	160.89	150.95
2023	934.14	0.00	0.00	0.00	0.96	0.00	935.10	19.29	3.98	430.30	86.62	62.59	171.97	109.13
2024	665.14	0.00	0.00	0.00	1.93	0.00	667.07	22.63	3.98	425.28	85.46	68.14	179.67	92.01
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	24.95	3.98	380.27	85.97	42.27	161.10	90.92
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	26.46	18.29	485.12	89.91	32.16	128.20	234.85
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	27.01	18.51	694.82	97.70	29.76	116.04	451.33
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	27.19	18.21	730.34	97.71	32.59	127.35	472.70
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.43	697.83	95.99	33.58	129.60	438.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.26	669.84	94.81	33.12	124.96	416.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	18.21	642.07	92.84	36.08	130.55	382.60
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.97	598.13	90.95	38.41	130.92	337.86
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.54	569.09	89.03	45.12	136.36	298.58
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.54	554.92	87.47	52.08	145.18	270.19
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.19	17.58	541.41	86.17	57.93	150.97	246.34
2036	0.00	0.00	50.66	0.00	0.00	0.00	50.66	27.44	20.30	534.51	85.10	58.51	160.21	230.69
2037	0.00	0.00	68.96	0.00	6.75	0.00	75.72	27.82	17.41	519.38	83.60	59.55	177.26	198.95
2038	0.00	0.00	10.41	0.00	0.00	0.00	10.41	27.87	21.39	505.83	82.11	91.92	175.48	156.33
2039	0.00	0.00	50.82	0.00	0.00	0.00	50.82	28.12	21.39	493.13	80.85	99.84	191.62	120.82
2040	0.00	0.00	71.20	0.00	53.19	0.00	124.39	28.73	21.39	483.39	79.52	99.23	213.12	91.52
2041	0.00	0.00	61.36	0.00	0.00	0.00	61.36	29.04	25.39	465.64	77.87	140.10	212.67	35.00
2042	0.00	0.00	69.26	0.00	0.00	0.00	69.26	29.39	24.73	447.67	76.54	157.67	220.50	-7.04
2043	0.00	0.00	61.48	0.00	0.00	0.00	61.48	29.70	28.71	438.44	75.23	176.69	234.75	-48.24
2044	0.00	0.00	69.40	0.00	44.75	0.00	114.15	30.27	28.71	424.19	73.94	179.05	259.56	-88.35
2045	0.00	0.00	10.49	0.00	0.00	0.00	10.49	30.32	32.72	413.09	72.61	245.68	243.96	-149.16
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	35.62	399.92	71.44	271.10	251.50	-194.12
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.73	386.31	70.13	276.12	280.64	-240.58
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.73	399.78	71.39	264.30	258.70	-194.62
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.74	399.78	71.39	264.30	258.70	-194.62
2050	0.00	0.00	49.86	0.00	9.87	0.00	59.72	30.32	32.75	399.78	71.39	264.30	258.70	-194.62
2051	0.00	0.00	67.83	0.00	9.87	0.00	77.69	30.32	34.49	399.78	71.39	264.30	258.70	-194.62
2052	0.00	0.00	10.25	0.00	9.87	0.00	20.11	30.32	34.50	399.78	71.39	264.30	258.70	-194.62
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	399.78	71.39	264.30	258.70	-194.62
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	399.78	71.39	264.30	258.70	-194.62
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	399.78	71.39	264.30	258.70	-194.62
2056	0.00	0.00	0.00	0.00	6.75	0.00	6.75	30.32	35.65	399.78	71.39	264.30	258.70	-194.62
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2066	0.00	0.00	50.66	0.00	0.00	0.00	50.66	30.32	35.65	399.78	71.39	264.30	258.70	-194.62
2067	0.00	0.00	68.92	0.00	0.00	0.00	68.92	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2068	0.00	0.00	10.41	0.00	0.00	0.00	10.41	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2069	0.00	0.00	50.82	0.00	0.00	0.00	50.82	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2070	0.00	0.00	69.13	0.00	0.00	0.00	69.13	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2071	0.00	0.00	61.36	0.00	0.00	0.00	61.36	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2072	0.00	0.00	69.26	0.00	7.24	0.00	76.50	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2073	0.00	0.00	61.48	0.00	0.96	0.00	62.45	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2074	0.00	0.00	69.40	0.00	1.93	0.00	71.33	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2075	0.00	0.00	10.49	0.00	44.23	0.00	54.72	30.32	48.25	399.78	71.39	264.30	258.70	-194.62
2076	0.00	0.00	0.00	0.00	1.93	0.00	1.93	30.32	35.65	399.78	71.39	264.30	258.70	-194.62
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	49.99	399.78	71.39	264.30	258.70	-194.62
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	34.50	399.78	71.39	264.30	258.70	-194.62
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	30.32	49.99	399.78	71.39	264.30	258.70	-194.62
2080	0.00	0.00	49.86	0.00	0.00	0.00	49.86	30.32	34.50	399.78	71.39	264.30	258.70	-194.62
2081	0.00	0.00	67.83	0.00	0.00	0.00	67.83	30.32	49.99	399.78	71.39	264.30	258.70	-194.62
2082	0.00	0.00	10.25	0.00	0.00	0.00	10.25	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	35.65	399.78	71.39	264.30	258.70	-194.62
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
2090	0.00	0.00	0.00	0.00	13.30	0.00	13.30	30.32	32.76	399.78	71.39	264.30	258.70	-194.62
Salvage Value	4.24	0.00	6.98	0.00	2.49	0.00	13.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	319.10	0.00	84.96	0.00	3953.84	387.64	293.52	9672.78	1780.93	1889.33	3441.45	2561.07

Net Present Value: -2074

CCGT/C26

TABLE 314
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Reference
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	371.50	103.01	29.23	113.00	126.25
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	424.74	101.10	33.46	118.81	171.37
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	440.11	99.26	35.68	121.95	183.21
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	480.41	97.64	36.87	127.53	218.36
2018	195.48	0.00	0.36	0.00	0.00	0.00	195.84	3.11	0.00	457.85	94.84	40.21	133.23	189.57
2019	233.41	0.00	100.17	0.00	0.00	0.00	333.58	4.78	0.00	441.28	92.91	35.63	136.08	176.67
2020	237.17	0.00	165.94	0.00	0.00	0.00	403.11	6.69	0.00	471.23	92.94	28.29	142.27	207.74
2021	651.87	0.00	86.10	0.00	6.75	0.00	744.73	10.30	0.00	472.78	91.95	23.51	152.56	204.76
2022	1043.45	0.00	4.71	0.00	0.48	0.00	1048.64	15.54	6.91	495.57	89.49	96.71	129.09	180.28
2023	934.14	0.00	0.00	0.00	0.96	0.00	935.10	20.22	6.91	487.20	87.45	111.41	137.47	150.87
2024	665.14	0.00	0.00	0.00	1.93	0.00	667.07	23.55	6.91	487.65	86.47	118.58	142.25	140.36
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	25.87	6.91	441.54	86.16	100.17	133.41	121.81
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	27.39	21.22	534.19	89.84	85.89	110.67	247.80
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	27.94	21.44	738.19	97.68	75.36	101.60	463.55
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	28.11	21.14	775.63	97.85	77.37	110.84	489.56
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.36	746.97	96.13	84.82	110.17	455.85
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.19	707.30	94.01	92.30	109.97	411.02
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	21.14	718.76	93.98	87.96	106.33	430.50
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.90	663.30	91.11	99.32	110.49	362.38
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.47	636.05	89.47	105.36	111.03	330.19
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.47	612.09	87.47	116.09	118.05	290.48
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	20.51	598.50	86.01	124.77	123.24	264.48
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.11	23.23	581.50	84.38	136.86	130.25	230.00
2037	0.00	0.00	50.71	0.00	0.00	0.00	50.71	28.37	20.34	579.37	83.66	141.12	133.42	221.17
2038	0.00	0.00	69.03	0.00	6.75	0.00	75.79	28.74	20.34	571.45	82.47	143.76	145.62	199.60
2039	0.00	0.00	10.42	0.00	0.00	0.00	10.42	28.80	24.32	555.47	80.71	172.56	157.53	144.68
2040	0.00	0.00	50.87	0.00	0.00	0.00	50.87	29.05	24.32	541.30	79.28	184.55	167.42	110.04
2041	0.00	0.00	71.27	0.00	53.19	0.00	124.46	29.66	24.32	527.29	77.98	192.58	179.89	76.84
2042	0.00	0.00	61.42	0.00	0.00	0.00	61.42	29.97	27.66	517.65	76.65	209.35	193.41	38.25
2043	0.00	0.00	69.33	0.00	0.00	0.00	69.33	30.32	27.66	498.50	75.25	237.04	194.15	-7.93
2044	0.00	0.00	10.48	0.00	0.00	0.00	10.48	30.37	31.64	484.88	73.94	261.61	202.58	-53.25
2045	0.00	0.00	51.12	0.00	0.00	0.00	51.12	30.62	31.64	469.64	72.62	269.60	221.57	-94.14
2046	0.00	0.00	69.54	0.00	44.75	0.00	114.29	31.20	34.55	461.69	71.73	268.75	239.28	-118.06
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	31.25	35.65	436.96	70.15	322.51	233.47	-189.16
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.66	456.10	71.50	286.95	231.44	-133.79
2049	0.00	0.00	100.17	0.00	9.87	0.00	110.03	31.25	35.66	456.10	71.50	286.95	231.44	-133.79
2050	0.00	0.00	144.13	0.00	9.87	0.00	154.00	31.25	35.66	456.10	71.50	286.95	231.44	-133.79
2051	0.00	0.00	64.30	0.00	9.87	0.00	74.16	31.25	37.41	456.10	71.50	286.95	231.44	-133.79
2052	0.00	0.00	4.71	0.00	9.87	0.00	14.57	31.25	37.41	456.10	71.50	286.95	231.44	-133.79
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.42	456.10	71.50	286.95	231.44	-133.79
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	456.10	71.50	286.95	231.44	-133.79
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	456.10	71.50	286.95	231.44	-133.79
2056	0.00	0.00	0.00	0.00	6.75	0.00	6.75	31.25	38.58	456.10	71.50	286.95	231.44	-133.79
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	38.58	456.10	71.50	286.95	231.44	-133.79
2067	0.00	0.00	50.71	0.00	0.00	0.00	50.71	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2068	0.00	0.00	68.99	0.00	0.00	0.00	68.99	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2069	0.00	0.00	10.42	0.00	0.00	0.00	10.42	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2070	0.00	0.00	50.87	0.00	0.00	0.00	50.87	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2071	0.00	0.00	69.19	0.00	0.00	0.00	69.19	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2072	0.00	0.00	61.42	0.00	0.48	0.00	61.90	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2073	0.00	0.00	69.33	0.00	7.72	0.00	77.05	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2074	0.00	0.00	10.48	0.00	1.93	0.00	12.40	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2075	0.00	0.00	51.12	0.00	4.34	0.00	55.46	31.25	51.18	456.10	71.50	286.95	231.44	-133.79
2076	0.00	0.00	69.54	0.00	41.82	0.00	111.36	31.25	38.58	456.10	71.50	286.95	231.44	-133.79
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	31.25	52.92	456.10	71.50	286.95	231.44	-133.79
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	37.43	456.10	71.50	286.95	231.44	-133.79
2079	0.00	0.00	100.17	0.00	0.00	0.00	100.17	31.25	52.92	456.10	71.50	286.95	231.44	-133.79
2080	0.00	0.00	144.13	0.00	0.00	0.00	144.13	31.25	37.43	456.10	71.50	286.95	231.44	-133.79
2081	0.00	0.00	64.30	0.00	33.56	0.00	97.86	31.25	52.92	456.10	71.50	286.95	231.44	-133.79
2082	0.00	0.00	4.71	0.00	0.00	0.00	4.71	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2084	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	38.58	456.10	71.50	286.95	231.44	-133.79
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.25	35.69	456.10	71.50	286.95	231.44	-133.79
Salvage Value	4.24	0.00	11.03	0.00	2.27	0.00	17.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	487.12	0.00	82.85	0.00	4119.75	400.97	328.31	10441.82	1783.74	2526.44	3062.03	3069.62

Net Present Value: -1779

Wind/C26

TABLE 315
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Reference
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.73	62.96	0.00	0.00	9.87	0.00	102.55	0.51	0.00	371.50	103.01	29.23	113.00	126.25
2015	37.96	0.00	0.00	0.00	9.87	0.00	47.82	0.75	0.00	424.74	101.10	33.46	118.82	171.36
2016	86.71	0.00	0.00	0.00	9.87	0.00	96.58	1.23	0.00	440.11	99.26	35.68	121.98	183.19
2017	169.88	0.00	0.00	0.00	9.87	0.00	179.74	2.13	0.00	480.42	97.64	36.87	127.52	218.38
2018	195.48	0.00	0.00	0.00	0.00	0.00	195.48	3.11	0.00	457.85	94.84	40.21	133.22	189.58
2019	233.41	0.00	0.00	0.00	0.00	0.00	233.41	4.28	0.00	441.28	92.91	35.63	136.09	176.66
2020	237.17	0.00	0.00	7.06	10.56	0.00	254.79	5.55	0.00	466.18	92.51	30.30	143.59	199.78
2021	651.87	0.00	0.00	215.62	17.59	0.00	885.08	9.98	0.00	457.68	90.76	29.26	156.43	181.23
2022	1043.45	0.00	0.00	219.66	21.59	0.00	1284.70	16.40	6.21	467.11	89.13	29.19	158.75	190.04
2023	934.14	0.00	0.00	212.59	11.52	0.00	1158.25	22.19	12.42	464.11	86.67	33.30	164.49	179.65
2024	665.14	0.00	0.00	4.04	5.45	0.00	674.63	25.57	18.63	468.43	84.78	34.04	170.99	178.62
2025	459.31	0.00	0.00	0.00	4.34	0.00	463.65	27.88	18.63	418.10	84.70	22.38	179.19	131.83
2026	300.81	0.00	0.00	0.00	1.93	0.00	302.74	29.40	32.93	560.78	88.67	26.58	127.31	318.21
2027	110.47	0.00	0.00	0.00	0.00	0.00	110.47	29.95	33.15	771.27	96.44	24.01	113.53	537.29
2028	34.76	0.00	0.00	0.00	0.00	0.00	34.76	30.12	32.86	799.11	96.24	26.17	123.68	553.02
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	33.07	768.49	94.59	26.56	126.14	521.19
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.90	747.48	93.54	25.94	123.30	504.69
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.85	731.40	92.11	26.86	126.01	486.42
2032	0.00	0.00	0.36	0.00	0.00	0.00	0.36	30.12	32.61	697.64	90.72	26.79	124.82	455.31
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.12	32.18	656.63	89.22	26.67	121.58	419.16
2034	0.00	0.00	72.37	0.00	0.00	0.00	72.37	30.38	32.18	624.16	87.77	26.83	123.42	386.14
2035	0.00	0.00	90.59	0.00	6.75	0.00	97.34	30.75	32.22	612.80	86.76	24.83	129.15	372.06
2036	0.00	0.00	61.06	0.00	0.00	0.00	61.06	31.06	38.93	588.86	84.68	46.18	135.78	322.22
2037	0.00	0.00	68.96	0.00	6.75	0.00	75.72	31.44	36.03	572.06	83.22	52.13	145.21	291.50
2038	0.00	0.00	10.41	0.00	0.00	0.00	10.41	31.49	40.02	563.55	81.96	67.77	151.76	262.06
2039	0.00	0.00	50.82	0.00	0.00	0.00	50.82	31.74	40.02	554.81	80.79	66.79	172.96	234.26
2040	0.00	0.00	71.20	7.06	53.19	0.00	131.45	32.39	40.02	533.18	79.11	86.16	179.06	188.85
2041	0.00	0.00	61.36	215.62	0.00	0.00	276.98	33.78	44.02	520.54	77.72	105.47	188.40	148.94
2042	0.00	0.00	69.26	219.66	0.00	0.00	288.92	35.22	43.36	505.54	76.43	110.34	202.90	115.87
2043	0.00	0.00	61.48	212.59	0.00	0.00	274.08	36.59	47.34	495.75	75.13	123.31	219.88	77.43
2044	0.00	0.00	69.40	4.04	44.75	0.00	118.18	37.18	47.34	474.30	73.77	155.30	217.55	27.67
2045	0.00	0.00	10.49	0.00	0.00	0.00	10.49	37.23	51.35	461.81	72.50	181.26	226.30	-18.25
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	54.25	446.54	71.25	185.00	248.48	-58.18
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.36	432.68	70.00	187.83	275.31	-100.47
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.36	447.01	71.25	184.70	250.03	-58.97
2049	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.37	447.01	71.25	184.70	250.03	-58.97
2050	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.38	447.01	71.25	184.70	250.03	-58.97
2051	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	53.12	447.01	71.25	184.70	250.03	-58.97
2052	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	53.13	447.01	71.25	184.70	250.03	-58.97
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	447.01	71.25	184.70	250.03	-58.97
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	447.01	71.25	184.70	250.03	-58.97
2055	0.00	0.00	0.00	0.00	2.64	0.00	2.64	37.23	53.13	447.01	71.25	184.70	250.03	-58.97
2056	0.00	0.00	0.00	0.00	4.40	0.00	4.40	37.23	54.28	447.01	71.25	184.70	250.03	-58.97
2057	0.00	0.00	0.00	0.00	5.28	0.00	5.28	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2058	0.00	0.00	0.00	0.00	2.64	0.00	2.64	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2059	0.00	0.00	0.00	0.00	0.88	0.00	0.88	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2060	0.00	0.00	0.00	7.06	0.00	0.00	7.06	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2061	0.00	0.00	0.00	215.62	0.00	0.00	215.62	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2062	0.00	0.00	0.00	219.66	0.00	0.00	219.66	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2063	0.00	0.00	0.00	212.59	0.00	0.00	212.59	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2064	0.00	0.00	50.56	4.04	0.00	0.00	54.60	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2065	0.00	0.00	68.78	0.00	0.00	0.00	68.78	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2066	0.00	0.00	61.06	0.00	0.00	0.00	61.06	37.23	54.28	447.01	71.25	184.70	250.03	-58.97
2067	0.00	0.00	68.92	0.00	0.00	0.00	68.92	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2068	0.00	0.00	10.41	0.00	0.00	0.00	10.41	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2069	0.00	0.00	50.82	0.00	0.00	0.00	50.82	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2070	0.00	0.00	69.13	0.00	14.67	0.00	83.80	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2071	0.00	0.00	61.36	0.00	13.19	0.00	74.56	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2072	0.00	0.00	69.26	0.00	23.07	0.00	92.33	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2073	0.00	0.00	61.48	0.00	8.88	0.00	70.37	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2074	0.00	0.00	69.40	0.00	4.57	0.00	73.97	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2075	0.00	0.00	10.49	0.00	44.23	0.00	54.72	37.23	66.88	447.01	71.25	184.70	250.03	-58.97
2076	0.00	0.00	0.00	0.00	1.93	0.00	1.93	37.23	54.28	447.01	71.25	184.70	250.03	-58.97
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	68.62	447.01	71.25	184.70	250.03	-58.97
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	53.13	447.01	71.25	184.70	250.03	-58.97
2079	0.00	0.00	0.00	0.00	33.56	0.00	33.56	37.23	68.62	447.01	71.25	184.70	250.03	-58.97
2080	0.00	0.00	0.00	7.06	0.00	0.00	7.06	37.23	53.13	447.01	71.25	184.70	250.03	-58.97
2081	0.00	0.00	0.00	215.62	0.00	0.00	215.62	37.23	68.62	447.01	71.25	184.70	250.03	-58.97
2082	0.00	0.00	0.00	219.66	0.00	0.00	219.66	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2083	0.00	0.00	0.00	212.59	0.00	0.00	212.59	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2084	0.00	0.00	0.00	4.04	9.87	0.00	13.90	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2085	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2086	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	54.28	447.01	71.25	184.70	250.03	-58.97
2087	0.00	0.00	0.00	0.00	9.87	0.00	9.87	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
2090	0.00	0.00	0.00	0.00	13.30	0.00	13.30	37.23	51.39	447.01	71.25	184.70	250.03	-58.97
Salvage Value	4.24	0.00	5.27	9.83	3.35	0.00	22.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.05%	3486.82	62.96	244.56	686.48	129.48	0.00	4610.30	447.54	505.89	10428.25	1774.80	1386.08	3309.98	3957.39

Net Present Value -1606

K19/C25/750MW (WPS Sale &Inv)

TABLE 316
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	3.71	273.08	1.37	0.00	358.24	101.24	28.78	111.56	116.66
2015	85.96	477.40	0.00	0.00	18.59	6.63	588.59	4.31	0.00	406.48	99.37	32.88	116.91	157.32
2016	179.08	632.15	0.00	0.00	25.44	16.86	853.53	8.58	0.00	421.54	97.56	35.11	120.12	168.74
2017	208.35	766.12	0.00	0.00	37.23	24.52	1036.22	13.76	0.00	454.19	95.60	37.61	127.04	193.93
2018	250.44	540.20	0.00	0.00	39.13	101.55	931.32	18.41	0.00	437.33	93.52	38.51	130.21	175.09
2019	256.44	386.37	0.00	0.00	49.83	83.68	776.33	22.30	12.78	471.97	93.46	35.97	130.92	211.62
2020	706.88	157.77	0.00	0.00	3.48	155.11	1023.24	27.41	44.08	743.40	100.59	28.16	149.83	464.81
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	33.57	42.24	812.89	101.21	30.70	165.27	515.71
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	38.77	40.92	815.51	100.07	30.71	170.12	514.60
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	42.60	39.11	776.92	97.80	30.33	175.50	473.29
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	45.43	37.57	750.59	95.59	33.47	184.95	436.58
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	47.52	50.01	840.45	100.09	29.55	138.22	572.59
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	48.63	48.49	1098.48	108.12	29.45	139.24	821.67
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	48.82	47.09	1143.10	108.03	28.82	153.34	852.91
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	46.10	1127.58	106.41	29.77	156.97	834.43
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	47.36	1099.01	104.53	29.84	161.29	803.35
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	42.28	1078.66	103.23	29.28	159.38	786.78
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	40.98	1066.18	101.61	29.88	164.57	770.11
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	39.52	1031.05	99.98	30.00	163.68	737.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	38.53	997.24	98.24	30.04	166.49	702.47
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	37.61	966.10	96.55	30.32	170.60	668.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	38.86	933.35	94.91	30.08	162.77	645.59
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	35.47	874.19	93.33	30.66	137.75	612.45
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	48.82	34.96	835.13	91.75	30.83	137.70	574.87
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.82	34.46	801.43	90.12	30.81	142.86	537.64
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	49.21	36.82	770.71	88.54	30.77	155.54	495.86
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	49.78	33.50	788.86	87.28	29.34	171.72	500.53
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	49.86	36.31	768.01	85.30	53.15	174.75	454.81
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	50.25	35.87	751.70	83.77	59.17	186.64	422.13
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	50.83	35.44	740.03	82.41	62.24	201.31	394.08
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	51.30	40.65	736.81	81.22	71.89	215.13	368.58
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	52.20	43.10	706.64	79.39	93.06	220.73	313.46
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	52.28	43.79	690.13	77.96	112.89	229.56	269.72
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	42.56	674.81	76.71	118.10	244.74	235.26
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	41.34	690.53	78.02	108.02	231.68	272.81
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	52.28	43.83	690.53	78.02	108.02	231.68	272.81
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	52.28	42.36	690.53	78.02	108.02	231.68	272.81
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	52.28	42.03	690.53	78.02	108.02	231.68	272.81
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	52.28	41.72	690.53	78.02	108.02	231.68	272.81
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	52.28	41.42	690.53	78.02	108.02	231.68	272.81
2054	0.00	0.00	0.00	0.00	17.32	18.17	35.50	52.28	41.12	690.53	78.02	108.02	231.68	272.81
2055	0.00	0.00	0.00	0.00	0.86	18.85	19.70	52.28	41.96	690.53	78.02	108.02	231.68	272.81
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	52.28	54.06	690.53	78.02	108.02	231.68	272.81
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	52.28	38.57	690.53	78.02	108.02	231.68	272.81
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	52.28	53.53	690.53	78.02	108.02	231.68	272.81
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	52.28	40.90	690.53	78.02	108.02	231.68	272.81
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	52.28	50.37	690.53	78.02	108.02	231.68	272.81
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	65.59	690.53	78.02	108.02	231.68	272.81
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	52.28	65.59	690.53	78.02	108.02	231.68	272.81
2065	0.00	0.00	0.00	0.00	8.50	4.10	12.60	52.28	37.99	690.53	78.02	108.02	231.68	272.81
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	52.28	65.59	690.53	78.02	108.02	231.68	272.81
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	52.28	65.59	690.53	78.02	108.02	231.68	272.81
2069	0.00	0.00	76.94	0.00	32.51	55.39	164.84	52.28	37.99	690.53	78.02	108.02	231.68	272.81
2070	0.00	0.00	105.09	0.00	2.62	57.44	165.15	52.28	52.08	690.53	78.02	108.02	231.68	272.81
2071	0.00	0.00	15.94	0.00	31.87	0.00	47.82	52.28	36.85	690.53	78.02	108.02	231.68	272.81
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	52.28	52.08	690.53	78.02	108.02	231.68	272.81
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	52.28	36.00	690.53	78.02	108.02	231.68	272.81
2074	0.00	0.00	95.07	0.00	49.15	0.00	144.22	52.28	50.37	690.53	78.02	108.02	231.68	272.81
2075	0.00	0.00	107.74	0.00	73.92	0.00	181.66	52.28	37.99	690.53	78.02	108.02	231.68	272.81
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	52.28	52.08	690.53	78.02	108.02	231.68	272.81
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	36.85	690.53	78.02	108.02	231.68	272.81
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	52.28	52.08	690.53	78.02	108.02	231.68	272.81
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	39.70	690.53	78.02	108.02	231.68	272.81
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	52.28	52.08	690.53	78.02	108.02	231.68	272.81
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	52.28	37.99	690.53	78.02	108.02	231.68	272.81
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	52.28	35.14	690.53	78.02	108.02	231.68	272.81
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	52.28	37.99	690.53	78.02	108.02	231.68	272.81
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	52.28	37.99	690.53	78.02	108.02	231.68	272.81
Salvage Value	7.48	0.00	21.73	0.00	34.06	15.84	79.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	322.69	0.00	545.81	377.72	8590.62	1165.64	974.39	21117.45	2597.27	1604.68	4998.85	11916.65

Net Present Value 1186

K19/C25/750MW

TABLE 317
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	5.19	274.56	1.37	0.00	364.12	101.24	28.76	111.11	123.01
2015	85.96	477.40	0.00	0.00	18.59	8.41	590.37	4.32	0.00	415.02	99.36	32.87	116.83	165.96
2016	179.08	632.15	0.00	0.00	25.44	17.62	854.30	8.60	0.00	429.97	97.55	35.07	119.93	177.41
2017	208.35	766.12	0.00	0.00	37.23	24.52	1036.22	13.78	0.00	464.09	95.60	37.63	126.83	204.02
2018	250.44	540.20	0.00	0.00	39.13	143.53	973.30	18.64	0.00	447.37	93.51	38.40	130.05	185.41
2019	256.44	386.37	0.00	0.00	49.83	98.87	791.51	22.60	12.78	481.40	93.45	35.95	130.68	221.33
2020	706.88	157.77	0.00	0.00	3.48	273.35	1141.47	28.31	47.15	766.23	100.58	28.13	148.43	489.08
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	34.47	45.41	829.69	101.21	30.89	164.36	533.23
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	39.67	44.12	831.42	100.07	30.71	169.06	531.57
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	43.49	42.17	793.80	97.79	30.33	174.25	491.44
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	46.33	40.51	767.66	95.58	33.54	183.79	454.75
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	48.41	52.82	858.53	100.08	29.60	135.82	593.03
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	49.53	51.19	1110.18	108.13	29.59	133.39	839.06
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	49.72	49.67	1144.12	108.05	28.59	139.27	868.21
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	48.57	1130.08	106.42	29.74	142.08	851.84
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	49.73	1104.57	104.53	29.81	146.70	823.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	44.54	1087.85	103.23	29.28	145.60	809.75
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	43.14	1080.52	101.60	30.01	150.89	798.01
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	41.59	1049.49	99.98	30.06	150.63	768.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	40.50	1018.96	98.26	29.98	153.05	737.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	39.49	992.33	96.57	30.16	157.71	707.89
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	40.66	923.95	94.98	30.38	132.17	666.43
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	37.19	887.46	93.34	30.70	132.40	631.02
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	49.72	36.60	855.78	91.73	30.75	136.15	597.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.72	36.04	823.03	90.12	30.75	140.89	561.27
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	50.10	38.33	793.05	88.54	30.83	153.33	520.35
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	50.67	34.95	791.41	87.27	29.35	169.18	505.62
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	50.75	37.70	765.96	85.30	53.15	172.39	455.12
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	51.14	37.20	750.27	83.77	59.17	184.73	422.60
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	51.72	36.72	738.81	82.41	62.24	199.60	394.56
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	52.20	41.87	735.96	81.22	71.89	213.63	369.23
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	53.10	44.26	705.67	79.39	93.06	219.35	313.87
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	53.18	44.90	689.14	77.96	112.89	228.17	270.13
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	43.62	673.50	76.71	118.10	243.12	235.57
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	42.35	689.44	78.02	108.02	230.21	273.19
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	53.18	44.80	689.44	78.02	108.02	230.21	273.19
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	53.18	43.28	689.44	78.02	108.02	230.21	273.19
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	53.18	42.91	689.44	78.02	108.02	230.21	273.19
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	53.18	42.55	689.44	78.02	108.02	230.21	273.19
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	53.18	42.21	689.44	78.02	108.02	230.21	273.19
2054	0.00	0.00	0.00	0.00	17.32	18.17	35.50	53.18	41.87	689.44	78.02	108.02	230.21	273.19
2055	0.00	0.00	0.00	0.00	0.86	18.85	19.70	53.18	42.68	689.44	78.02	108.02	230.21	273.19
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	53.18	54.74	689.44	78.02	108.02	230.21	273.19
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	53.18	39.21	689.44	78.02	108.02	230.21	273.19
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	53.18	54.14	689.44	78.02	108.02	230.21	273.19
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	53.18	41.48	689.44	78.02	108.02	230.21	273.19
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	53.18	50.37	689.44	78.02	108.02	230.21	273.19
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	65.59	689.44	78.02	108.02	230.21	273.19
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	53.18	65.59	689.44	78.02	108.02	230.21	273.19
2065	0.00	0.00	0.00	0.00	8.50	4.10	12.60	53.18	37.99	689.44	78.02	108.02	230.21	273.19
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	53.18	65.59	689.44	78.02	108.02	230.21	273.19
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	53.18	65.59	689.44	78.02	108.02	230.21	273.19
2069	0.00	0.00	76.94	0.00	32.51	55.39	164.84	53.18	37.99	689.44	78.02	108.02	230.21	273.19
2070	0.00	0.00	105.09	0.00	2.62	57.44	165.15	53.18	52.08	689.44	78.02	108.02	230.21	273.19
2071	0.00	0.00	15.94	0.00	31.87	0.00	47.82	53.18	36.85	689.44	78.02	108.02	230.21	273.19
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	53.18	52.08	689.44	78.02	108.02	230.21	273.19
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	53.18	36.00	689.44	78.02	108.02	230.21	273.19
2074	0.00	0.00	95.07	0.00	49.15	0.00	144.22	53.18	50.37	689.44	78.02	108.02	230.21	273.19
2075	0.00	0.00	107.74	0.00	73.92	0.00	181.66	53.18	37.99	689.44	78.02	108.02	230.21	273.19
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	53.18	52.08	689.44	78.02	108.02	230.21	273.19
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	36.85	689.44	78.02	108.02	230.21	273.19
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	53.18	52.08	689.44	78.02	108.02	230.21	273.19
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	39.70	689.44	78.02	108.02	230.21	273.19
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	53.18	52.08	689.44	78.02	108.02	230.21	273.19
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	53.18	37.99	689.44	78.02	108.02	230.21	273.19
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	53.18	35.14	689.44	78.02	108.02	230.21	273.19
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	53.18	37.99	689.44	78.02	108.02	230.21	273.19
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	53.18	37.99	689.44	78.02	108.02	230.21	273.19
Salvage Value	7.48	0.00	21.73	0.00	34.06	15.84	79.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	322.69	0.00	545.81	528.33	8741.23	1186.69	1010.79	21329.91	2597.27	1604.77	4885.86	12242.02

Net Present Value 1303

K19/Gas25/750MW (WPS Sale & INV)

TABLE 318
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	3.71	241.92	1.21	0.00	358.24	101.24	28.78	111.56	116.66
2015	0.00	477.40	0.00	0.00	18.59	6.63	502.63	3.72	0.00	406.49	99.38	32.87	116.89	157.35
2016	0.00	632.15	0.00	0.00	25.44	16.86	674.45	7.09	0.00	421.47	97.56	35.09	120.03	168.78
2017	0.00	766.12	0.00	0.00	37.23	24.52	827.87	11.23	0.00	454.59	95.60	37.59	126.98	194.41
2018	0.00	540.20	0.00	0.00	39.13	101.55	680.89	14.64	0.00	438.03	93.52	38.43	130.13	175.94
2019	0.00	386.37	0.00	0.00	46.36	83.68	516.41	17.22	12.78	473.13	93.46	35.95	130.84	212.88
2020	0.00	157.77	0.00	0.00	0.01	155.11	312.89	18.79	44.08	745.25	100.58	28.13	149.64	466.88
2021	0.00	54.75	0.35	0.00	0.00	0.00	55.10	19.06	42.24	816.24	101.21	30.69	165.06	519.27
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.06	40.92	819.13	100.07	30.64	169.82	518.60
2023	0.00	0.00	92.47	0.00	0.00	0.00	92.47	19.41	39.11	777.19	97.28	32.35	175.26	472.31
2024	0.00	0.00	189.86	0.00	9.12	0.00	198.97	20.30	37.57	755.28	95.25	35.33	183.57	441.13
2025	0.00	0.00	114.27	0.00	71.81	0.00	186.08	21.22	39.87	712.91	94.98	34.36	159.98	423.59
2026	0.00	0.00	86.91	0.00	0.00	0.00	86.91	21.66	42.07	718.94	93.68	41.19	172.48	411.58
2027	0.00	0.00	98.49	0.00	0.00	0.00	98.49	22.15	40.80	695.94	91.74	40.47	186.70	377.04
2028	0.00	0.00	14.94	0.00	0.00	0.00	14.94	22.22	43.51	673.36	89.43	61.56	194.28	328.09
2029	0.00	0.00	73.20	0.00	0.00	0.00	73.20	22.59	44.95	652.55	87.65	68.39	205.07	291.43
2030	0.00	0.00	99.98	0.00	60.41	0.00	160.39	23.39	39.91	647.89	86.58	75.06	212.02	274.22
2031	0.00	0.00	89.10	0.00	0.00	0.00	89.10	23.84	42.71	661.42	86.24	82.47	216.87	275.84
2032	0.00	0.00	100.98	0.00	0.00	0.00	100.98	24.34	41.62	631.49	83.87	99.79	229.78	218.05
2033	0.00	0.00	15.32	0.00	0.00	0.00	15.32	24.42	44.48	618.91	82.36	119.60	239.35	177.59
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	43.45	614.24	81.63	127.32	245.28	160.01
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	42.03	540.99	79.53	120.84	236.54	104.07
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	41.50	471.83	78.10	121.71	204.22	67.81
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	40.99	443.69	76.71	133.26	207.51	26.21
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.42	40.49	440.26	75.98	132.10	221.70	10.48
2039	0.00	0.00	158.62	0.00	0.00	0.00	158.62	25.21	42.85	407.90	74.06	161.90	231.68	-59.74
2040	0.00	0.00	229.15	0.00	0.00	0.00	229.15	26.36	39.54	401.95	72.75	179.93	241.22	-91.94
2041	0.00	0.00	102.63	0.00	9.12	0.00	111.75	26.92	39.08	421.84	73.03	179.61	240.05	-70.86
2042	0.00	0.00	7.55	0.00	0.00	0.00	7.55	26.95	45.44	486.12	70.79	288.46	233.04	-106.17
2043	0.00	0.00	78.50	0.00	0.00	0.00	78.50	27.35	45.01	456.15	69.07	310.91	246.21	-170.04
2044	0.00	0.00	107.21	0.00	60.41	0.00	167.62	28.18	46.30	427.29	67.47	334.90	258.12	-233.20
2045	0.00	0.00	51.14	0.00	0.00	0.00	51.14	28.44	49.83	412.16	66.18	366.91	267.66	-288.60
2046	0.00	0.00	47.63	0.00	0.00	0.00	47.63	28.68	49.44	394.53	64.99	392.94	277.88	-341.29
2047	0.00	0.00	7.23	0.00	0.00	0.00	7.23	28.71	49.62	386.52	64.22	408.99	289.88	-376.57
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	48.40	397.73	65.13	389.61	278.47	-335.48
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	28.71	50.90	397.73	65.13	389.61	278.47	-335.48
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	28.71	47.72	397.73	65.13	389.61	278.47	-335.48
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	28.71	47.40	397.73	65.13	389.61	278.47	-335.48
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	28.71	47.08	397.73	65.13	389.61	278.47	-335.48
2053	0.00	0.00	71.04	0.00	20.19	18.17	109.40	28.71	46.77	397.73	65.13	389.61	278.47	-335.48
2054	0.00	0.00	168.43	0.00	16.47	18.17	203.07	28.71	46.47	397.73	65.13	389.61	278.47	-335.48
2055	0.00	0.00	112.23	0.00	0.00	18.85	131.08	28.71	46.18	397.73	65.13	389.61	278.47	-335.48
2056	0.00	0.00	86.91	0.00	0.00	0.00	86.91	28.71	61.13	397.73	65.13	389.61	278.47	-335.48
2057	0.00	0.00	98.49	0.00	0.00	0.00	98.49	28.71	45.63	397.73	65.13	389.61	278.47	-335.48
2058	0.00	0.00	14.94	0.00	0.00	0.00	14.94	28.71	60.60	397.73	65.13	389.61	278.47	-335.48
2059	0.00	0.00	73.20	0.00	9.12	0.00	82.32	28.71	47.96	397.73	65.13	389.61	278.47	-335.48
2060	0.00	0.00	99.98	0.00	53.86	0.00	153.83	28.71	57.43	397.73	65.13	389.61	278.47	-335.48
2061	0.00	0.00	89.10	0.00	0.00	0.00	89.10	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2062	0.00	0.00	100.98	0.00	0.00	0.00	100.98	28.71	57.43	397.73	65.13	389.61	278.47	-335.48
2063	0.00	0.00	15.32	0.00	0.00	0.00	15.32	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2064	0.00	0.00	0.00	0.00	10.23	2.05	12.29	28.71	57.43	397.73	65.13	389.61	278.47	-335.48
2065	0.00	0.00	0.00	0.00	53.80	4.10	57.91	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2066	0.00	0.00	0.00	0.00	1.02	12.31	13.33	28.71	57.43	397.73	65.13	389.61	278.47	-335.48
2067	0.00	0.00	0.00	0.00	8.86	18.46	27.32	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	28.71	57.43	397.73	65.13	389.61	278.47	-335.48
2069	0.00	0.00	158.62	0.00	29.89	55.39	243.90	28.71	45.05	397.73	65.13	389.61	278.47	-335.48
2070	0.00	0.00	229.15	0.00	0.01	57.44	286.60	28.71	43.92	397.73	65.13	389.61	278.47	-335.48
2071	0.00	0.00	102.63	0.00	0.00	0.00	102.63	28.71	43.92	397.73	65.13	389.61	278.47	-335.48
2072	0.00	0.00	7.55	0.00	0.00	0.00	7.55	28.71	43.92	397.73	65.13	389.61	278.47	-335.48
2073	0.00	0.00	78.50	0.00	0.00	0.00	78.50	28.71	43.06	397.73	65.13	389.61	278.47	-335.48
2074	0.00	0.00	107.21	0.00	0.00	0.00	107.21	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2075	0.00	0.00	51.14	0.00	17.95	0.00	69.09	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2076	0.00	0.00	47.63	0.00	9.12	0.00	56.75	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2077	0.00	0.00	7.23	0.00	0.00	0.00	7.23	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	28.71	45.05	397.73	65.13	389.61	278.47	-335.48
2080	0.00	0.00	0.00	0.00	15.10	0.00	15.10	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2083	0.00	0.00	71.04	0.00	0.00	0.00	71.04	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2084	0.00	0.00	168.43	0.00	10.41	0.67	179.51	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2085	0.00	0.00	112.23	0.00	10.09	1.35	123.67	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2086	0.00	0.00	86.91	0.00	24.42	4.04	115.36	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2087	0.00	0.00	98.49	0.00	28.37	6.06	132.92	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2088	0.00	0.00	14.94	0.00	20.19	18.17	53.30	28.71	42.21	397.73	65.13	389.61	278.47	-335.48
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	28.71	45.05	397.73	65.13	389.61	278.47	-335.48
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	28.71	45.05	397.73	65.13	389.61	278.47	-335.48
Salvage Value	0.00	0.00	69.00	0.00	18.88	15.84	103.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1282.78	0.00	357.34	377.72	4957.29	621.82	1020.30	14772.73	2334.79	4945.71	5966.11	1526.12

Net Present Value -5073

K19/C31/750MW

TABLE 319
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	217.56	0.00	0.00	20.64	5.19	273.93	1.37	0.00	364.12	101.24	28.76	111.11	123.01
2015	38.54	477.40	0.00	0.00	18.59	8.41	542.95	4.08	0.00	415.02	99.36	32.87	116.83	165.96
2016	10.47	632.15	0.00	0.00	25.44	17.62	685.69	7.51	0.00	429.97	97.55	35.08	119.91	177.42
2017	10.54	766.12	0.00	0.00	37.23	24.52	838.40	11.70	0.00	464.64	95.59	37.63	126.80	204.62
2018	12.52	540.20	0.00	0.00	39.13	143.53	735.39	15.38	0.00	448.05	93.50	38.39	129.98	186.18
2019	12.59	386.37	0.00	0.00	46.36	98.87	544.19	18.10	12.78	482.55	93.44	36.00	130.67	222.44
2020	12.67	157.77	0.00	0.00	0.01	273.35	443.79	20.32	47.15	768.21	100.57	28.19	148.21	491.24
2021	16.02	54.75	0.00	0.00	0.00	0.00	70.77	20.68	45.41	832.49	101.20	30.82	163.98	536.50
2022	162.04	0.00	0.00	0.00	0.00	0.00	162.04	21.49	44.12	835.52	100.08	30.66	168.80	535.98
2023	247.17	0.00	0.00	0.00	0.00	0.00	247.17	22.72	42.17	791.90	97.17	32.75	174.57	487.40
2024	268.52	0.00	0.00	0.00	0.00	0.00	268.52	24.06	40.51	768.83	95.05	36.16	184.10	453.51
2025	273.67	0.00	0.00	0.00	3.47	0.00	277.14	25.45	38.77	726.85	95.00	26.02	167.05	438.77
2026	740.31	0.00	0.00	0.00	3.47	0.00	743.78	29.17	36.92	707.21	93.11	26.77	185.31	402.03
2027	1175.50	0.00	0.00	0.00	42.16	0.00	1217.66	35.26	35.54	654.18	91.26	25.33	178.67	358.93
2028	1055.42	0.00	0.00	0.00	21.87	0.00	1077.29	40.64	34.22	628.52	89.68	26.29	194.40	318.15
2029	753.68	0.00	0.00	0.00	36.80	0.00	790.48	44.60	35.55	607.20	88.09	27.07	215.61	276.43
2030	521.97	0.00	0.00	0.00	63.72	0.00	585.69	47.52	30.41	599.97	86.78	27.60	233.91	251.68
2031	342.84	0.00	0.00	0.00	85.37	0.00	428.22	49.67	43.23	720.18	90.74	31.91	150.70	446.84
2032	126.27	0.00	0.00	0.00	100.61	0.00	226.89	50.80	42.25	961.90	97.91	31.40	139.96	692.63
2033	39.85	0.00	0.00	0.00	0.00	0.00	39.85	51.00	40.96	1024.02	98.34	30.76	153.84	741.09
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	40.05	992.47	96.57	30.15	157.65	708.10
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	38.37	922.80	94.97	30.18	132.02	665.62
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	37.71	887.48	93.34	30.88	132.55	630.71
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	51.00	36.95	856.38	91.74	30.82	136.24	597.59
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.00	36.03	823.12	90.12	30.74	140.87	561.40
2039	0.00	0.00	98.37	0.00	0.00	0.00	98.37	51.38	38.39	793.15	88.55	30.81	153.34	520.46
2040	0.00	0.00	126.52	0.00	9.12	0.00	135.64	51.95	35.12	791.42	87.27	29.34	169.18	505.64
2041	0.00	0.00	15.94	0.00	0.00	0.00	15.94	52.03	41.20	765.95	85.30	53.15	172.35	455.15
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	52.43	37.85	750.27	83.77	59.17	184.68	422.65
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	53.00	37.36	738.81	82.41	62.24	199.55	394.61
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	53.48	42.52	735.96	81.22	71.89	213.64	369.22
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	54.38	42.06	705.67	79.39	93.06	219.34	313.88
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	54.46	45.55	689.14	77.96	112.89	228.19	270.11
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	43.62	673.50	76.71	118.10	243.09	235.61
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	42.35	689.44	78.02	108.02	230.20	273.20
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	54.46	44.80	689.44	78.02	108.02	230.20	273.20
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	54.46	41.57	689.44	78.02	108.02	230.20	273.20
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	54.46	44.05	689.44	78.02	108.02	230.20	273.20
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	54.46	40.84	689.44	78.02	108.02	230.20	273.20
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	54.46	40.50	689.44	78.02	108.02	230.20	273.20
2054	0.00	0.00	0.00	0.00	16.47	18.17	34.64	54.46	40.16	689.44	78.02	108.02	230.20	273.20
2055	0.00	0.00	0.00	0.00	0.00	18.85	18.85	54.46	39.83	689.44	78.02	108.02	230.20	273.20
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	56.45	689.44	78.02	108.02	230.20	273.20
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	40.92	689.44	78.02	108.02	230.20	273.20
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	55.85	689.44	78.02	108.02	230.20	273.20
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	43.18	689.44	78.02	108.02	230.20	273.20
2060	0.00	0.00	0.00	0.00	0.86	0.00	0.86	54.46	52.08	689.44	78.02	108.02	230.20	273.20
2061	0.00	0.00	0.00	0.00	0.86	0.00	0.86	54.46	37.99	689.44	78.02	108.02	230.20	273.20
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2063	0.00	0.00	0.00	0.00	5.14	0.00	5.14	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2064	0.00	0.00	0.00	0.00	18.81	2.05	20.86	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2065	0.00	0.00	0.00	0.00	23.07	4.10	27.17	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2066	0.00	0.00	0.00	0.00	21.59	12.31	33.90	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2067	0.00	0.00	0.00	0.00	33.71	18.46	52.18	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2068	0.00	0.00	0.00	0.00	18.95	55.39	74.34	54.46	65.59	689.44	78.02	108.02	230.20	273.20
2069	0.00	0.00	76.94	0.00	29.89	55.39	162.23	54.46	37.99	689.44	78.02	108.02	230.20	273.20
2070	0.00	0.00	105.09	0.00	0.01	57.44	162.54	54.46	52.08	689.44	78.02	108.02	230.20	273.20
2071	0.00	0.00	15.94	0.00	0.00	0.00	15.94	54.46	39.70	689.44	78.02	108.02	230.20	273.20
2072	0.00	0.00	78.10	0.00	0.00	0.00	78.10	54.46	52.08	689.44	78.02	108.02	230.20	273.20
2073	0.00	0.00	106.67	0.00	0.00	0.00	106.67	54.46	36.00	689.44	78.02	108.02	230.20	273.20
2074	0.00	0.00	95.07	0.00	0.00	0.00	95.07	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2075	0.00	0.00	107.74	0.00	11.73	0.00	119.47	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2076	0.00	0.00	16.34	0.00	2.61	0.00	18.96	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2077	0.00	0.00	0.00	0.00	31.87	0.00	31.87	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2078	0.00	0.00	0.00	0.00	25.85	0.00	25.85	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2079	0.00	0.00	0.00	0.00	28.23	0.00	28.23	54.46	37.99	689.44	78.02	108.02	230.20	273.20
2080	0.00	0.00	0.00	0.00	103.00	0.00	103.00	54.46	50.37	689.44	78.02	108.02	230.20	273.20
2081	0.00	0.00	0.00	0.00	64.80	0.00	64.80	54.46	37.99	689.44	78.02	108.02	230.20	273.20
2082	0.00	0.00	0.00	0.00	75.76	0.00	75.76	54.46	52.08	689.44	78.02	108.02	230.20	273.20
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.46	36.85	689.44	78.02	108.02	230.20	273.20
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	54.46	52.08	689.44	78.02	108.02	230.20	273.20
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	54.46	36.85	689.44	78.02	108.02	230.20	273.20
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	54.46	52.08	689.44	78.02	108.02	230.20	273.20
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2088	0.00	0.00	0.00	0.00	20.19	18.17	38.36	54.46	35.14	689.44	78.02	108.02	230.20	273.20
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	54.46	37.99	689.44	78.02	108.02	230.20	273.20
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	54.46	37.99	689.44	78.02	108.02	230.20	273.20
Salvage Value	55.10	0.00	21.73	0.00	38.18	15.84	130.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3753.27	2939.45	322.69	0.00	485.48	528.33	8029.23	1083.29	953.49	19496.98	2534.21	1599.33	5089.34	10274.10

Net Present Value 208

K19/Gas31/750MW

TABLE 320
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	5.19	243.40	1.22	0.00	364.12	101.24	28.76	111.11	123.01
2015	0.00	477.40	0.00	0.00	18.59	8.41	504.40	3.74	0.00	415.02	99.36	32.87	116.83	165.96
2016	0.00	632.15	0.00	0.00	25.44	17.62	675.22	7.12	0.00	429.97	97.55	35.08	119.91	177.42
2017	0.00	766.12	0.00	0.00	37.23	24.52	827.87	11.25	0.00	464.64	95.59	37.63	126.80	204.62
2018	0.00	540.20	0.00	0.00	39.13	143.53	722.87	14.87	0.00	448.05	93.50	38.39	129.98	186.18
2019	0.00	386.37	0.00	0.00	46.36	98.87	531.59	17.53	12.78	482.55	93.44	36.00	130.67	222.44
2020	0.00	157.77	0.00	0.00	0.01	273.35	431.12	19.68	47.15	768.21	100.57	28.19	148.21	491.24
2021	0.00	54.75	0.00	0.00	0.00	0.00	54.75	19.96	45.41	832.49	101.20	30.82	163.98	536.50
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	44.12	835.43	100.08	30.69	168.80	535.85
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	42.17	792.58	97.17	32.75	174.60	488.06
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	40.51	770.14	95.06	36.18	184.09	454.80
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	38.77	730.07	94.99	26.04	167.86	441.18
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.96	36.92	713.62	93.10	26.95	187.32	406.25
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	19.96	35.54	662.27	91.24	25.40	180.47	365.17
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	19.96	34.22	640.43	89.66	26.31	198.25	326.21
2029	0.00	0.00	167.83	0.00	0.00	0.00	167.83	20.69	35.55	616.60	88.14	26.71	216.11	285.64
2030	0.00	0.00	294.95	0.00	18.24	0.00	313.19	22.15	30.41	618.20	87.57	23.63	227.51	279.48
2031	0.00	0.00	132.85	0.00	71.81	0.00	204.66	23.16	37.01	606.55	85.41	55.69	193.05	272.39
2032	0.00	0.00	89.55	0.00	0.00	0.00	89.55	23.61	39.74	593.40	83.86	70.99	201.58	236.96
2033	0.00	0.00	101.48	0.00	0.00	0.00	101.48	24.12	38.59	576.03	82.43	77.83	212.12	203.66
2034	0.00	0.00	15.39	0.00	0.00	0.00	15.39	24.19	41.38	578.06	81.65	84.93	221.84	189.64
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.19	39.87	499.99	79.57	102.56	193.13	124.73
2036	0.00	0.00	156.26	0.00	0.00	0.00	156.26	24.97	39.26	471.94	78.15	112.05	197.07	84.65
2037	0.00	0.00	225.75	0.00	0.00	0.00	225.75	26.10	38.68	453.77	76.85	122.83	205.73	48.37
2038	0.00	0.00	101.11	0.00	60.41	0.00	161.52	26.91	38.12	464.87	76.76	115.82	217.96	54.34
2039	0.00	0.00	7.44	0.00	0.00	0.00	7.44	26.95	47.22	529.94	74.52	238.26	202.09	15.06
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.95	43.85	501.96	72.65	256.41	215.79	-42.90
2041	0.00	0.00	77.72	0.00	0.00	0.00	77.72	27.34	43.33	479.82	71.21	273.36	226.88	-91.62
2042	0.00	0.00	267.15	0.00	0.00	0.00	267.15	28.67	42.83	459.10	69.87	292.46	236.96	-140.20
2043	0.00	0.00	248.71	0.00	0.00	0.00	248.71	29.91	46.26	453.15	69.02	310.21	245.80	-171.88
2044	0.00	0.00	104.18	0.00	60.41	0.00	164.59	30.74	47.51	456.46	68.72	300.86	261.99	-175.11
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.78	53.86	530.46	66.77	445.17	232.68	-214.16
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	53.43	509.64	65.57	461.02	244.50	-261.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	52.15	487.05	64.34	485.22	253.07	-315.59
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	50.88	509.05	65.56	463.80	243.42	-263.73
2049	0.00	0.00	0.00	0.00	10.41	0.67	11.08	30.78	53.33	509.05	65.56	463.80	243.42	-263.73
2050	0.00	0.00	0.00	0.00	10.09	1.35	11.44	30.78	50.10	509.05	65.56	463.80	243.42	-263.73
2051	0.00	0.00	0.00	0.00	24.42	4.04	28.46	30.78	49.74	509.05	65.56	463.80	243.42	-263.73
2052	0.00	0.00	0.00	0.00	28.37	6.06	34.42	30.78	49.38	509.05	65.56	463.80	243.42	-263.73
2053	0.00	0.00	0.00	0.00	20.19	18.17	38.36	30.78	49.03	509.05	65.56	463.80	243.42	-263.73
2054	0.00	0.00	0.00	0.00	16.47	18.17	34.64	30.78	48.69	509.05	65.56	463.80	243.42	-263.73
2055	0.00	0.00	0.00	0.00	0.00	18.85	18.85	30.78	48.36	509.05	65.56	463.80	243.42	-263.73
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	63.27	509.05	65.56	463.80	243.42	-263.73
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	47.74	509.05	65.56	463.80	243.42	-263.73
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	62.67	509.05	65.56	463.80	243.42	-263.73
2059	0.00	0.00	146.40	0.00	0.00	0.00	146.40	30.78	50.00	509.05	65.56	463.80	243.42	-263.73
2060	0.00	0.00	273.52	0.00	0.00	0.00	273.52	30.78	58.90	509.05	65.56	463.80	243.42	-263.73
2061	0.00	0.00	130.81	0.00	0.00	0.00	130.81	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2062	0.00	0.00	89.55	0.00	0.00	0.00	89.55	30.78	58.90	509.05	65.56	463.80	243.42	-263.73
2063	0.00	0.00	101.48	0.00	0.00	0.00	101.48	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2064	0.00	0.00	15.39	0.00	10.23	2.05	27.68	30.78	58.90	509.05	65.56	463.80	243.42	-263.73
2065	0.00	0.00	0.00	0.00	26.73	4.10	30.84	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2066	0.00	0.00	156.26	0.00	54.88	12.31	223.45	30.78	58.90	509.05	65.56	463.80	243.42	-263.73
2067	0.00	0.00	225.75	0.00	8.86	18.46	253.07	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2068	0.00	0.00	101.11	0.00	18.95	55.39	175.44	30.78	58.90	509.05	65.56	463.80	243.42	-263.73
2069	0.00	0.00	7.44	0.00	29.89	55.39	92.72	30.78	46.52	509.05	65.56	463.80	243.42	-263.73
2070	0.00	0.00	0.00	0.00	0.01	57.44	57.45	30.78	45.38	509.05	65.56	463.80	243.42	-263.73
2071	0.00	0.00	77.72	0.00	0.00	0.00	77.72	30.78	45.38	509.05	65.56	463.80	243.42	-263.73
2072	0.00	0.00	267.15	0.00	0.00	0.00	267.15	30.78	45.38	509.05	65.56	463.80	243.42	-263.73
2073	0.00	0.00	248.71	0.00	45.31	0.00	294.01	30.78	44.53	509.05	65.56	463.80	243.42	-263.73
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2075	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	30.78	46.52	509.05	65.56	463.80	243.42	-263.73
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2081	0.00	0.00	0.00	0.00	17.95	0.00	17.95	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2084	0.00	0.00	0.00	0.00	10.41	0.67	11.08	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2085	0.00	0.00	0.00	0.00	10.09	1.35	11.44	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2086	0.00	0.00	0.00	0.00	24.42	4.04	28.46	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2087	0.00	0.00	0.00	0.00	28.37	6.06	34.42	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2088	0.00	0.00	0.00	0.00	35.29	18.17	53.46	30.78	43.67	509.05	65.56	463.80	243.42	-263.73
2089	0.00	0.00	0.00	0.00	16.47	18.17	34.64	30.78	46.52	509.05	65.56	463.80	243.42	-263.73
2090	0.00	0.00	0.00	0.00	0.00	18.85	18.85	30.78	46.52	509.05	65.56	463.80	243.42	-263.73
Salvage Value	0.00	0.00	41.11	0.00	20.74	15.84	77.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1280.02	0.00	333.95	528.33	5081.75	640.64	1017.33	15798.59	2338.07	5478.29	5578.11	2404.12

Net Present Value -4336

K19/C25/250MW

TABLE 321
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.16	217.56	0.00	0.00	20.64	3.90	273.27	1.38	0.00	364.12	101.24	28.76	111.11	123.01
2015	85.96	477.40	0.00	0.00	18.59	2.67	584.63	4.30	0.00	415.02	99.36	32.87	116.83	165.96
2016	179.08	632.15	0.00	0.00	25.44	3.89	840.56	8.51	0.00	429.97	97.55	35.07	119.93	177.41
2017	208.35	766.12	0.00	0.00	37.23	5.84	1017.53	13.59	0.00	464.09	95.60	37.63	126.83	204.02
2018	250.44	540.20	0.00	0.00	39.13	17.51	847.28	17.83	0.00	443.29	92.93	41.10	132.18	177.08
2019	256.44	386.37	0.00	0.00	49.83	17.51	710.15	21.38	12.78	472.56	92.58	40.85	132.74	206.39
2020	706.88	157.77	0.00	0.00	3.48	18.16	886.28	25.81	12.99	714.03	100.92	29.10	126.26	457.75
2021	1134.80	54.75	0.00	0.00	42.16	0.00	1231.71	31.97	12.75	757.29	101.61	29.64	133.34	492.69
2022	1018.88	0.00	0.00	0.00	21.87	0.00	1040.75	37.17	12.97	743.63	99.74	30.76	139.16	473.99
2023	727.59	0.00	0.00	0.00	36.80	0.00	764.39	41.00	12.80	725.53	97.56	30.53	152.59	444.84
2024	503.90	0.00	0.00	0.00	63.72	0.00	567.62	43.83	12.75	713.09	95.28	33.65	170.08	414.08
2025	330.97	0.00	0.00	0.00	85.37	0.00	416.35	45.92	26.59	792.09	99.89	29.94	115.54	546.72
2026	121.90	0.00	0.00	0.00	100.61	0.00	222.51	47.03	26.40	1015.31	107.47	29.11	111.05	767.67
2027	38.47	0.00	0.00	0.00	0.00	0.00	38.47	47.22	26.29	1026.11	106.81	27.56	115.06	776.67
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	26.56	1009.31	105.10	28.75	118.34	757.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	29.04	983.31	103.34	29.01	120.80	730.16
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	25.13	967.62	102.09	28.69	119.91	716.92
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.96	953.98	100.51	29.32	122.63	701.52
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.60	924.64	98.94	29.56	123.08	673.05
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.67	887.74	97.32	29.76	119.94	640.72
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	24.78	857.78	95.71	30.02	121.98	610.07
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	26.81	831.33	94.12	30.28	118.26	588.67
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	47.22	23.97	798.92	92.58	30.72	119.55	556.06
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.22	23.97	765.06	91.04	30.68	121.46	521.87
2038	0.00	0.00	97.99	0.00	0.00	0.00	97.99	47.60	23.97	729.67	89.52	30.70	124.09	485.35
2039	0.00	0.00	125.99	0.00	9.12	0.00	135.11	48.17	26.81	718.53	88.35	29.06	137.85	463.27
2040	0.00	0.00	15.86	0.00	0.00	0.00	15.86	48.25	27.88	697.50	86.36	51.91	144.14	415.09
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	27.23	680.68	84.87	58.17	153.65	384.00
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	48.64	27.23	667.32	83.55	61.69	163.52	358.55
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	49.22	27.23	654.28	82.18	61.68	180.34	330.08
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	49.70	32.86	638.10	80.63	93.39	180.39	283.69
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	50.59	35.70	619.43	79.25	102.77	191.18	246.24
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	50.68	36.78	606.69	77.90	116.80	203.86	208.14
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.93	587.98	76.52	118.46	223.28	169.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.08	604.70	77.89	112.68	206.10	208.03
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	50.68	37.92	604.70	77.89	112.68	206.10	208.03
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	50.68	36.79	604.70	77.89	112.68	206.10	208.03
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	50.68	36.80	604.70	77.89	112.68	206.10	208.03
2052	0.00	0.00	0.00	0.00	28.37	1.44	29.81	50.68	36.80	604.70	77.89	112.68	206.10	208.03
2053	0.00	0.00	0.00	0.00	20.19	4.33	24.51	50.68	36.81	604.70	77.89	112.68	206.10	208.03
2054	0.00	0.00	0.00	0.00	17.32	4.33	21.65	50.68	36.81	604.70	77.89	112.68	206.10	208.03
2055	0.00	0.00	0.00	0.00	0.86	4.49	5.34	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2056	0.00	0.00	0.00	0.00	10.28	0.00	10.28	50.68	50.33	604.70	77.89	112.68	206.10	208.03
2057	0.00	0.00	0.00	0.00	5.14	0.00	5.14	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2058	0.00	0.00	0.00	0.00	8.57	0.00	8.57	50.68	50.33	604.70	77.89	112.68	206.10	208.03
2059	0.00	0.00	0.00	0.00	14.57	0.00	14.57	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2060	0.00	0.00	0.00	0.00	20.57	0.00	20.57	50.68	50.33	604.70	77.89	112.68	206.10	208.03
2061	0.00	0.00	0.00	0.00	24.85	0.00	24.85	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	65.55	604.70	77.89	112.68	206.10	208.03
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2064	0.00	0.00	0.00	0.00	10.23	3.74	13.98	50.68	65.55	604.70	77.89	112.68	206.10	208.03
2065	0.00	0.00	0.00	0.00	8.50	2.35	10.85	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2066	0.00	0.00	0.00	0.00	1.02	2.93	3.95	50.68	65.55	604.70	77.89	112.68	206.10	208.03
2067	0.00	0.00	0.00	0.00	8.86	4.39	13.25	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2068	0.00	0.00	76.56	0.00	18.95	13.18	108.69	50.68	65.55	604.70	77.89	112.68	206.10	208.03
2069	0.00	0.00	104.57	0.00	32.51	13.18	150.26	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2070	0.00	0.00	15.86	0.00	2.62	13.67	32.16	50.68	52.03	604.70	77.89	112.68	206.10	208.03
2071	0.00	0.00	0.00	0.00	31.87	0.00	31.87	50.68	36.81	604.70	77.89	112.68	206.10	208.03
2072	0.00	0.00	78.10	0.00	16.73	0.00	94.83	50.68	52.03	604.70	77.89	112.68	206.10	208.03
2073	0.00	0.00	106.67	0.00	28.23	0.00	134.90	50.68	35.95	604.70	77.89	112.68	206.10	208.03
2074	0.00	0.00	95.07	0.00	58.27	0.00	153.34	50.68	50.33	604.70	77.89	112.68	206.10	208.03
2075	0.00	0.00	107.74	0.00	64.80	0.00	172.55	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2076	0.00	0.00	16.34	0.00	75.76	0.00	92.10	50.68	52.03	604.70	77.89	112.68	206.10	208.03
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	36.81	604.70	77.89	112.68	206.10	208.03
2078	0.00	0.00	0.00	0.00	9.12	0.00	9.12	50.68	52.03	604.70	77.89	112.68	206.10	208.03
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	39.65	604.70	77.89	112.68	206.10	208.03
2080	0.00	0.00	0.00	0.00	53.86	0.00	53.86	50.68	52.03	604.70	77.89	112.68	206.10	208.03
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2084	0.00	0.00	0.00	0.00	10.41	0.16	10.57	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2087	0.00	0.00	0.00	0.00	28.37	1.44	29.81	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2088	0.00	0.00	0.00	0.00	20.19	4.33	24.51	50.68	35.10	604.70	77.89	112.68	206.10	208.03
2089	0.00	0.00	0.00	0.00	16.47	4.33	20.79	50.68	37.95	604.70	77.89	112.68	206.10	208.03
2090	0.00	0.00	0.00	0.00	0.00	4.49	4.49	50.68	37.95	604.70	77.89	112.68	206.10	208.03
Salvage Value	7.48	0.00	21.14	0.00	34.04	4.20	66.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4404.95	2939.45	327.21	0.00	546.00	74.45	8292.06	1127.99	692.55	19253.79	2586.67	1668.33	4349.24	10649.57

Net Present Value 537

K19/Gas24/250MW

TABLE 322
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	217.56	0.00	0.00	20.64	3.90	242.11	1.22	0.00	364.12	101.24	28.76	111.11	123.01
2015	0.00	477.40	0.00	0.00	18.59	2.67	498.67	3.72	0.00	415.02	99.36	32.87	116.83	165.96
2016	0.00	632.15	0.00	0.00	25.44	3.89	661.49	7.03	0.00	429.97	97.55	35.08	119.92	177.41
2017	0.00	766.12	0.00	0.00	37.23	5.84	809.18	11.07	0.00	464.64	95.59	37.63	126.80	204.62
2018	0.00	540.20	0.00	0.00	39.13	17.51	596.85	14.06	0.00	444.05	92.93	41.05	132.08	177.98
2019	0.00	386.37	0.00	0.00	46.36	17.51	450.24	16.31	12.78	473.80	92.57	40.84	132.67	207.73
2020	0.00	157.77	0.35	0.00	0.01	18.16	176.29	17.19	12.99	716.09	100.91	29.12	126.27	459.79
2021	0.00	54.75	0.00	0.00	0.00	0.00	54.75	17.46	12.75	760.54	101.59	29.64	133.21	496.10
2022	0.00	0.00	92.12	0.00	0.00	0.00	92.12	17.81	12.97	753.48	100.19	29.03	137.76	486.51
2023	0.00	0.00	117.97	0.00	9.12	0.00	127.09	18.34	12.80	748.58	99.12	24.37	143.10	481.99
2024	0.00	0.00	14.65	0.00	0.00	0.00	14.65	18.41	16.67	742.41	97.29	39.70	147.98	457.44
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.41	16.45	653.89	95.06	30.32	134.03	394.47
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.41	16.05	627.55	92.81	34.33	142.52	357.89
2027	0.00	0.00	72.47	0.00	0.00	0.00	72.47	18.78	16.07	594.16	90.79	37.25	145.09	321.04
2028	0.00	0.00	101.02	0.00	71.81	0.00	172.83	19.63	16.13	574.33	88.97	43.16	152.83	289.37
2029	0.00	0.00	165.92	0.00	0.00	0.00	165.92	20.46	22.71	560.66	87.26	59.57	159.48	254.35
2030	0.00	0.00	218.00	0.00	0.00	0.00	218.00	21.55	18.84	557.52	86.37	64.26	163.16	243.74
2031	0.00	0.00	97.64	0.00	9.12	0.00	106.76	22.08	18.84	583.78	86.94	55.79	164.76	276.30
2032	0.00	0.00	7.18	0.00	0.00	0.00	7.18	22.12	25.64	617.25	84.45	152.04	142.33	238.43
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.12	25.65	604.74	82.96	162.09	152.37	207.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.12	25.65	590.85	81.50	174.33	161.07	173.94
2035	0.00	0.00	155.48	0.00	0.00	0.00	155.48	22.90	25.01	522.23	79.52	174.91	152.06	115.74
2036	0.00	0.00	224.62	0.00	0.00	0.00	224.62	24.02	25.02	496.20	78.07	185.24	156.54	76.35
2037	0.00	0.00	100.61	0.00	0.00	0.00	100.61	24.52	25.02	513.46	78.51	178.17	155.47	101.31
2038	0.00	0.00	165.23	0.00	0.00	0.00	165.23	25.35	31.81	553.51	76.13	290.47	137.25	49.65
2039	0.00	0.00	228.01	0.00	0.00	0.00	228.01	26.49	34.66	538.34	74.77	304.17	154.06	5.35
2040	0.00	0.00	102.12	0.00	60.41	0.00	162.53	27.30	31.81	537.87	74.16	308.52	162.35	-7.16
2041	0.00	0.00	7.51	0.00	0.00	0.00	7.51	27.34	38.62	586.10	72.34	421.65	140.05	-47.94
2042	0.00	0.00	161.01	0.00	0.00	0.00	161.01	28.15	38.62	565.20	70.56	448.56	150.30	-104.22
2043	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.31	38.62	550.04	69.26	469.86	158.01	-147.09
2044	0.00	0.00	104.18	0.00	0.00	0.00	104.18	29.83	40.33	542.41	68.78	470.57	165.79	-162.73
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	29.87	47.13	586.09	66.51	604.11	148.26	-232.79
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	47.13	594.45	66.69	598.35	148.89	-219.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	46.28	566.97	64.76	640.01	161.35	-299.15
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	29.87	48.28	582.50	65.99	614.15	152.83	-250.47
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2052	0.00	0.00	70.69	0.00	28.37	1.44	100.50	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2053	0.00	0.00	96.55	0.00	20.19	4.33	121.06	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2054	0.00	0.00	14.65	0.00	16.47	4.33	35.44	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2055	0.00	0.00	0.00	0.00	0.00	4.49	4.49	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2057	0.00	0.00	72.47	0.00	0.00	0.00	72.47	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2058	0.00	0.00	98.98	0.00	9.12	0.00	108.10	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2059	0.00	0.00	165.92	0.00	0.00	0.00	165.92	29.87	48.28	582.50	65.99	614.15	152.83	-250.47
2060	0.00	0.00	218.00	0.00	0.00	0.00	218.00	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2061	0.00	0.00	97.64	0.00	0.00	0.00	97.64	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2062	0.00	0.00	7.18	0.00	0.00	0.00	7.18	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2063	0.00	0.00	0.00	0.00	53.86	2.76	56.61	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2064	0.00	0.00	0.00	0.00	10.23	3.74	13.98	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2065	0.00	0.00	155.48	0.00	8.50	2.35	166.33	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2066	0.00	0.00	224.62	0.00	10.14	2.93	237.69	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2067	0.00	0.00	100.61	0.00	8.86	4.39	113.86	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2068	0.00	0.00	165.23	0.00	18.95	13.18	197.36	29.87	60.66	582.50	65.99	614.15	152.83	-250.47
2069	0.00	0.00	228.01	0.00	29.89	13.18	271.09	29.87	48.28	582.50	65.99	614.15	152.83	-250.47
2070	0.00	0.00	102.12	0.00	0.01	13.67	115.80	29.87	47.14	582.50	65.99	614.15	152.83	-250.47
2071	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.87	47.14	582.50	65.99	614.15	152.83	-250.47
2072	0.00	0.00	161.01	0.00	0.00	0.00	161.01	29.87	47.14	582.50	65.99	614.15	152.83	-250.47
2073	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.87	46.29	582.50	65.99	614.15	152.83	-250.47
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2075	0.00	0.00	7.66	0.00	45.31	0.00	52.97	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2078	0.00	0.00	0.00	0.00	17.95	0.00	17.95	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	48.28	582.50	65.99	614.15	152.83	-250.47
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2082	0.00	0.00	70.69	0.00	0.00	0.00	70.69	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2083	0.00	0.00	96.55	0.00	0.00	0.00	96.55	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2084	0.00	0.00	14.65	0.00	10.41	0.16	25.21	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2087	0.00	0.00	72.47	0.00	28.37	1.44	102.28	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2088	0.00	0.00	98.98	0.00	20.19	4.33	123.50	29.87	45.44	582.50	65.99	614.15	152.83	-250.47
2089	0.00	0.00	15.02	0.00	16.47	4.33	35.81	29.87	48.28	582.50	65.99	614.15	152.83	-250.47
2090	0.00	0.00	0.00	0.00	15.10	4.49	19.59	29.87	48.28	582.50	65.99	614.15	152.83	-250.47
Salvage Value	0.00	0.00	73.23	0.00	17.91	4.20	95.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2939.45	1623.51	0.00	313.82	74.45	4951.23	612.25	744.62	16228.82	2345.57	7464.75	4106.85	2311.66

Net Present Value -3996

K19/C31/250MW

TABLE 323
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	217.56	0.00	0.00	20.64	3.90	272.65	1.38	0.00	364.12	101.24	28.76	111.11	123.01
2015	38.54	477.40	0.00	0.00	18.59	2.67	537.21	4.06	0.00	415.02	99.36	32.87	116.83	165.96
2016	10.47	632.15	0.00	0.00	25.44	3.89	671.96	7.42	0.00	429.97	97.55	35.08	119.92	177.41
2017	10.54	766.12	0.00	0.00	37.23	5.84	819.72	11.52	0.00	464.64	95.59	37.63	126.80	204.62
2018	12.52	540.20	0.00	0.00	39.13	17.51	609.37	14.57	0.00	444.05	92.93	41.05	132.08	177.98
2019	12.59	386.37	0.00	0.00	46.36	17.51	462.83	16.88	12.78	473.80	92.57	40.84	132.67	207.73
2020	12.67	157.77	0.35	0.00	0.01	18.16	188.96	17.83	12.99	716.09	100.91	29.12	126.27	459.79
2021	16.02	54.75	0.00	0.00	0.00	0.00	70.77	18.18	12.75	760.54	101.59	29.64	133.21	496.10
2022	162.04	0.00	92.12	0.00	0.00	0.00	254.16	19.34	12.97	753.31	100.16	29.07	137.81	486.26
2023	247.17	0.00	117.97	0.00	9.12	0.00	374.26	21.11	12.80	747.77	99.09	24.54	143.37	480.76
2024	268.52	0.00	14.65	0.00	0.00	0.00	283.17	22.52	16.67	741.62	97.27	39.96	148.49	455.90
2025	273.67	0.00	0.00	0.00	3.47	0.00	277.14	23.91	16.45	652.56	95.02	30.49	134.81	392.24
2026	740.31	0.00	0.00	0.00	3.47	0.00	743.78	27.63	16.05	625.91	92.80	34.57	143.10	355.43
2027	1175.50	0.00	72.47	0.00	42.16	0.00	1290.14	34.08	16.07	591.70	90.78	37.66	145.71	317.56
2028	1055.42	0.00	98.98	0.00	30.99	0.00	1185.39	40.01	16.13	570.67	88.90	44.30	153.60	283.87
2029	753.68	0.00	15.02	0.00	36.80	0.00	805.50	44.03	22.70	556.59	87.23	60.79	160.81	247.77
2030	521.97	0.00	0.00	0.00	63.72	0.00	585.69	46.96	18.83	584.67	88.28	53.13	154.99	288.27
2031	342.84	0.00	0.00	0.00	85.37	0.00	428.22	49.10	32.89	669.75	91.34	44.48	120.23	413.71
2032	126.27	0.00	0.00	0.00	100.61	0.00	226.89	50.24	33.10	892.75	98.34	42.94	112.95	638.52
2033	39.85	0.00	0.00	0.00	0.00	0.00	39.85	50.44	32.96	923.56	98.26	44.53	119.95	660.83
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	33.18	888.85	96.51	45.62	122.25	624.47
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.36	859.78	94.86	46.28	118.70	599.95
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.31	829.59	93.26	47.43	120.08	568.82
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	32.15	789.88	91.43	49.18	123.24	526.03
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.79	744.28	89.49	51.25	126.44	477.10
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	34.70	712.81	87.62	56.65	138.80	429.73
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.97	693.19	85.95	64.10	146.10	397.04
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	34.64	672.47	84.33	72.64	154.97	360.53
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	50.44	31.80	670.53	83.49	73.58	161.24	352.22
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.44	31.80	658.69	82.17	73.31	177.12	326.09
2044	0.00	0.00	78.89	0.00	0.00	0.00	78.89	50.83	33.50	638.36	80.64	93.34	180.38	283.99
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	51.73	33.50	619.54	79.25	102.74	191.13	246.43
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	51.81	37.43	606.81	77.90	116.79	203.85	208.28
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.93	587.99	76.52	118.46	223.28	169.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.08	604.78	77.89	112.66	206.08	208.15
2049	0.00	0.00	0.00	0.00	10.41	0.16	10.57	51.81	37.92	604.78	77.89	112.66	206.08	208.15
2050	0.00	0.00	0.00	0.00	10.09	0.32	10.42	51.81	35.08	604.78	77.89	112.66	206.08	208.15
2051	0.00	0.00	0.00	0.00	24.42	0.96	25.38	51.81	37.94	604.78	77.89	112.66	206.08	208.15
2052	0.00	0.00	70.69	0.00	28.37	1.44	100.50	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2053	0.00	0.00	96.55	0.00	20.19	4.33	121.06	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2054	0.00	0.00	14.65	0.00	16.47	4.33	35.44	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2055	0.00	0.00	0.00	0.00	0.00	4.49	4.49	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2057	0.00	0.00	72.47	0.00	0.00	0.00	72.47	51.81	36.81	604.78	77.89	112.66	206.08	208.15
2058	0.00	0.00	98.98	0.00	9.12	0.00	108.10	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2059	0.00	0.00	15.02	0.00	0.00	0.00	15.02	51.81	39.65	604.78	77.89	112.66	206.08	208.15
2060	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2061	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.81	37.95	604.78	77.89	112.66	206.08	208.15
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2063	0.00	0.00	0.00	0.00	14.26	2.76	17.02	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2064	0.00	0.00	0.00	0.00	18.81	3.74	22.55	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2065	0.00	0.00	0.00	0.00	23.07	2.35	25.42	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2066	0.00	0.00	0.00	0.00	21.59	2.93	24.52	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2067	0.00	0.00	0.00	0.00	33.71	4.39	38.11	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2068	0.00	0.00	0.00	0.00	18.95	13.18	32.13	51.81	65.55	604.78	77.89	112.66	206.08	208.15
2069	0.00	0.00	0.00	0.00	29.89	13.18	43.08	51.81	37.95	604.78	77.89	112.66	206.08	208.15
2070	0.00	0.00	0.00	0.00	0.01	13.67	13.68	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	39.65	604.78	77.89	112.66	206.08	208.15
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.81	35.95	604.78	77.89	112.66	206.08	208.15
2074	0.00	0.00	78.89	0.00	0.00	0.00	78.89	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2075	0.00	0.00	107.74	0.00	2.61	0.00	110.35	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2076	0.00	0.00	16.34	0.00	2.61	0.00	18.96	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2077	0.00	0.00	0.00	0.00	31.87	0.00	31.87	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2078	0.00	0.00	0.00	0.00	16.73	0.00	16.73	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2079	0.00	0.00	0.00	0.00	28.23	0.00	28.23	51.81	37.95	604.78	77.89	112.66	206.08	208.15
2080	0.00	0.00	0.00	0.00	103.00	0.00	103.00	51.81	50.33	604.78	77.89	112.66	206.08	208.15
2081	0.00	0.00	0.00	0.00	64.80	0.00	64.80	51.81	37.95	604.78	77.89	112.66	206.08	208.15
2082	0.00	0.00	70.69	0.00	75.76	0.00	146.45	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2083	0.00	0.00	96.55	0.00	0.00	0.00	96.55	51.81	36.81	604.78	77.89	112.66	206.08	208.15
2084	0.00	0.00	14.65	0.00	10.41	0.16	25.21	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2085	0.00	0.00	0.00	0.00	10.09	0.32	10.42	51.81	36.81	604.78	77.89	112.66	206.08	208.15
2086	0.00	0.00	0.00	0.00	24.42	0.96	25.38	51.81	52.03	604.78	77.89	112.66	206.08	208.15
2087	0.00	0.00	72.47	0.00	28.37	1.44	102.28	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2088	0.00	0.00	98.98	0.00	20.19	4.33	123.50	51.81	35.10	604.78	77.89	112.66	206.08	208.15
2089	0.00	0.00	15.02	0.00	16.47	4.33	35.81	51.81	37.95	604.78	77.89	112.66	206.08	208.15
2090	0.00	0.00	0.00	0.00	0.00	4.49	4.49	51.81	37.95	604.78	77.89	112.66	206.08	208.15
Salvage Value	55.10	0.00	35.42	0.00	37.50	4.20	132.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3753.27	2939.45	485.15	0.00	492.94	74.45	7745.25	1039.60	699.58	17798.20	2533.08	1819.74	4442.85	9002.54

Net Present Value -482

All Gas

TABLE 324
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	417.37	99.35	32.88	116.74	168.41
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	432.48	97.54	35.06	119.84	180.03
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	472.04	95.95	36.24	125.29	214.56
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	450.49	93.20	39.49	130.88	186.92
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	434.55	91.30	35.00	133.68	174.57
2020	0.00	0.00	91.42	0.00	0.00	0.00	91.42	0.85	0.00	464.76	91.36	27.64	139.70	206.06
2021	0.00	0.00	117.06	0.00	9.12	0.00	126.18	1.38	0.00	456.19	89.63	25.87	152.12	188.56
2022	0.00	0.00	14.50	0.00	0.00	0.00	14.50	1.45	3.92	444.19	87.41	48.06	157.42	151.30
2023	0.00	0.00	71.04	0.00	0.00	0.00	71.04	1.80	3.92	426.51	85.26	59.16	167.81	114.28
2024	0.00	0.00	99.07	0.00	71.81	0.00	170.88	2.65	3.92	418.40	83.81	67.54	176.64	90.42
2025	0.00	0.00	14.72	0.00	0.00	0.00	14.72	2.72	7.84	366.67	83.34	56.58	154.41	72.34
2026	0.00	0.00	72.11	0.00	0.00	0.00	72.11	3.08	7.84	348.07	82.05	58.54	159.24	48.24
2027	0.00	0.00	98.49	0.00	0.00	0.00	98.49	3.58	7.84	326.72	80.23	58.85	177.10	10.54
2028	0.00	0.00	165.09	0.00	0.00	0.00	165.09	4.40	11.76	303.98	78.32	91.77	175.78	-41.88
2029	0.00	0.00	216.92	0.00	0.00	0.00	216.92	5.49	11.76	283.25	76.88	104.34	183.37	-81.34
2030	0.00	0.00	97.15	0.00	9.12	0.00	106.27	6.02	11.77	301.37	77.81	97.10	177.81	-51.35
2031	0.00	0.00	7.14	0.00	0.00	0.00	7.14	6.05	18.57	325.92	75.44	181.14	158.48	-89.13
2032	0.00	0.00	74.30	0.00	0.00	0.00	74.30	6.42	18.58	296.32	73.56	198.16	168.41	-143.81
2033	0.00	0.00	101.48	0.00	60.41	0.00	161.89	7.23	18.58	269.85	71.85	215.19	178.86	-196.04
2034	0.00	0.00	170.10	0.00	0.00	0.00	170.10	8.08	22.50	252.39	70.46	241.38	185.05	-244.50
2035	0.00	0.00	223.51	0.00	0.00	0.00	223.51	9.20	22.50	236.87	69.58	253.62	190.94	-277.27
2036	0.00	0.00	100.10	0.00	0.00	0.00	100.10	9.70	22.50	235.84	69.54	246.68	200.75	-281.13
2037	0.00	0.00	164.40	0.00	0.00	0.00	164.40	10.52	29.30	246.22	67.58	337.14	170.48	-328.98
2038	0.00	0.00	226.88	0.00	0.00	0.00	226.88	11.66	29.31	224.90	66.39	355.09	179.98	-376.56
2039	0.00	0.00	101.61	0.00	0.00	0.00	101.61	12.17	29.31	220.98	66.34	360.65	187.89	-393.89
2040	0.00	0.00	7.47	0.00	0.00	0.00	7.47	12.20	36.11	239.48	64.44	449.71	167.20	-441.86
2041	0.00	0.00	160.21	0.00	0.00	0.00	160.21	13.00	36.12	223.77	62.69	486.50	182.92	-508.34
2042	0.00	0.00	231.45	0.00	0.00	0.00	231.45	14.16	36.12	214.26	61.66	511.92	194.66	-553.98
2043	0.00	0.00	103.66	0.00	60.41	0.00	164.07	14.98	36.12	217.37	61.66	517.10	199.03	-560.43
2044	0.00	0.00	7.62	0.00	0.00	0.00	7.62	15.02	42.93	238.17	60.11	609.93	174.01	-605.89
2045	0.00	0.00	34.87	0.00	0.00	0.00	34.87	15.19	42.93	225.49	58.61	649.76	189.27	-672.15
2046	0.00	0.00	47.63	0.00	0.00	0.00	47.63	15.43	42.93	215.92	57.53	682.72	200.93	-725.27
2047	0.00	0.00	7.23	0.00	0.00	0.00	7.23	15.47	44.34	212.11	56.68	719.52	206.88	-770.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.35	217.84	57.61	684.00	199.03	-722.80
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	15.47	44.35	217.84	57.61	684.00	199.03	-722.80
2050	0.00	0.00	69.99	0.00	9.69	0.00	79.68	15.47	44.36	217.84	57.61	684.00	199.03	-722.80
2051	0.00	0.00	95.59	0.00	9.69	0.00	105.28	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2052	0.00	0.00	14.50	0.00	9.69	0.00	24.19	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2053	0.00	0.00	71.04	0.00	0.00	0.00	71.04	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2054	0.00	0.00	97.03	0.00	0.00	0.00	97.03	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2055	0.00	0.00	14.72	0.00	0.00	0.00	14.72	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2056	0.00	0.00	72.11	0.00	9.12	0.00	81.23	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2057	0.00	0.00	98.49	0.00	0.00	0.00	98.49	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2058	0.00	0.00	165.09	0.00	0.00	0.00	165.09	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2059	0.00	0.00	216.92	0.00	53.86	0.00	270.77	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2060	0.00	0.00	97.15	0.00	0.00	0.00	97.15	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2061	0.00	0.00	7.14	0.00	0.00	0.00	7.14	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2062	0.00	0.00	74.30	0.00	0.00	0.00	74.30	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2063	0.00	0.00	101.48	0.00	0.00	0.00	101.48	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2064	0.00	0.00	170.10	0.00	0.00	0.00	170.10	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2065	0.00	0.00	223.51	0.00	9.12	0.00	232.63	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2066	0.00	0.00	100.10	0.00	0.00	0.00	100.10	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2067	0.00	0.00	164.40	0.00	0.00	0.00	164.40	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2068	0.00	0.00	226.88	0.00	45.31	0.00	272.18	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2069	0.00	0.00	101.61	0.00	0.00	0.00	101.61	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2070	0.00	0.00	7.47	0.00	0.00	0.00	7.47	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2071	0.00	0.00	160.21	0.00	0.00	0.00	160.21	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2072	0.00	0.00	231.45	0.00	0.00	0.00	231.45	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2073	0.00	0.00	103.66	0.00	0.00	0.00	103.66	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2074	0.00	0.00	7.62	0.00	17.95	0.00	25.57	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2075	0.00	0.00	34.87	0.00	0.00	0.00	34.87	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2076	0.00	0.00	47.63	0.00	0.00	0.00	47.63	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2077	0.00	0.00	7.23	0.00	0.00	0.00	7.23	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2078	0.00	0.00	0.00	0.00	45.31	0.00	45.31	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2080	0.00	0.00	69.99	0.00	0.00	0.00	69.99	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2081	0.00	0.00	95.59	0.00	0.00	0.00	95.59	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2082	0.00	0.00	14.50	0.00	0.00	0.00	14.50	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2083	0.00	0.00	71.04	0.00	15.10	0.00	86.15	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2084	0.00	0.00	97.03	0.00	9.69	0.00	106.72	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2085	0.00	0.00	14.72	0.00	9.69	0.00	24.41	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2086	0.00	0.00	72.11	0.00	9.69	0.00	81.81	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2087	0.00	0.00	98.49	0.00	9.69	0.00	108.19	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2088	0.00	0.00	14.94	0.00	0.00	0.00	14.94	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.47	44.37	217.84	57.61	684.00	199.03	-722.80
Salvage Value	0.00	0.00	98.73	0.00	9.17	0.00	107.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2039.34	0.00	196.29	0.00	2297.49	226.03	608.54	8823.77	2120.50	8784.17	4845.19	-6926.09

Net Present Value: -10058

Wind/Gas

TABLE 325
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	417.37	99.35	32.88	116.76	168.39
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	432.48	97.54	35.06	119.86	180.01
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	472.09	95.95	36.24	125.31	214.59
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	450.49	93.20	39.49	130.88	186.92
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	434.55	91.30	35.00	133.68	174.57
2020	0.00	0.00	0.00	9.41	13.30	0.00	22.71	0.62	0.00	459.30	90.90	29.81	141.05	197.54
2021	0.00	0.00	0.35	287.40	22.16	0.00	309.92	2.16	0.00	450.67	89.18	28.63	153.02	179.83
2022	0.00	0.00	0.00	292.78	26.75	0.00	319.53	3.76	6.10	460.54	87.58	28.72	154.67	189.56
2023	0.00	0.00	163.52	283.36	13.93	0.00	460.81	5.96	12.20	457.54	85.14	32.85	160.25	179.30
2024	0.00	0.00	215.53	5.38	24.58	0.00	245.49	7.08	18.31	464.10	83.41	33.11	164.58	182.99
2025	0.00	0.00	29.44	4.71	3.82	0.00	37.97	7.27	26.14	426.41	83.49	38.69	136.32	167.91
2026	0.00	0.00	72.11	143.70	9.61	0.00	225.42	8.40	26.14	415.86	82.51	36.99	140.27	156.09
2027	0.00	0.00	100.53	146.39	87.07	0.00	333.99	10.06	29.19	398.37	80.18	45.44	148.04	124.71
2028	0.00	0.00	14.94	146.39	21.15	0.00	182.49	10.97	36.17	392.21	78.47	58.92	153.26	101.56
2029	0.00	0.00	73.20	146.39	21.23	0.00	240.83	12.17	39.22	381.26	76.92	63.97	158.74	81.63
2030	0.00	0.00	99.98	146.39	21.23	0.00	267.60	13.51	42.27	383.78	76.02	67.05	159.99	80.72
2031	0.00	0.00	89.10	146.39	21.23	0.00	256.73	14.79	49.24	388.65	74.83	79.51	163.68	70.63
2032	0.00	0.00	100.98	146.39	81.64	0.00	329.01	16.44	52.29	384.59	73.75	80.25	169.24	61.36
2033	0.00	0.00	15.32	146.39	21.23	0.00	182.94	17.35	59.28	393.17	73.11	85.49	172.68	61.89
2034	0.00	0.00	75.05	146.39	21.23	0.00	242.67	18.57	62.33	376.91	71.34	100.62	177.06	27.89
2035	0.00	0.00	102.50	146.39	21.23	0.00	270.12	19.92	65.39	360.58	69.71	108.56	185.65	-3.34
2036	0.00	0.00	91.35	146.39	21.23	0.00	258.98	21.21	72.36	353.97	68.38	124.77	190.28	-29.45
2037	0.00	0.00	103.53	146.39	21.23	0.00	271.15	22.57	75.41	342.96	67.12	132.20	197.18	-53.53
2038	0.00	0.00	92.27	146.39	21.23	0.00	259.89	23.87	82.39	342.52	66.12	145.67	202.67	-71.94
2039	0.00	0.00	104.57	146.39	81.64	0.00	332.60	25.53	85.44	336.07	65.00	146.10	222.66	-97.70
2040	0.00	0.00	15.86	155.80	21.23	0.00	192.90	26.50	92.43	342.56	64.23	154.71	231.65	-108.02
2041	0.00	0.00	77.72	433.79	21.23	0.00	532.74	29.16	95.48	325.35	62.75	185.74	228.96	-152.09
2042	0.00	0.00	106.14	439.17	21.23	0.00	566.54	31.99	98.53	311.34	61.41	198.72	239.21	-187.99
2043	0.00	0.00	94.60	429.75	21.08	0.00	545.43	34.72	105.50	305.23	60.27	219.76	245.75	-220.54
2044	0.00	0.00	107.21	151.77	20.60	0.00	279.57	36.12	108.55	299.68	59.37	228.45	253.66	-241.80
2045	0.00	0.00	51.14	151.10	19.32	0.00	221.56	37.22	115.53	295.90	58.31	241.87	266.65	-270.92
2046	0.00	0.00	47.63	285.38	17.41	0.00	350.42	38.98	118.58	289.57	57.30	243.38	285.94	-297.06
2047	0.00	0.00	7.23	149.08	11.63	0.00	167.93	39.82	123.06	281.51	56.28	251.68	290.30	-316.74
2048	0.00	0.00	0.00	146.39	5.97	0.00	152.36	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2049	0.00	0.00	0.00	146.39	9.77	0.00	156.16	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2050	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2051	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2052	0.00	0.00	0.00	146.39	9.69	0.00	156.08	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2053	0.00	0.00	142.09	146.39	0.00	0.00	288.48	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2054	0.00	0.00	194.06	146.39	0.00	0.00	340.45	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2055	0.00	0.00	29.44	146.39	3.32	0.00	179.15	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2056	0.00	0.00	72.11	146.39	5.54	0.00	224.04	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2057	0.00	0.00	98.49	146.39	6.73	0.00	251.61	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2058	0.00	0.00	14.94	146.39	3.72	0.00	165.05	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2059	0.00	0.00	73.20	146.39	20.06	0.00	239.65	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2060	0.00	0.00	99.98	155.80	1.67	0.00	257.45	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2061	0.00	0.00	89.10	433.79	2.68	0.00	525.57	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2062	0.00	0.00	100.98	439.17	57.73	0.00	597.88	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2063	0.00	0.00	15.32	429.75	5.31	0.00	450.38	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2064	0.00	0.00	75.05	151.77	5.31	0.00	232.13	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2065	0.00	0.00	102.50	151.10	5.31	0.00	258.91	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2066	0.00	0.00	91.35	285.38	5.31	0.00	382.04	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2067	0.00	0.00	103.53	149.08	50.62	0.00	303.22	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2068	0.00	0.00	92.27	146.39	5.31	0.00	243.97	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2069	0.00	0.00	104.57	146.39	5.31	0.00	256.26	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2070	0.00	0.00	15.86	146.39	15.28	0.00	177.53	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2071	0.00	0.00	77.72	146.39	21.93	0.00	246.04	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2072	0.00	0.00	106.14	146.39	25.33	0.00	277.87	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2073	0.00	0.00	94.60	146.39	15.52	0.00	256.51	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2074	0.00	0.00	107.21	146.39	55.14	0.00	308.73	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2075	0.00	0.00	51.14	146.39	7.46	0.00	204.99	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2076	0.00	0.00	47.63	146.39	12.24	0.00	206.26	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2077	0.00	0.00	7.23	146.39	34.65	0.00	188.26	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2078	0.00	0.00	0.00	146.39	21.08	0.00	167.46	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2079	0.00	0.00	0.00	146.39	20.84	0.00	167.23	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2080	0.00	0.00	0.00	155.80	20.52	0.00	176.32	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2081	0.00	0.00	0.00	433.79	19.56	0.00	453.35	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2082	0.00	0.00	0.00	439.17	33.66	0.00	472.82	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2083	0.00	0.00	142.09	429.75	17.36	0.00	589.20	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2084	0.00	0.00	194.06	151.77	25.54	0.00	371.37	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2085	0.00	0.00	29.44	151.10	25.38	0.00	205.92	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2086	0.00	0.00	72.11	285.38	24.43	0.00	381.92	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2087	0.00	0.00	98.49	149.08	23.47	0.00	271.04	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2088	0.00	0.00	14.94	146.39	9.00	0.00	170.33	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2089	0.00	0.00	0.00	141.68	19.64	0.00	161.32	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
2090	0.00	0.00	0.00	2.69	0.08	0.00	2.77	39.82	123.06	288.99	57.29	245.64	280.96	-294.91
Salvage Value	0.00	0.00	70.93	177.50	32.63	0.00	281.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1486.10	3886.04	504.24	0.00	5938.24	552.63	1713.36	10462.25	2114.72	3519.28	5594.70	-766.45

Net Present Value -8971

K22/Gas

TABLE 326
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	103.08	0.00	0.00	9.69	0.00	112.78	0.56	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	31.29	0.00	0.00	10.60	0.00	41.88	0.77	0.00	417.37	99.35	32.88	116.74	168.41
2016	0.00	27.76	0.00	0.00	10.68	0.00	38.43	0.97	0.00	431.94	97.54	35.07	119.84	179.49
2017	0.00	207.16	0.00	0.00	26.68	0.00	233.84	2.13	0.00	470.70	95.96	36.26	125.36	213.13
2018	0.00	404.01	0.00	0.00	8.71	0.00	412.72	4.20	0.00	447.59	93.21	39.51	131.02	183.85
2019	0.00	658.97	0.00	0.00	15.17	0.00	674.13	7.57	0.00	431.58	91.31	35.01	133.82	171.44
2020	0.00	733.85	0.00	0.00	27.60	0.00	761.45	11.38	0.00	452.62	90.73	30.74	142.07	189.08
2021	0.00	599.92	0.00	0.00	39.15	0.00	639.07	14.57	0.00	447.69	89.13	29.22	155.23	174.10
2022	0.00	348.41	0.00	0.00	46.36	0.00	394.77	16.55	12.78	456.10	89.10	33.24	143.38	190.38
2023	0.00	161.97	0.00	0.00	0.01	0.00	161.98	17.36	12.99	603.65	94.69	32.69	127.31	348.96
2024	0.00	56.00	0.00	0.00	0.00	0.00	56.00	17.64	12.71	628.07	94.54	36.93	136.19	360.41
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.64	12.92	598.68	94.53	25.75	119.04	359.36
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.64	12.75	578.30	92.71	26.07	124.80	334.73
2027	0.00	0.00	93.90	0.00	0.00	0.00	93.90	18.00	12.70	534.04	90.90	24.94	121.49	296.71
2028	0.00	0.00	120.46	0.00	9.12	0.00	129.58	18.54	12.47	509.00	89.38	26.00	125.94	267.68
2029	0.00	0.00	15.02	0.00	0.00	0.00	15.02	18.61	15.96	502.32	88.56	32.79	127.50	253.47
2030	0.00	0.00	73.57	0.00	0.00	0.00	73.57	18.98	15.96	486.47	86.83	40.64	134.18	224.82
2031	0.00	0.00	254.93	0.00	71.81	0.00	326.74	20.60	16.00	474.16	85.20	47.65	142.60	198.71
2032	0.00	0.00	235.43	0.00	0.00	0.00	235.43	21.78	22.58	460.24	83.61	64.17	149.61	162.84
2033	0.00	0.00	98.62	0.00	9.12	0.00	107.74	22.32	18.71	474.38	83.80	56.50	153.08	181.00
2034	0.00	0.00	7.25	0.00	0.00	0.00	7.25	22.36	25.51	508.75	81.42	153.07	131.05	143.21
2035	0.00	0.00	155.48	0.00	0.00	0.00	155.48	23.13	25.51	482.09	79.40	167.88	141.09	93.72
2036	0.00	0.00	224.62	0.00	0.00	0.00	224.62	24.26	25.51	465.82	77.91	181.90	148.91	57.10
2037	0.00	0.00	100.61	0.00	0.00	0.00	100.61	24.76	25.52	481.81	78.35	172.47	149.06	81.93
2038	0.00	0.00	165.23	0.00	0.00	0.00	165.23	25.59	31.67	516.26	76.02	278.46	130.79	30.99
2039	0.00	0.00	228.01	0.00	0.00	0.00	228.01	26.73	31.68	501.83	74.68	292.94	147.27	-13.06
2040	0.00	0.00	102.12	0.00	60.41	0.00	162.53	27.54	31.68	504.68	74.21	295.76	154.84	-20.12
2041	0.00	0.00	7.51	0.00	0.00	0.00	7.51	27.58	38.49	545.60	72.27	406.02	132.81	-65.49
2042	0.00	0.00	161.01	0.00	0.00	0.00	161.01	28.38	41.33	524.77	70.49	433.91	143.24	-122.87
2043	0.00	0.00	232.61	0.00	0.00	0.00	232.61	29.54	38.49	510.12	69.17	455.42	151.44	-165.92
2044	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.07	38.49	507.30	68.83	455.51	158.28	-175.31
2045	0.00	0.00	7.66	0.00	0.00	0.00	7.66	30.10	45.29	556.66	67.26	571.57	136.43	-218.59
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.29	540.06	66.03	592.46	146.12	-264.55
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	47.01	524.64	64.69	621.61	155.79	-317.45
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	47.01	540.45	65.99	595.21	146.11	-266.87
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	47.01	540.45	65.99	595.21	146.11	-266.87
2050	0.00	0.00	0.00	0.00	10.09	0.00	10.09	30.10	46.16	540.45	65.99	595.21	146.11	-266.87
2051	0.00	0.00	0.00	0.00	10.15	0.00	10.15	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2052	0.00	0.00	0.00	0.00	10.16	0.00	10.16	30.10	48.15	540.45	65.99	595.21	146.11	-266.87
2053	0.00	0.00	0.00	0.00	0.43	0.00	0.43	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2054	0.00	0.00	0.00	0.00	14.08	0.00	14.08	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2055	0.00	0.00	0.00	0.00	18.67	0.00	18.67	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2056	0.00	0.00	0.00	0.00	20.19	0.00	20.19	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2057	0.00	0.00	72.47	0.00	16.47	0.00	88.94	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2058	0.00	0.00	98.98	0.00	0.00	0.00	98.98	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2059	0.00	0.00	15.02	0.00	0.00	0.00	15.02	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2060	0.00	0.00	73.57	0.00	0.00	0.00	73.57	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2061	0.00	0.00	252.89	0.00	0.00	0.00	252.89	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2062	0.00	0.00	235.43	0.00	0.00	0.00	235.43	30.10	48.15	540.45	65.99	595.21	146.11	-266.87
2063	0.00	0.00	98.62	0.00	9.12	0.00	107.74	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2064	0.00	0.00	7.25	0.00	0.00	0.00	7.25	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2065	0.00	0.00	155.48	0.00	0.50	0.00	155.99	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2066	0.00	0.00	224.62	0.00	54.39	0.00	279.01	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2067	0.00	0.00	100.61	0.00	16.52	0.00	117.13	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2068	0.00	0.00	165.23	0.00	17.40	0.00	182.63	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2069	0.00	0.00	228.01	0.00	1.09	0.00	229.10	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2070	0.00	0.00	102.12	0.00	8.92	0.00	111.04	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2071	0.00	0.00	7.51	0.00	18.96	0.00	26.47	30.10	60.53	540.45	65.99	595.21	146.11	-266.87
2072	0.00	0.00	161.01	0.00	29.89	0.00	190.90	30.10	48.15	540.45	65.99	595.21	146.11	-266.87
2073	0.00	0.00	232.61	0.00	0.01	0.00	232.61	30.10	47.01	540.45	65.99	595.21	146.11	-266.87
2074	0.00	0.00	104.18	0.00	0.00	0.00	104.18	30.10	47.01	540.45	65.99	595.21	146.11	-266.87
2075	0.00	0.00	7.66	0.00	45.31	0.00	52.98	30.10	47.01	540.45	65.99	595.21	146.11	-266.87
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	46.16	540.45	65.99	595.21	146.11	-266.87
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2081	0.00	0.00	0.00	0.00	17.95	0.00	17.95	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	48.15	540.45	65.99	595.21	146.11	-266.87
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2087	0.00	0.00	72.47	0.00	9.69	0.00	82.17	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2088	0.00	0.00	98.98	0.00	0.00	0.00	98.98	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2089	0.00	0.00	15.02	0.00	0.00	0.00	15.02	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
2090	0.00	0.00	0.00	0.00	15.10	0.00	15.10	30.10	45.30	540.45	65.99	595.21	146.11	-266.87
Salvage Value	0.00	0.00	64.67	0.00	13.77	0.00	78.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2766.90	1549.56	0.00	296.69	0.00	4613.15	566.94	684.05	14310.50	2312.62	7075.72	3914.11	1008.05

Net Present Value: -4856

K22/C29

TABLE 327
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	103.08	0.00	0.00	9.69	0.00	143.31	0.72	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.06	31.29	0.00	0.00	10.60	0.00	80.94	1.12	0.00	417.37	99.35	32.88	116.74	168.41
2016	10.99	27.76	0.00	0.00	10.68	0.00	49.42	1.37	0.00	431.94	97.54	35.07	119.84	179.49
2017	11.71	207.16	0.00	0.00	26.68	0.00	245.55	2.60	0.00	470.70	95.96	36.26	125.36	213.13
2018	11.78	404.01	0.00	0.00	8.71	0.00	424.50	4.72	0.00	447.59	93.21	39.51	131.02	183.85
2019	14.08	658.97	0.00	0.00	15.17	0.00	688.22	8.16	0.00	431.58	91.31	35.01	133.82	171.44
2020	163.28	733.85	0.00	0.00	27.60	0.00	924.72	12.78	0.00	452.63	90.73	30.74	142.08	189.08
2021	247.43	599.92	0.00	0.00	39.15	0.00	886.50	17.22	0.00	447.39	89.13	29.24	155.49	173.53
2022	265.39	348.41	0.00	0.00	46.36	0.00	660.16	20.52	12.78	455.73	89.11	33.19	143.64	189.78
2023	270.48	161.97	0.00	0.00	3.48	0.00	435.92	22.70	12.99	602.34	94.67	32.78	127.42	347.46
2024	731.67	56.00	0.00	0.00	3.47	0.00	791.14	26.65	12.71	625.42	94.53	36.94	136.28	357.67
2025	1161.78	0.00	0.00	0.00	42.16	0.00	1203.94	32.67	12.92	595.38	94.55	25.79	119.20	355.84
2026	1043.10	0.00	0.00	0.00	21.87	0.00	1064.97	38.00	12.75	574.21	92.71	26.14	125.09	330.27
2027	744.89	0.00	0.00	0.00	36.80	0.00	781.69	41.90	12.70	531.92	91.13	23.95	121.49	295.34
2028	515.88	0.00	0.00	0.00	63.72	0.00	579.60	44.80	12.47	499.70	89.28	26.32	127.13	256.97
2029	338.84	0.00	0.00	0.00	85.37	0.00	424.21	46.92	26.10	655.65	92.97	30.17	113.02	419.49
2030	124.80	0.00	0.00	0.00	100.61	0.00	225.41	48.05	26.31	870.86	100.00	29.35	103.81	637.70
2031	39.38	0.00	0.00	0.00	0.00	0.00	39.38	48.25	26.22	901.67	99.71	30.01	109.02	662.93
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	29.08	870.82	98.08	29.66	110.00	633.07
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	25.04	836.52	96.50	29.65	107.72	602.65
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	25.00	810.12	94.94	30.29	109.64	575.25
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	24.83	779.73	93.43	30.49	110.34	545.47
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	48.25	24.47	747.21	91.92	30.44	111.38	513.48
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.25	24.54	714.38	90.42	30.60	113.19	480.17
2038	0.00	0.00	97.99	0.00	0.00	0.00	97.99	48.63	24.00	682.57	88.94	30.65	116.57	446.40
2039	0.00	0.00	125.99	0.00	9.12	0.00	135.11	49.20	26.68	671.56	87.61	30.02	133.28	420.65
2040	0.00	0.00	15.86	0.00	0.00	0.00	15.86	49.28	27.75	656.24	85.92	53.45	135.68	381.20
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	27.75	639.69	84.49	59.64	143.94	351.62
2042	0.00	0.00	78.15	0.00	0.00	0.00	78.15	49.67	30.59	626.67	83.11	61.50	157.38	324.68
2043	0.00	0.00	106.67	0.00	9.12	0.00	115.79	50.25	27.75	610.85	81.66	62.68	173.91	292.59
2044	0.00	0.00	95.07	0.00	0.00	0.00	95.07	50.72	31.66	596.11	80.24	96.67	170.41	248.79
2045	0.00	0.00	109.78	0.00	71.81	0.00	181.59	51.62	31.02	582.77	79.00	103.59	180.95	219.23
2046	0.00	0.00	16.34	0.00	0.00	0.00	16.34	51.70	34.94	600.11	78.65	102.57	190.72	228.17
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.65	557.22	76.49	137.30	197.36	146.07
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.65	580.04	78.05	114.49	189.68	197.82
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	39.50	580.04	78.05	114.49	189.68	197.82
2050	0.00	0.00	0.00	0.00	10.09	0.00	10.09	51.70	35.80	580.04	78.05	114.49	189.68	197.82
2051	0.00	0.00	0.00	0.00	10.15	0.00	10.15	51.70	34.96	580.04	78.05	114.49	189.68	197.82
2052	0.00	0.00	0.00	0.00	10.16	0.00	10.16	51.70	37.81	580.04	78.05	114.49	189.68	197.82
2053	0.00	0.00	0.00	0.00	0.43	0.00	0.43	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2054	0.00	0.00	0.00	0.00	14.08	0.00	14.08	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2055	0.00	0.00	0.00	0.00	18.67	0.00	18.67	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2056	0.00	0.00	0.00	0.00	20.19	0.00	20.19	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2057	0.00	0.00	0.00	0.00	16.47	0.00	16.47	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2058	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2059	0.00	0.00	0.00	0.00	0.86	0.00	0.86	51.70	53.04	580.04	78.05	114.49	189.68	197.82
2060	0.00	0.00	0.00	0.00	10.28	0.00	10.28	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2061	0.00	0.00	0.00	0.00	5.14	0.00	5.14	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2062	0.00	0.00	0.00	0.00	8.57	0.00	8.57	51.70	37.81	580.04	78.05	114.49	189.68	197.82
2063	0.00	0.00	0.00	0.00	14.57	0.00	14.57	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2064	0.00	0.00	0.00	0.00	20.57	0.00	20.57	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2065	0.00	0.00	0.00	0.00	25.36	0.00	25.36	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2066	0.00	0.00	0.00	0.00	0.53	0.00	0.53	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2067	0.00	0.00	0.00	0.00	16.52	0.00	16.52	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2068	0.00	0.00	76.56	0.00	8.28	0.00	84.84	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2069	0.00	0.00	104.57	0.00	1.09	0.00	105.65	51.70	53.04	580.04	78.05	114.49	189.68	197.82
2070	0.00	0.00	15.86	0.00	8.92	0.00	24.79	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2071	0.00	0.00	0.00	0.00	18.96	0.00	18.96	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2072	0.00	0.00	78.10	0.00	29.89	0.00	108.00	51.70	53.04	580.04	78.05	114.49	189.68	197.82
2073	0.00	0.00	106.67	0.00	2.62	0.00	109.29	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2074	0.00	0.00	95.07	0.00	11.73	0.00	106.80	51.70	51.90	580.04	78.05	114.49	189.68	197.82
2075	0.00	0.00	107.74	0.00	31.87	0.00	139.62	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2076	0.00	0.00	16.34	0.00	16.73	0.00	33.07	51.70	51.05	580.04	78.05	114.49	189.68	197.82
2077	0.00	0.00	0.00	0.00	28.23	0.00	28.23	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2078	0.00	0.00	0.00	0.00	58.27	0.00	58.27	51.70	50.19	580.04	78.05	114.49	189.68	197.82
2079	0.00	0.00	0.00	0.00	64.80	0.00	64.80	51.70	37.81	580.04	78.05	114.49	189.68	197.82
2080	0.00	0.00	0.00	0.00	129.62	0.00	129.62	51.70	51.90	580.04	78.05	114.49	189.68	197.82
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	54.75	580.04	78.05	114.49	189.68	197.82
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	36.68	580.04	78.05	114.49	189.68	197.82
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	51.90	580.04	78.05	114.49	189.68	197.82
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	34.97	580.04	78.05	114.49	189.68	197.82
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	37.81	580.04	78.05	114.49	189.68	197.82
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.70	34.97	580.04	78.05	114.49	189.68	197.82
Salvage Value	38.68	0.00	21.14	0.00	32.03	0.00	91.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3958.91	2766.90	327.21	0.00	495.32	0.00	7548.33	1019.32	620.27	16538.29	2512.80	1679.12	4142.47	8203.91

Net Present Value: -984

SCGT/C26

TABLE 328
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	417.37	99.35	32.88	116.75	168.40
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	432.48	97.54	35.06	119.84	180.03
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	472.08	95.95	36.24	125.32	214.57
2018	209.58	0.00	0.35	0.00	0.00	0.00	209.93	3.23	0.00	449.90	93.20	39.51	130.92	186.28
2019	251.91	0.00	0.00	0.00	0.00	0.00	251.91	4.49	0.00	433.63	91.30	35.01	133.72	173.60
2020	257.96	0.00	91.42	0.00	0.00	0.00	349.37	6.13	0.00	463.06	91.33	27.80	139.80	204.14
2021	711.05	0.00	117.02	0.00	9.12	0.00	837.18	10.21	0.00	454.53	89.60	26.18	152.68	186.06
2022	1141.50	0.00	14.50	0.00	0.53	0.00	1156.53	15.99	3.92	442.53	87.43	48.67	158.09	148.33
2023	1024.89	0.00	0.00	0.00	1.05	0.00	1025.94	21.12	3.92	422.83	85.11	61.50	168.98	107.24
2024	731.88	0.00	0.00	0.00	2.11	0.00	733.99	24.79	3.92	417.90	83.98	66.96	176.55	90.41
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	27.35	3.92	373.67	84.48	41.54	158.31	89.34
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	29.02	17.97	476.70	88.35	31.60	125.97	230.78
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	29.64	18.18	682.76	96.00	29.25	114.02	443.50
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	29.83	17.90	717.67	96.01	32.02	125.14	464.50
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	18.11	685.72	94.33	33.00	127.35	431.05
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.94	658.21	93.16	32.54	122.79	409.72
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.89	630.93	91.23	35.45	128.29	375.96
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.66	587.75	89.37	37.75	128.64	331.99
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.23	559.21	87.48	44.34	133.99	293.40
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.23	545.29	85.95	51.17	142.67	265.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.83	17.27	532.02	84.67	56.93	148.35	242.06
2036	0.00	0.00	75.80	0.00	0.00	0.00	75.80	30.21	19.95	525.23	83.62	57.49	157.43	226.69
2037	0.00	0.00	103.57	0.00	9.12	0.00	112.69	30.77	17.10	510.36	82.15	58.52	174.19	195.50
2038	0.00	0.00	15.71	0.00	0.00	0.00	15.71	30.85	21.02	497.06	80.68	90.33	172.43	153.61
2039	0.00	0.00	76.94	0.00	0.00	0.00	76.94	31.24	21.02	484.58	79.45	98.10	188.30	118.73
2040	0.00	0.00	107.13	0.00	71.81	0.00	178.94	32.12	21.02	475.01	78.14	97.51	209.42	89.93
2041	0.00	0.00	93.66	0.00	0.00	0.00	93.66	32.59	24.95	457.56	76.52	137.67	208.98	34.39
2042	0.00	0.00	106.14	0.00	0.00	0.00	106.14	33.12	24.30	439.90	75.22	154.93	216.68	-6.92
2043	0.00	0.00	94.60	0.00	0.00	0.00	94.60	33.59	28.21	430.83	73.93	173.62	230.68	-47.40
2044	0.00	0.00	107.21	0.00	60.41	0.00	167.62	34.43	28.21	416.83	72.65	175.94	255.05	-86.82
2045	0.00	0.00	16.26	0.00	0.00	0.00	16.26	34.51	32.15	405.92	71.35	241.42	239.73	-146.57
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	35.00	392.99	70.21	266.39	247.14	-190.75
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.16	379.61	68.91	271.33	275.77	-236.40
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.17	392.84	70.15	259.71	254.21	-191.24
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.17	392.84	70.15	259.71	254.21	-191.24
2050	0.00	0.00	69.99	0.00	9.69	0.00	79.68	34.51	32.18	392.84	70.15	259.71	254.21	-191.24
2051	0.00	0.00	95.59	0.00	9.69	0.00	105.28	34.51	33.89	392.84	70.15	259.71	254.21	-191.24
2052	0.00	0.00	14.50	0.00	9.69	0.00	24.19	34.51	33.90	392.84	70.15	259.71	254.21	-191.24
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	392.84	70.15	259.71	254.21	-191.24
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	392.84	70.15	259.71	254.21	-191.24
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	392.84	70.15	259.71	254.21	-191.24
2056	0.00	0.00	0.00	0.00	9.12	0.00	9.12	34.51	35.04	392.84	70.15	259.71	254.21	-191.24
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2066	0.00	0.00	75.80	0.00	0.00	0.00	75.80	34.51	35.04	392.84	70.15	259.71	254.21	-191.24
2067	0.00	0.00	103.53	0.00	0.00	0.00	103.53	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2068	0.00	0.00	15.71	0.00	0.00	0.00	15.71	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2069	0.00	0.00	76.94	0.00	0.00	0.00	76.94	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2070	0.00	0.00	105.09	0.00	0.00	0.00	105.09	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2071	0.00	0.00	93.66	0.00	0.00	0.00	93.66	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2072	0.00	0.00	106.14	0.00	9.64	0.00	115.79	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2073	0.00	0.00	94.60	0.00	1.05	0.00	95.65	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2074	0.00	0.00	107.21	0.00	2.11	0.00	109.31	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2075	0.00	0.00	16.26	0.00	58.59	0.00	74.86	34.51	47.41	392.84	70.15	259.71	254.21	-191.24
2076	0.00	0.00	0.00	0.00	2.11	0.00	2.11	34.51	35.04	392.84	70.15	259.71	254.21	-191.24
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	49.12	392.84	70.15	259.71	254.21	-191.24
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	33.90	392.84	70.15	259.71	254.21	-191.24
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	34.51	49.12	392.84	70.15	259.71	254.21	-191.24
2080	0.00	0.00	69.99	0.00	0.00	0.00	69.99	34.51	33.90	392.84	70.15	259.71	254.21	-191.24
2081	0.00	0.00	95.59	0.00	0.00	0.00	95.59	34.51	49.12	392.84	70.15	259.71	254.21	-191.24
2082	0.00	0.00	14.50	0.00	0.00	0.00	14.50	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	35.04	392.84	70.15	259.71	254.21	-191.24
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
2090	0.00	0.00	0.00	0.00	17.95	0.00	17.95	34.51	32.19	392.84	70.15	259.71	254.21	-191.24
Salvage Value	15.19	0.00	35.15	0.00	10.26	0.00	60.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	676.53	0.00	132.97	0.00	5188.63	684.15	509.81	13099.53	2369.24	3295.94	5116.69	2317.66

Net Present Value: -4065

CCGT/C26

TABLE 329
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	417.37	99.35	32.88	116.75	168.40
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	432.48	97.54	35.06	119.84	180.03
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	472.08	95.95	36.24	125.32	214.57
2018	209.58	0.00	0.35	0.00	0.00	0.00	209.93	3.23	0.00	449.90	93.20	39.51	130.92	186.28
2019	251.91	0.00	143.56	0.00	0.00	0.00	395.47	5.21	0.00	433.63	91.30	35.01	133.72	173.60
2020	257.96	0.00	228.83	0.00	0.00	0.00	486.78	7.54	0.00	463.06	91.33	27.80	139.80	204.14
2021	711.05	0.00	114.32	0.00	9.12	0.00	834.49	11.60	0.00	464.58	90.36	23.10	149.91	201.21
2022	1141.50	0.00	6.83	0.00	0.53	0.00	1148.86	17.35	6.79	486.98	87.94	95.03	126.85	177.16
2023	1024.89	0.00	0.00	0.00	1.05	0.00	1025.94	22.47	6.79	478.75	85.93	109.48	135.08	148.26
2024	731.88	0.00	0.00	0.00	2.11	0.00	733.99	26.14	6.79	479.19	84.97	116.52	139.78	137.92
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	28.70	6.79	433.88	84.66	98.43	131.09	119.70
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	30.38	20.85	524.93	88.28	84.40	108.75	243.50
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	30.99	21.06	725.38	95.98	74.05	99.84	455.51
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	31.18	20.78	762.17	96.15	76.03	108.92	481.07
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.99	734.01	94.46	83.35	108.26	447.95
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.82	695.03	92.38	90.70	108.06	403.89
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.77	706.29	92.35	86.43	104.48	423.03
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.54	651.79	89.53	97.59	108.57	356.10
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.11	625.02	87.92	103.53	109.10	324.46
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.11	601.47	85.95	114.07	116.00	285.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	20.15	588.12	84.52	122.60	121.10	259.89
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.18	22.83	571.41	82.92	134.48	127.99	226.01
2037	0.00	0.00	76.18	0.00	0.00	0.00	76.18	31.57	19.98	569.31	82.21	138.68	131.10	217.33
2038	0.00	0.00	104.09	0.00	9.12	0.00	113.21	32.13	19.98	561.54	81.04	141.27	143.09	196.14
2039	0.00	0.00	15.78	0.00	0.00	0.00	15.78	32.21	23.90	545.83	79.31	169.56	154.80	142.17
2040	0.00	0.00	77.33	0.00	0.00	0.00	77.33	32.60	23.90	531.91	77.91	181.35	164.51	108.13
2041	0.00	0.00	107.66	0.00	71.81	0.00	179.46	33.48	23.90	518.14	76.62	189.24	176.77	75.51
2042	0.00	0.00	94.13	0.00	0.00	0.00	94.13	33.95	27.18	508.67	75.32	205.72	190.05	37.58
2043	0.00	0.00	106.67	0.00	0.00	0.00	106.67	34.49	27.18	489.85	73.94	232.93	190.78	-7.80
2044	0.00	0.00	16.18	0.00	0.00	0.00	16.18	34.57	31.09	476.47	72.65	257.08	199.06	-52.33
2045	0.00	0.00	79.28	0.00	0.00	0.00	79.28	34.97	31.09	461.50	71.36	264.92	217.73	-92.51
2046	0.00	0.00	108.28	0.00	60.41	0.00	168.69	35.81	33.95	453.68	70.48	264.09	235.13	-116.01
2047	0.00	0.00	16.43	0.00	0.00	0.00	16.43	35.89	35.03	429.38	68.93	316.91	229.42	-185.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.04	448.19	70.26	281.97	227.42	-131.47
2049	0.00	0.00	143.56	0.00	9.69	0.00	153.25	35.89	35.05	448.19	70.26	281.97	227.42	-131.47
2050	0.00	0.00	207.40	0.00	9.69	0.00	217.09	35.89	35.05	448.19	70.26	281.97	227.42	-131.47
2051	0.00	0.00	92.89	0.00	9.69	0.00	102.58	35.89	36.76	448.19	70.26	281.97	227.42	-131.47
2052	0.00	0.00	6.83	0.00	9.69	0.00	16.52	35.89	36.77	448.19	70.26	281.97	227.42	-131.47
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.77	448.19	70.26	281.97	227.42	-131.47
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	448.19	70.26	281.97	227.42	-131.47
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	448.19	70.26	281.97	227.42	-131.47
2056	0.00	0.00	0.00	0.00	9.12	0.00	9.12	35.89	37.92	448.19	70.26	281.97	227.42	-131.47
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	37.92	448.19	70.26	281.97	227.42	-131.47
2067	0.00	0.00	76.18	0.00	0.00	0.00	76.18	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2068	0.00	0.00	104.05	0.00	0.00	0.00	104.05	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2069	0.00	0.00	15.78	0.00	0.00	0.00	15.78	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2070	0.00	0.00	77.33	0.00	0.00	0.00	77.33	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2071	0.00	0.00	105.61	0.00	0.00	0.00	105.61	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2072	0.00	0.00	94.13	0.00	0.53	0.00	94.65	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2073	0.00	0.00	106.67	0.00	10.17	0.00	116.84	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2074	0.00	0.00	16.18	0.00	2.11	0.00	18.29	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2075	0.00	0.00	79.28	0.00	4.74	0.00	84.02	35.89	50.29	448.19	70.26	281.97	227.42	-131.47
2076	0.00	0.00	108.28	0.00	55.96	0.00	164.24	35.89	37.92	448.19	70.26	281.97	227.42	-131.47
2077	0.00	0.00	16.43	0.00	0.00	0.00	16.43	35.89	52.00	448.19	70.26	281.97	227.42	-131.47
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.78	448.19	70.26	281.97	227.42	-131.47
2079	0.00	0.00	143.56	0.00	0.00	0.00	143.56	35.89	52.00	448.19	70.26	281.97	227.42	-131.47
2080	0.00	0.00	207.40	0.00	0.00	0.00	207.40	35.89	36.78	448.19	70.26	281.97	227.42	-131.47
2081	0.00	0.00	92.89	0.00	45.31	0.00	138.20	35.89	52.00	448.19	70.26	281.97	227.42	-131.47
2082	0.00	0.00	6.83	0.00	0.00	0.00	6.83	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	37.92	448.19	70.26	281.97	227.42	-131.47
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.07	448.19	70.26	281.97	227.42	-131.47
Salvage Value	15.19	0.00	55.03	0.00	9.23	0.00	79.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	983.31	0.00	129.36	0.00	5491.80	713.60	563.34	14286.68	2372.87	4208.78	4529.64	3175.40

Net Present Value: -3593

Wind/C26

TABLE 330
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.54	61.86	0.00	0.00	9.69	0.00	102.09	0.51	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.06	0.00	0.00	0.00	9.69	0.00	48.75	0.75	0.00	417.37	99.35	32.88	116.76	168.39
2016	86.32	0.00	0.00	0.00	9.69	0.00	96.01	1.23	0.00	432.48	97.54	35.06	119.86	180.01
2017	180.14	0.00	0.00	0.00	9.69	0.00	189.83	2.18	0.00	472.09	95.95	36.24	125.31	214.59
2018	209.58	0.00	0.00	0.00	0.00	0.00	209.58	3.23	0.00	449.90	93.20	39.51	130.91	186.29
2019	251.91	0.00	0.00	0.00	0.00	0.00	251.91	4.49	0.00	433.63	91.30	35.01	133.73	173.59
2020	257.96	0.00	0.00	9.41	13.30	0.00	280.67	5.89	0.00	458.09	90.91	29.78	141.09	196.31
2021	711.05	0.00	0.00	287.40	22.16	0.00	1020.61	11.00	0.00	449.74	89.18	28.76	153.72	178.08
2022	1141.50	0.00	0.00	292.78	27.12	0.00	1461.40	18.30	6.10	459.01	87.58	28.68	155.99	186.75
2023	1024.89	0.00	0.00	283.36	14.35	0.00	1322.60	24.92	12.20	456.06	85.16	32.72	161.63	176.53
2024	731.88	0.00	0.00	5.38	6.54	0.00	743.80	28.64	18.31	460.30	83.31	33.45	168.02	175.52
2025	506.87	0.00	0.00	0.00	4.74	0.00	511.61	31.19	18.31	410.84	83.23	21.99	176.08	129.54
2026	332.93	0.00	0.00	0.00	2.11	0.00	335.03	32.87	32.36	551.05	87.13	26.12	125.10	312.69
2027	122.62	0.00	0.00	0.00	0.00	0.00	122.62	33.48	32.58	757.89	94.77	23.59	111.56	527.97
2028	38.69	0.00	0.00	0.00	0.00	0.00	38.69	33.68	32.29	785.25	94.57	25.71	121.53	543.43
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.50	755.15	92.95	26.10	123.95	512.15
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.33	734.51	91.92	25.49	121.16	495.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	32.28	718.71	90.51	26.40	123.83	477.98
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	33.68	32.05	685.54	89.14	26.33	122.65	447.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.68	31.62	645.23	87.67	26.20	119.47	411.88
2034	0.00	0.00	96.48	0.00	0.00	0.00	96.48	34.05	31.62	613.34	86.25	26.37	121.28	379.44
2035	0.00	0.00	123.93	0.00	9.12	0.00	133.05	34.61	31.66	602.17	85.26	24.40	126.91	365.61
2036	0.00	0.00	91.35	0.00	0.00	0.00	91.35	35.07	38.26	578.64	83.22	45.38	133.42	316.63
2037	0.00	0.00	103.57	0.00	9.12	0.00	112.69	35.63	35.41	562.13	81.78	51.23	142.69	286.44
2038	0.00	0.00	15.71	0.00	0.00	0.00	15.71	35.71	39.32	553.77	80.54	66.59	149.12	257.51
2039	0.00	0.00	76.94	0.00	0.00	0.00	76.94	36.09	39.32	545.18	79.39	65.63	169.96	230.20
2040	0.00	0.00	107.13	9.41	71.81	0.00	188.35	37.02	39.32	523.93	77.74	84.66	175.95	185.57
2041	0.00	0.00	93.66	287.40	0.00	0.00	381.06	38.93	43.25	511.51	76.37	103.64	185.14	146.36
2042	0.00	0.00	106.14	292.78	0.00	0.00	398.92	40.92	42.61	496.77	75.10	108.43	199.38	113.86
2043	0.00	0.00	94.60	283.36	0.00	0.00	377.96	42.81	46.52	487.15	73.83	121.18	216.06	76.08
2044	0.00	0.00	107.21	5.38	60.41	0.00	173.00	43.68	46.52	466.07	72.49	152.60	213.78	27.19
2045	0.00	0.00	16.26	0.00	0.00	0.00	16.26	43.76	50.45	453.80	71.25	178.11	222.37	-17.93
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	53.31	438.79	70.01	181.79	244.17	-57.17
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.47	425.17	68.79	184.57	270.53	-98.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.47	439.25	70.01	181.49	245.69	-57.94
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.48	439.25	70.01	181.49	245.69	-57.94
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.48	439.25	70.01	181.49	245.69	-57.94
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2055	0.00	0.00	0.00	0.00	3.32	0.00	3.32	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2056	0.00	0.00	0.00	0.00	5.54	0.00	5.54	43.76	53.34	439.25	70.01	181.49	245.69	-57.94
2057	0.00	0.00	0.00	0.00	6.65	0.00	6.65	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2058	0.00	0.00	0.00	0.00	3.32	0.00	3.32	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2059	0.00	0.00	0.00	0.00	1.11	0.00	1.11	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2060	0.00	0.00	0.00	9.41	0.00	0.00	9.41	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2061	0.00	0.00	0.00	287.40	0.00	0.00	287.40	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2062	0.00	0.00	0.00	292.78	0.00	0.00	292.78	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2063	0.00	0.00	0.00	283.36	0.00	0.00	283.36	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2064	0.00	0.00	75.05	5.38	0.00	0.00	80.43	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2065	0.00	0.00	102.50	0.00	0.00	0.00	102.50	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2066	0.00	0.00	91.35	0.00	0.00	0.00	91.35	43.76	53.34	439.25	70.01	181.49	245.69	-57.94
2067	0.00	0.00	103.53	0.00	0.00	0.00	103.53	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2068	0.00	0.00	15.71	0.00	0.00	0.00	15.71	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2069	0.00	0.00	76.94	0.00	0.00	0.00	76.94	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2070	0.00	0.00	105.09	0.00	19.09	0.00	124.18	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2071	0.00	0.00	93.66	0.00	16.62	0.00	110.28	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2072	0.00	0.00	106.14	0.00	29.59	0.00	135.73	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2073	0.00	0.00	94.60	0.00	11.03	0.00	105.62	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2074	0.00	0.00	107.21	0.00	5.43	0.00	112.64	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2075	0.00	0.00	16.26	0.00	58.59	0.00	74.86	43.76	65.72	439.25	70.01	181.49	245.69	-57.94
2076	0.00	0.00	0.00	0.00	2.11	0.00	2.11	43.76	53.34	439.25	70.01	181.49	245.69	-57.94
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	67.43	439.25	70.01	181.49	245.69	-57.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2079	0.00	0.00	0.00	0.00	45.31	0.00	45.31	43.76	67.43	439.25	70.01	181.49	245.69	-57.94
2080	0.00	0.00	0.00	9.41	0.00	0.00	9.41	43.76	52.20	439.25	70.01	181.49	245.69	-57.94
2081	0.00	0.00	0.00	287.40	0.00	0.00	287.40	43.76	67.43	439.25	70.01	181.49	245.69	-57.94
2082	0.00	0.00	0.00	292.78	0.00	0.00	292.78	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2083	0.00	0.00	0.00	283.36	0.00	0.00	283.36	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2084	0.00	0.00	0.00	5.38	9.69	0.00	15.07	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	53.34	439.25	70.01	181.49	245.69	-57.94
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
2090	0.00	0.00	0.00	0.00	17.95	0.00	17.95	43.76	50.50	439.25	70.01	181.49	245.69	-57.94
Salvage Value	15.19	0.00	27.13	44.54	13.92	0.00	100.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4317.27	61.86	587.41	1254.53	201.65	0.00	6422.72	821.60	850.83	14245.21	2361.22	2376.29	4903.98	4603.72

Net Present Value -3491

K19/C25/750MW (WPS Sale &Inv)

TABLE 331
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**High**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	4.77	308.38	1.54	0.00	358.24	101.24	28.78	111.56	116.66
2015	86.56	537.27	0.00	0.00	21.36	8.59	653.78	4.81	0.00	406.48	99.37	32.88	116.91	157.32
2016	195.77	714.27	0.00	0.00	30.34	22.12	962.50	9.62	0.00	421.54	97.56	35.11	120.12	168.74
2017	231.66	866.06	0.00	0.00	45.80	32.26	1175.77	15.50	0.00	454.19	95.60	37.61	127.04	193.93
2018	278.90	617.26	0.00	0.00	51.31	130.38	1077.85	20.89	0.00	437.33	93.52	38.51	130.21	175.09
2019	286.07	433.17	0.00	0.00	64.96	108.94	893.13	25.36	12.78	471.97	93.46	35.97	130.92	211.62
2020	789.91	179.32	0.00	0.00	4.17	194.97	1168.37	31.20	44.08	743.40	100.59	28.16	149.83	464.81
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	38.12	42.24	812.89	101.21	30.70	165.27	515.71
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	43.96	40.92	815.51	100.07	30.71	170.12	514.60
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	48.27	39.11	776.92	97.80	30.33	175.50	473.29
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	51.50	37.57	750.59	95.59	33.47	184.95	436.58
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	53.88	50.01	840.45	100.09	29.55	138.22	572.59
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	55.17	48.49	1098.48	108.12	29.45	139.24	821.67
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	55.39	47.09	1143.10	108.03	28.82	153.34	852.91
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	46.10	1127.58	106.41	29.77	156.97	834.43
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	47.36	1099.01	104.53	29.84	161.29	803.35
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	42.28	1078.66	103.23	29.28	159.38	786.78
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	40.98	1066.18	101.61	29.88	164.57	770.11
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	39.52	1031.05	99.98	30.00	163.68	737.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	38.53	997.24	98.24	30.04	166.49	702.47
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	37.61	966.10	96.55	30.32	170.60	668.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	38.86	933.35	94.91	30.08	162.77	645.59
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	35.47	874.19	93.33	30.66	137.75	612.45
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	55.39	34.96	835.13	91.75	30.83	137.70	574.87
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.39	34.46	801.43	90.12	30.81	142.86	537.64
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	55.94	36.82	770.71	88.54	30.77	155.54	495.86
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	56.75	33.50	788.86	87.28	29.34	171.72	500.53
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	56.87	36.31	768.01	85.30	53.15	174.75	454.81
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	57.43	35.87	751.70	83.77	59.17	186.64	422.13
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	58.26	35.44	740.03	82.41	62.24	201.31	394.08
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	58.94	40.65	736.81	81.22	71.89	215.13	368.58
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	60.19	43.10	706.64	79.39	93.06	220.73	313.46
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	60.31	43.79	690.13	77.96	112.89	229.56	269.72
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	42.56	674.81	76.71	118.10	244.74	235.26
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	41.34	690.53	78.02	108.02	231.68	272.81
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	60.31	43.83	690.53	78.02	108.02	231.68	272.81
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	60.31	42.36	690.53	78.02	108.02	231.68	272.81
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	60.31	42.03	690.53	78.02	108.02	231.68	272.81
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	60.31	41.72	690.53	78.02	108.02	231.68	272.81
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	60.31	41.42	690.53	78.02	108.02	231.68	272.81
2054	0.00	0.00	0.00	0.00	22.62	23.91	46.53	60.31	41.12	690.53	78.02	108.02	231.68	272.81
2055	0.00	0.00	0.00	0.00	1.03	24.80	25.82	60.31	41.96	690.53	78.02	108.02	231.68	272.81
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	60.31	54.06	690.53	78.02	108.02	231.68	272.81
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	60.31	38.57	690.53	78.02	108.02	231.68	272.81
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	60.31	53.53	690.53	78.02	108.02	231.68	272.81
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	60.31	40.90	690.53	78.02	108.02	231.68	272.81
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	60.31	50.37	690.53	78.02	108.02	231.68	272.81
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	65.59	690.53	78.02	108.02	231.68	272.81
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	60.31	65.59	690.53	78.02	108.02	231.68	272.81
2065	0.00	0.00	0.00	0.00	11.14	5.40	16.54	60.31	37.99	690.53	78.02	108.02	231.68	272.81
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	60.31	65.59	690.53	78.02	108.02	231.68	272.81
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	60.31	65.59	690.53	78.02	108.02	231.68	272.81
2069	0.00	0.00	110.19	0.00	42.33	72.88	225.41	60.31	37.99	690.53	78.02	108.02	231.68	272.81
2070	0.00	0.00	150.79	0.00	3.15	75.58	229.52	60.31	52.08	690.53	78.02	108.02	231.68	272.81
2071	0.00	0.00	22.92	0.00	38.41	0.00	61.33	60.31	36.85	690.53	78.02	108.02	231.68	272.81
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	60.31	52.08	690.53	78.02	108.02	231.68	272.81
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	60.31	36.00	690.53	78.02	108.02	231.68	272.81
2074	0.00	0.00	137.51	0.00	60.40	0.00	197.91	60.31	50.37	690.53	78.02	108.02	231.68	272.81
2075	0.00	0.00	156.15	0.00	90.26	0.00	246.41	60.31	37.99	690.53	78.02	108.02	231.68	272.81
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	60.31	52.08	690.53	78.02	108.02	231.68	272.81
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	36.85	690.53	78.02	108.02	231.68	272.81
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	60.31	52.08	690.53	78.02	108.02	231.68	272.81
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	39.70	690.53	78.02	108.02	231.68	272.81
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	60.31	52.08	690.53	78.02	108.02	231.68	272.81
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	60.31	37.99	690.53	78.02	108.02	231.68	272.81
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	60.31	35.14	690.53	78.02	108.02	231.68	272.81
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	60.31	37.99	690.53	78.02	108.02	231.68	272.81
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	60.31	37.99	690.53	78.02	108.02	231.68	272.81
Salvage Value	8.35	0.00	31.34	0.00	41.94	20.84	102.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	456.50	0.00	669.64	485.37	9855.57	1331.82	974.39	21117.45	2597.27	1604.68	4998.85	11916.65

Net Present Value -245

K19/C25/750MW

TABLE 332
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	6.54	310.15	1.55	0.00	364.12	101.24	28.76	111.11	123.01
2015	86.56	537.27	0.00	0.00	21.36	10.72	655.91	4.83	0.00	415.02	99.36	32.87	116.83	165.96
2016	195.77	714.27	0.00	0.00	30.34	23.04	963.42	9.65	0.00	429.97	97.55	35.07	119.93	177.41
2017	231.66	866.06	0.00	0.00	45.80	32.26	1175.77	15.53	0.00	464.09	95.60	37.63	126.83	204.02
2018	278.90	617.26	0.00	0.00	51.31	180.76	1128.23	21.17	0.00	447.37	93.51	38.40	130.05	185.41
2019	286.07	433.17	0.00	0.00	64.96	127.16	911.35	25.72	12.78	481.40	93.45	35.95	130.68	221.33
2020	789.91	179.32	0.00	0.00	4.17	336.85	1310.26	32.28	47.15	766.23	100.58	28.13	148.43	489.08
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	39.19	45.41	829.69	101.21	30.89	164.36	533.23
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	45.04	44.12	831.42	100.07	30.71	169.06	531.57
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	49.35	42.17	793.80	97.79	30.33	174.25	491.44
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	52.57	40.51	767.66	95.58	33.54	183.79	454.75
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	54.95	52.82	858.53	100.08	29.60	135.82	593.03
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	56.25	51.19	1110.18	108.13	29.59	133.39	839.06
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	56.46	49.67	1144.12	108.05	28.59	139.27	868.21
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	48.57	1130.08	106.42	29.74	142.08	851.84
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	49.73	1104.57	104.53	29.81	146.70	823.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	44.54	1087.85	103.23	29.28	145.60	809.75
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	43.14	1080.52	101.60	30.01	150.89	798.01
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	41.59	1049.49	99.98	30.06	150.63	768.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	40.50	1018.96	98.26	29.98	153.05	737.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	39.49	992.33	96.57	30.16	157.71	707.89
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	40.66	923.95	94.98	30.38	132.17	666.43
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	37.19	887.46	93.34	30.70	132.40	631.02
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	56.46	36.60	855.78	91.73	30.75	136.15	597.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.46	36.04	823.03	90.12	30.75	140.89	561.27
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	57.01	38.33	793.05	88.54	30.83	153.33	520.35
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	57.83	34.95	791.41	87.27	29.35	169.18	505.62
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	57.94	37.70	765.96	85.30	53.15	172.39	455.12
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	58.50	37.20	750.27	83.77	59.17	184.73	422.60
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	59.33	36.72	738.81	82.41	62.24	199.60	394.56
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	60.02	41.87	735.96	81.22	71.89	213.63	369.23
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	61.27	44.26	705.67	79.39	93.06	219.35	313.87
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	61.39	44.90	689.14	77.96	112.89	228.17	270.13
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	43.62	673.50	76.71	118.10	243.12	235.57
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	42.35	689.44	78.02	108.02	230.21	273.19
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	61.39	44.80	689.44	78.02	108.02	230.21	273.19
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	61.39	43.28	689.44	78.02	108.02	230.21	273.19
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	61.39	42.91	689.44	78.02	108.02	230.21	273.19
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	61.39	42.55	689.44	78.02	108.02	230.21	273.19
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	61.39	42.21	689.44	78.02	108.02	230.21	273.19
2054	0.00	0.00	0.00	0.00	22.62	23.91	46.53	61.39	41.87	689.44	78.02	108.02	230.21	273.19
2055	0.00	0.00	0.00	0.00	1.03	24.80	25.82	61.39	42.68	689.44	78.02	108.02	230.21	273.19
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	61.39	54.74	689.44	78.02	108.02	230.21	273.19
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	61.39	39.21	689.44	78.02	108.02	230.21	273.19
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	61.39	54.14	689.44	78.02	108.02	230.21	273.19
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	61.39	41.48	689.44	78.02	108.02	230.21	273.19
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	61.39	50.37	689.44	78.02	108.02	230.21	273.19
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	65.59	689.44	78.02	108.02	230.21	273.19
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	61.39	65.59	689.44	78.02	108.02	230.21	273.19
2065	0.00	0.00	0.00	0.00	11.14	5.40	16.54	61.39	37.99	689.44	78.02	108.02	230.21	273.19
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	61.39	65.59	689.44	78.02	108.02	230.21	273.19
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	61.39	65.59	689.44	78.02	108.02	230.21	273.19
2069	0.00	0.00	110.19	0.00	42.33	72.88	225.41	61.39	37.99	689.44	78.02	108.02	230.21	273.19
2070	0.00	0.00	150.79	0.00	3.15	75.58	229.52	61.39	52.08	689.44	78.02	108.02	230.21	273.19
2071	0.00	0.00	22.92	0.00	38.41	0.00	61.33	61.39	36.85	689.44	78.02	108.02	230.21	273.19
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	61.39	52.08	689.44	78.02	108.02	230.21	273.19
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	61.39	36.00	689.44	78.02	108.02	230.21	273.19
2074	0.00	0.00	137.51	0.00	60.40	0.00	197.91	61.39	50.37	689.44	78.02	108.02	230.21	273.19
2075	0.00	0.00	156.15	0.00	90.26	0.00	246.41	61.39	37.99	689.44	78.02	108.02	230.21	273.19
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	61.39	52.08	689.44	78.02	108.02	230.21	273.19
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	36.85	689.44	78.02	108.02	230.21	273.19
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	61.39	52.08	689.44	78.02	108.02	230.21	273.19
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	39.70	689.44	78.02	108.02	230.21	273.19
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	61.39	52.08	689.44	78.02	108.02	230.21	273.19
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	61.39	37.99	689.44	78.02	108.02	230.21	273.19
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	61.39	35.14	689.44	78.02	108.02	230.21	273.19
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	61.39	37.99	689.44	78.02	108.02	230.21	273.19
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	61.39	37.99	689.44	78.02	108.02	230.21	273.19
Salvage Value	8.35	0.00	31.34	0.00	41.94	20.84	102.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	456.50	0.00	669.64	666.11	10036.31	1357.07	1010.79	21329.91	2597.27	1604.77	4885.86	12242.02

Net Present Value -162

K19/Gas25/750MW (WPS Sale & INV)

TABLE 333
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**High**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	4.77	277.01	1.39	0.00	358.24	101.24	28.78	111.56	116.66
2015	0.00	537.27	0.00	0.00	21.36	8.59	567.22	4.22	0.00	406.49	99.38	32.87	116.89	157.35
2016	0.00	714.27	0.00	0.00	30.34	22.12	766.73	8.05	0.00	421.47	97.56	35.09	120.03	168.78
2017	0.00	866.06	0.00	0.00	45.80	32.26	944.12	12.78	0.00	454.59	95.60	37.59	126.98	194.41
2018	0.00	617.26	0.00	0.00	51.31	130.38	798.95	16.77	0.00	438.03	93.52	38.43	130.13	175.94
2019	0.00	433.17	0.00	0.00	60.79	108.94	602.90	19.78	12.78	473.13	93.46	35.95	130.84	212.88
2020	0.00	179.32	0.00	0.00	0.01	194.97	374.30	21.66	44.08	745.25	100.58	28.13	149.64	466.88
2021	0.00	62.33	0.35	0.00	0.00	0.00	62.68	21.97	42.24	816.24	101.21	30.69	165.06	519.27
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.97	40.92	819.13	100.07	30.64	169.82	518.60
2023	0.00	0.00	119.98	0.00	0.00	0.00	119.98	22.46	39.11	777.19	97.28	32.35	175.26	472.31
2024	0.00	0.00	255.54	0.00	11.87	0.00	267.41	23.69	37.57	755.28	95.25	35.33	183.57	441.13
2025	0.00	0.00	158.35	0.00	93.47	0.00	251.83	24.94	39.87	712.91	94.98	34.36	159.98	423.59
2026	0.00	0.00	121.28	0.00	0.00	0.00	121.28	25.55	42.07	718.94	93.68	41.19	172.48	411.58
2027	0.00	0.00	137.72	0.00	0.00	0.00	137.72	26.23	40.80	695.94	91.74	40.47	186.70	377.04
2028	0.00	0.00	20.93	0.00	0.00	0.00	20.93	26.34	43.51	673.36	89.43	61.56	194.28	328.09
2029	0.00	0.00	102.77	0.00	0.00	0.00	102.77	26.85	44.95	652.55	87.65	68.39	205.07	291.43
2030	0.00	0.00	140.63	0.00	78.64	0.00	219.27	27.95	39.91	647.89	86.58	75.06	212.02	274.22
2031	0.00	0.00	125.59	0.00	0.00	0.00	125.59	28.58	42.71	661.42	86.24	82.47	216.87	275.84
2032	0.00	0.00	142.61	0.00	0.00	0.00	142.61	29.29	41.62	631.49	83.87	99.79	229.78	218.05
2033	0.00	0.00	21.68	0.00	0.00	0.00	21.68	29.40	44.48	618.91	82.36	119.60	239.35	177.59
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	43.45	614.24	81.63	127.32	245.28	160.01
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	42.03	540.99	79.53	120.84	236.54	104.07
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	41.50	471.83	78.10	121.71	204.22	67.81
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	40.99	443.69	76.71	133.26	207.51	26.21
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.40	40.49	440.26	75.98	132.10	221.70	10.48
2039	0.00	0.00	230.85	0.00	0.00	0.00	230.85	30.55	42.85	407.90	74.06	161.90	231.68	-59.74
2040	0.00	0.00	334.17	0.00	0.00	0.00	334.17	32.22	39.54	401.95	72.75	179.93	241.22	-91.94
2041	0.00	0.00	149.96	0.00	11.87	0.00	161.83	33.03	39.08	421.84	73.03	179.61	240.05	-70.86
2042	0.00	0.00	11.05	0.00	0.00	0.00	11.05	33.09	45.44	486.12	70.79	288.46	233.04	-106.17
2043	0.00	0.00	113.31	0.00	0.00	0.00	113.31	33.65	45.01	456.15	69.07	310.91	246.21	-170.04
2044	0.00	0.00	155.06	0.00	78.64	0.00	233.70	34.82	46.30	427.29	67.47	334.90	258.12	-233.20
2045	0.00	0.00	74.11	0.00	0.00	0.00	74.11	35.19	49.83	412.16	66.18	366.91	267.66	-288.60
2046	0.00	0.00	69.17	0.00	0.00	0.00	69.17	35.54	49.44	394.53	64.99	392.94	277.88	-341.29
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	35.59	49.62	386.52	64.22	408.99	289.88	-376.57
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	48.40	397.73	65.13	389.61	278.47	-335.48
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	35.59	50.90	397.73	65.13	389.61	278.47	-335.48
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	35.59	47.72	397.73	65.13	389.61	278.47	-335.48
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	35.59	47.40	397.73	65.13	389.61	278.47	-335.48
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	35.59	47.08	397.73	65.13	389.61	278.47	-335.48
2053	0.00	0.00	98.55	0.00	26.47	23.91	148.93	35.59	46.77	397.73	65.13	389.61	278.47	-335.48
2054	0.00	0.00	234.11	0.00	21.59	23.91	279.62	35.59	46.47	397.73	65.13	389.61	278.47	-335.48
2055	0.00	0.00	156.31	0.00	0.00	24.80	181.11	35.59	46.18	397.73	65.13	389.61	278.47	-335.48
2056	0.00	0.00	121.28	0.00	0.00	0.00	121.28	35.59	61.13	397.73	65.13	389.61	278.47	-335.48
2057	0.00	0.00	137.72	0.00	0.00	0.00	137.72	35.59	45.63	397.73	65.13	389.61	278.47	-335.48
2058	0.00	0.00	20.93	0.00	0.00	0.00	20.93	35.59	60.60	397.73	65.13	389.61	278.47	-335.48
2059	0.00	0.00	102.77	0.00	11.87	0.00	114.64	35.59	47.96	397.73	65.13	389.61	278.47	-335.48
2060	0.00	0.00	140.63	0.00	70.10	0.00	210.74	35.59	57.43	397.73	65.13	389.61	278.47	-335.48
2061	0.00	0.00	125.59	0.00	0.00	0.00	125.59	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2062	0.00	0.00	142.61	0.00	0.00	0.00	142.61	35.59	57.43	397.73	65.13	389.61	278.47	-335.48
2063	0.00	0.00	21.68	0.00	0.00	0.00	21.68	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2064	0.00	0.00	0.00	0.00	13.42	2.70	16.12	35.59	57.43	397.73	65.13	389.61	278.47	-335.48
2065	0.00	0.00	0.00	0.00	70.12	5.40	75.51	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2066	0.00	0.00	0.00	0.00	1.34	16.20	17.54	35.59	57.43	397.73	65.13	389.61	278.47	-335.48
2067	0.00	0.00	0.00	0.00	11.62	24.29	35.91	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	35.59	57.43	397.73	65.13	389.61	278.47	-335.48
2069	0.00	0.00	230.85	0.00	39.20	72.88	342.93	35.59	45.05	397.73	65.13	389.61	278.47	-335.48
2070	0.00	0.00	334.17	0.00	0.01	75.58	409.76	35.59	43.92	397.73	65.13	389.61	278.47	-335.48
2071	0.00	0.00	149.96	0.00	0.00	0.00	149.96	35.59	43.92	397.73	65.13	389.61	278.47	-335.48
2072	0.00	0.00	11.05	0.00	0.00	0.00	11.05	35.59	43.92	397.73	65.13	389.61	278.47	-335.48
2073	0.00	0.00	113.31	0.00	0.00	0.00	113.31	35.59	43.06	397.73	65.13	389.61	278.47	-335.48
2074	0.00	0.00	155.06	0.00	0.00	0.00	155.06	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2075	0.00	0.00	74.11	0.00	23.37	0.00	97.48	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2076	0.00	0.00	69.17	0.00	11.87	0.00	81.04	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	35.59	45.05	397.73	65.13	389.61	278.47	-335.48
2080	0.00	0.00	0.00	0.00	19.66	0.00	19.66	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2083	0.00	0.00	98.55	0.00	0.00	0.00	98.55	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2084	0.00	0.00	234.11	0.00	10.63	0.89	245.63	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2085	0.00	0.00	156.31	0.00	10.22	1.77	168.30	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2086	0.00	0.00	121.28	0.00	29.00	5.31	155.60	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2087	0.00	0.00	137.72	0.00	34.18	7.97	179.87	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2088	0.00	0.00	20.93	0.00	26.47	23.91	71.31	35.59	42.21	397.73	65.13	389.61	278.47	-335.48
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	35.59	45.05	397.73	65.13	389.61	278.47	-335.48
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	35.59	45.05	397.73	65.13	389.61	278.47	-335.48
Salvage Value	0.00	0.00	97.84	0.00	23.77	20.84	142.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	1803.55	0.00	451.84	485.37	6067.10	750.60	1020.30	14772.73	2334.79	4945.71	5966.11	1526.12

Net Present Value -6312

K19/C31/750MW

TABLE 334
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	248.19	0.00	0.00	24.05	6.54	309.50	1.55	0.00	364.12	101.24	28.76	111.11	123.01
2015	38.79	537.27	0.00	0.00	21.36	10.72	608.15	4.59	0.00	415.02	99.36	32.87	116.83	165.96
2016	10.56	714.27	0.00	0.00	30.34	23.04	778.21	8.48	0.00	429.97	97.55	35.08	119.91	177.42
2017	10.64	866.06	0.00	0.00	45.80	32.26	954.76	13.25	0.00	464.64	95.59	37.63	126.80	204.62
2018	12.67	617.26	0.00	0.00	51.31	180.76	862.00	17.56	0.00	448.05	93.50	38.39	129.98	186.18
2019	12.77	433.17	0.00	0.00	60.79	127.16	633.89	20.73	12.78	482.55	93.44	36.00	130.67	222.44
2020	12.87	179.32	0.00	0.00	0.01	336.85	529.05	23.38	47.15	768.21	100.57	28.19	148.21	491.24
2021	16.31	62.33	0.00	0.00	0.00	0.00	78.63	23.77	45.41	832.49	101.20	30.82	163.98	536.50
2022	181.28	0.00	0.00	0.00	0.00	0.00	181.28	24.68	44.12	835.52	100.08	30.66	168.80	535.98
2023	274.96	0.00	0.00	0.00	0.00	0.00	274.96	26.05	42.17	791.90	97.17	32.75	174.57	487.40
2024	301.80	0.00	0.00	0.00	0.00	0.00	301.80	27.56	40.51	768.83	95.05	36.16	184.10	453.51
2025	308.20	0.00	0.00	0.00	4.16	0.00	312.36	29.12	38.77	726.85	95.00	26.02	167.05	438.77
2026	836.68	0.00	0.00	0.00	4.16	0.00	840.85	33.33	36.92	707.21	93.11	26.77	185.31	402.03
2027	1332.35	0.00	0.00	0.00	50.75	0.00	1383.10	40.24	35.54	654.18	91.26	25.33	178.67	358.93
2028	1198.48	0.00	0.00	0.00	26.56	0.00	1225.03	46.37	34.22	628.52	89.68	26.29	194.40	318.15
2029	857.44	0.00	0.00	0.00	44.79	0.00	902.23	50.88	35.55	607.20	88.09	27.07	215.61	276.43
2030	594.94	0.00	0.00	0.00	77.88	0.00	672.82	54.24	30.41	599.97	86.78	27.60	233.91	251.68
2031	391.50	0.00	0.00	0.00	103.08	0.00	494.58	56.72	43.23	720.18	90.74	31.91	150.70	446.84
2032	144.46	0.00	0.00	0.00	120.74	0.00	265.20	58.04	42.25	961.90	97.91	31.40	139.96	692.63
2033	45.67	0.00	0.00	0.00	0.00	0.00	45.67	58.27	40.96	1024.02	98.34	30.76	153.84	741.09
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	40.05	992.47	96.57	30.15	157.65	708.10
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	38.37	922.80	94.97	30.18	132.02	665.62
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	37.71	887.48	93.34	30.88	132.55	630.71
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	58.27	36.95	856.38	91.74	30.82	136.24	597.59
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.27	36.03	823.12	90.12	30.74	140.87	561.40
2039	0.00	0.00	131.62	0.00	0.00	0.00	131.62	58.82	38.39	793.15	88.55	30.81	153.34	520.46
2040	0.00	0.00	172.22	0.00	11.87	0.00	184.09	59.63	35.12	791.42	87.27	29.34	169.18	505.64
2041	0.00	0.00	22.92	0.00	0.00	0.00	22.92	59.75	41.20	765.95	85.30	53.15	172.35	455.15
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	60.31	37.85	750.27	83.77	59.17	184.68	422.65
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	61.14	37.36	738.81	82.41	62.24	199.55	394.61
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	61.83	42.52	735.96	81.22	71.89	213.64	369.22
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	63.08	42.06	705.67	79.39	93.06	219.34	313.88
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	63.20	45.55	689.14	77.96	112.89	228.19	270.11
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	43.62	673.50	76.71	118.10	243.09	235.61
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	42.35	689.44	78.02	108.02	230.20	273.20
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	63.20	44.80	689.44	78.02	108.02	230.20	273.20
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	63.20	41.57	689.44	78.02	108.02	230.20	273.20
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	63.20	44.05	689.44	78.02	108.02	230.20	273.20
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	63.20	40.84	689.44	78.02	108.02	230.20	273.20
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	63.20	40.50	689.44	78.02	108.02	230.20	273.20
2054	0.00	0.00	0.00	0.00	21.59	23.91	45.50	63.20	40.16	689.44	78.02	108.02	230.20	273.20
2055	0.00	0.00	0.00	0.00	0.00	24.80	24.80	63.20	39.83	689.44	78.02	108.02	230.20	273.20
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	56.45	689.44	78.02	108.02	230.20	273.20
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	40.92	689.44	78.02	108.02	230.20	273.20
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	55.85	689.44	78.02	108.02	230.20	273.20
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	43.18	689.44	78.02	108.02	230.20	273.20
2060	0.00	0.00	0.00	0.00	1.03	0.00	1.03	63.20	52.08	689.44	78.02	108.02	230.20	273.20
2061	0.00	0.00	0.00	0.00	1.03	0.00	1.03	63.20	37.99	689.44	78.02	108.02	230.20	273.20
2062	0.00	0.00	0.00	0.00	12.34	0.00	12.34	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2063	0.00	0.00	0.00	0.00	6.17	0.00	6.17	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2064	0.00	0.00	0.00	0.00	23.70	2.70	26.40	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2065	0.00	0.00	0.00	0.00	28.62	5.40	34.02	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2066	0.00	0.00	0.00	0.00	26.02	16.20	42.22	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2067	0.00	0.00	0.00	0.00	41.44	24.29	65.73	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2068	0.00	0.00	0.00	0.00	24.84	72.88	97.72	63.20	65.59	689.44	78.02	108.02	230.20	273.20
2069	0.00	0.00	110.19	0.00	39.20	72.88	222.27	63.20	37.99	689.44	78.02	108.02	230.20	273.20
2070	0.00	0.00	150.79	0.00	0.01	75.58	226.39	63.20	52.08	689.44	78.02	108.02	230.20	273.20
2071	0.00	0.00	22.92	0.00	0.00	0.00	22.92	63.20	39.70	689.44	78.02	108.02	230.20	273.20
2072	0.00	0.00	112.52	0.00	0.00	0.00	112.52	63.20	52.08	689.44	78.02	108.02	230.20	273.20
2073	0.00	0.00	153.98	0.00	0.00	0.00	153.98	63.20	36.00	689.44	78.02	108.02	230.20	273.20
2074	0.00	0.00	137.51	0.00	0.00	0.00	137.51	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2075	0.00	0.00	156.15	0.00	15.00	0.00	171.15	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2076	0.00	0.00	23.73	0.00	3.13	0.00	26.87	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2077	0.00	0.00	0.00	0.00	38.41	0.00	38.41	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2078	0.00	0.00	0.00	0.00	32.26	0.00	32.26	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2079	0.00	0.00	0.00	0.00	34.51	0.00	34.51	63.20	37.99	689.44	78.02	108.02	230.20	273.20
2080	0.00	0.00	0.00	0.00	130.50	0.00	130.50	63.20	50.37	689.44	78.02	108.02	230.20	273.20
2081	0.00	0.00	0.00	0.00	78.40	0.00	78.40	63.20	37.99	689.44	78.02	108.02	230.20	273.20
2082	0.00	0.00	0.00	0.00	90.91	0.00	90.91	63.20	52.08	689.44	78.02	108.02	230.20	273.20
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.20	36.85	689.44	78.02	108.02	230.20	273.20
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	63.20	52.08	689.44	78.02	108.02	230.20	273.20
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	63.20	36.85	689.44	78.02	108.02	230.20	273.20
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	63.20	52.08	689.44	78.02	108.02	230.20	273.20
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2088	0.00	0.00	0.00	0.00	26.47	23.91	50.38	63.20	35.14	689.44	78.02	108.02	230.20	273.20
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	63.20	37.99	689.44	78.02	108.02	230.20	273.20
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	63.20	37.99	689.44	78.02	108.02	230.20	273.20
Salvage Value	62.18	0.00	31.34	0.00	46.91	20.84	161.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4235.48	3326.34	456.50	0.00	596.73	666.11	9281.15	1247.15	953.49	19496.98	2534.21	1599.33	5089.34	10274.10

Net Present Value -1208

K19/Gas31/750MW

TABLE 335
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	6.54	278.78	1.39	0.00	364.12	101.24	28.76	111.11	123.01
2015	0.00	537.27	0.00	0.00	21.36	10.72	569.35	4.24	0.00	415.02	99.36	32.87	116.83	165.96
2016	0.00	714.27	0.00	0.00	30.34	23.04	767.65	8.08	0.00	429.97	97.55	35.08	119.91	177.42
2017	0.00	866.06	0.00	0.00	45.80	32.26	944.12	12.80	0.00	464.64	95.59	37.63	126.80	204.62
2018	0.00	617.26	0.00	0.00	51.31	180.76	849.33	17.05	0.00	448.05	93.50	38.39	129.98	186.18
2019	0.00	433.17	0.00	0.00	60.79	127.16	621.12	20.15	12.78	482.55	93.44	36.00	130.67	222.44
2020	0.00	179.32	0.00	0.00	0.01	336.85	516.18	22.73	47.15	768.21	100.57	28.19	148.21	491.24
2021	0.00	62.33	0.00	0.00	0.00	0.00	62.33	23.04	45.41	832.49	101.20	30.82	163.98	536.50
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	44.12	835.43	100.08	30.69	168.80	535.85
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	42.17	792.58	97.17	32.75	174.60	488.06
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	40.51	770.14	95.06	36.18	184.09	454.80
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	38.77	730.07	94.99	26.04	167.86	441.18
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.04	36.92	713.62	93.10	26.95	187.32	406.25
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	23.04	35.54	662.27	91.24	25.40	180.47	365.17
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	23.04	34.22	640.43	89.66	26.31	198.25	326.21
2029	0.00	0.00	226.96	0.00	0.00	0.00	226.96	24.07	35.55	616.60	88.14	26.71	216.11	285.64
2030	0.00	0.00	406.18	0.00	23.74	0.00	429.92	26.11	30.41	618.20	87.57	23.63	227.51	279.48
2031	0.00	0.00	186.41	0.00	93.47	0.00	279.88	27.50	37.01	606.55	85.41	55.69	193.05	272.39
2032	0.00	0.00	126.47	0.00	0.00	0.00	126.47	28.14	39.74	593.40	83.86	70.99	201.58	236.96
2033	0.00	0.00	143.61	0.00	0.00	0.00	143.61	28.85	38.59	576.03	82.43	77.83	212.12	203.66
2034	0.00	0.00	21.83	0.00	0.00	0.00	21.83	28.96	41.38	578.06	81.65	84.93	221.84	189.64
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.96	39.87	499.99	79.57	102.56	193.13	124.73
2036	0.00	0.00	226.07	0.00	0.00	0.00	226.07	30.09	39.26	471.94	78.15	112.05	197.07	84.65
2037	0.00	0.00	327.25	0.00	0.00	0.00	327.25	31.73	38.68	453.77	76.85	122.83	205.73	48.37
2038	0.00	0.00	146.86	0.00	78.64	0.00	225.49	32.86	38.12	464.87	76.76	115.82	217.96	54.34
2039	0.00	0.00	10.82	0.00	0.00	0.00	10.82	32.91	47.22	529.94	74.52	238.26	202.09	15.06
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.91	43.85	501.96	72.65	256.41	215.79	-42.90
2041	0.00	0.00	111.74	0.00	0.00	0.00	111.74	33.47	43.33	479.82	71.21	273.36	226.88	-91.62
2042	0.00	0.00	388.64	0.00	0.00	0.00	388.64	35.41	42.83	459.10	69.87	292.46	236.96	-140.20
2043	0.00	0.00	364.48	0.00	0.00	0.00	364.48	37.24	46.26	453.15	69.02	310.21	245.80	-171.88
2044	0.00	0.00	153.14	0.00	78.64	0.00	231.77	38.39	47.51	456.46	68.72	300.86	261.99	-175.11
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.45	53.86	530.46	66.77	445.17	232.68	-214.16
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	53.43	509.64	65.57	461.02	244.50	-261.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	52.15	487.05	64.34	485.22	253.07	-315.59
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	50.88	509.05	65.56	463.80	243.42	-263.73
2049	0.00	0.00	0.00	0.00	10.63	0.89	11.52	38.45	53.33	509.05	65.56	463.80	243.42	-263.73
2050	0.00	0.00	0.00	0.00	10.22	1.77	11.99	38.45	50.10	509.05	65.56	463.80	243.42	-263.73
2051	0.00	0.00	0.00	0.00	29.00	5.31	34.31	38.45	49.74	509.05	65.56	463.80	243.42	-263.73
2052	0.00	0.00	0.00	0.00	34.18	7.97	42.15	38.45	49.38	509.05	65.56	463.80	243.42	-263.73
2053	0.00	0.00	0.00	0.00	26.47	23.91	50.38	38.45	49.03	509.05	65.56	463.80	243.42	-263.73
2054	0.00	0.00	0.00	0.00	21.59	23.91	45.50	38.45	48.69	509.05	65.56	463.80	243.42	-263.73
2055	0.00	0.00	0.00	0.00	0.00	24.80	24.80	38.45	48.36	509.05	65.56	463.80	243.42	-263.73
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	63.27	509.05	65.56	463.80	243.42	-263.73
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	47.74	509.05	65.56	463.80	243.42	-263.73
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	62.67	509.05	65.56	463.80	243.42	-263.73
2059	0.00	0.00	205.53	0.00	0.00	0.00	205.53	38.45	50.00	509.05	65.56	463.80	243.42	-263.73
2060	0.00	0.00	384.75	0.00	0.00	0.00	384.75	38.45	58.90	509.05	65.56	463.80	243.42	-263.73
2061	0.00	0.00	184.37	0.00	0.00	0.00	184.37	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2062	0.00	0.00	126.47	0.00	0.00	0.00	126.47	38.45	58.90	509.05	65.56	463.80	243.42	-263.73
2063	0.00	0.00	143.61	0.00	0.00	0.00	143.61	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2064	0.00	0.00	21.83	0.00	13.42	2.70	37.95	38.45	58.90	509.05	65.56	463.80	243.42	-263.73
2065	0.00	0.00	0.00	0.00	34.88	5.40	40.28	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2066	0.00	0.00	226.07	0.00	71.44	16.20	313.71	38.45	58.90	509.05	65.56	463.80	243.42	-263.73
2067	0.00	0.00	327.25	0.00	11.62	24.29	363.15	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2068	0.00	0.00	146.86	0.00	24.84	72.88	244.58	38.45	58.90	509.05	65.56	463.80	243.42	-263.73
2069	0.00	0.00	10.82	0.00	39.20	72.88	122.90	38.45	46.52	509.05	65.56	463.80	243.42	-263.73
2070	0.00	0.00	0.00	0.00	0.01	75.58	75.59	38.45	45.38	509.05	65.56	463.80	243.42	-263.73
2071	0.00	0.00	111.74	0.00	0.00	0.00	111.74	38.45	45.38	509.05	65.56	463.80	243.42	-263.73
2072	0.00	0.00	388.64	0.00	0.00	0.00	388.64	38.45	45.38	509.05	65.56	463.80	243.42	-263.73
2073	0.00	0.00	364.48	0.00	58.98	0.00	423.45	38.45	44.53	509.05	65.56	463.80	243.42	-263.73
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2075	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	38.45	46.52	509.05	65.56	463.80	243.42	-263.73
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2081	0.00	0.00	0.00	0.00	23.37	0.00	23.37	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2084	0.00	0.00	0.00	0.00	10.63	0.89	11.52	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2085	0.00	0.00	0.00	0.00	10.22	1.77	11.99	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2086	0.00	0.00	0.00	0.00	29.00	5.31	34.31	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2087	0.00	0.00	0.00	0.00	34.18	7.97	42.15	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2088	0.00	0.00	0.00	0.00	46.13	23.91	70.04	38.45	43.67	509.05	65.56	463.80	243.42	-263.73
2089	0.00	0.00	0.00	0.00	21.59	23.91	45.50	38.45	46.52	509.05	65.56	463.80	243.42	-263.73
2090	0.00	0.00	0.00	0.00	0.00	24.80	24.80	38.45	46.52	509.05	65.56	463.80	243.42	-263.73
Salvage Value	0.00	0.00	59.79	0.00	26.20	20.84	106.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	1821.83	0.00	421.38	666.11	6235.66	774.91	1017.33	15798.59	2338.07	5478.29	5578.11	2404.12

Net Present Value -5624

K19/C25/250MW

TABLE 336
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.37	248.19	0.00	0.00	24.05	4.11	307.71	1.55	0.00	364.12	101.24	28.76	111.11	123.01
2015	86.56	537.27	0.00	0.00	21.36	3.08	648.27	4.79	0.00	415.02	99.36	32.87	116.83	165.96
2016	195.77	714.27	0.00	0.00	30.34	5.11	945.49	9.52	0.00	429.97	97.55	35.07	119.93	177.41
2017	231.66	866.06	0.00	0.00	45.80	7.66	1151.17	15.28	0.00	464.09	95.60	37.63	126.83	204.02
2018	278.90	617.26	0.00	0.00	51.31	22.98	970.46	20.13	0.00	443.29	92.93	41.10	132.18	177.08
2019	286.07	433.17	0.00	0.00	64.96	22.98	807.18	24.17	12.78	472.56	92.58	40.85	132.74	206.39
2020	789.91	179.32	0.00	0.00	4.17	23.83	997.24	29.15	12.99	714.03	100.92	29.10	126.26	457.75
2021	1270.31	62.33	0.00	0.00	50.75	0.00	1383.39	36.07	12.75	757.29	101.61	29.64	133.34	492.69
2022	1142.53	0.00	0.00	0.00	26.56	0.00	1169.08	41.91	12.97	743.63	99.74	30.76	139.16	473.99
2023	817.31	0.00	0.00	0.00	44.79	0.00	862.10	46.22	12.80	725.53	97.56	30.53	152.59	444.84
2024	567.02	0.00	0.00	0.00	77.88	0.00	644.90	49.45	12.75	713.09	95.28	33.65	170.08	414.08
2025	373.09	0.00	0.00	0.00	103.08	0.00	476.16	51.83	26.59	792.09	99.89	29.94	115.54	546.72
2026	137.65	0.00	0.00	0.00	120.74	0.00	258.39	53.12	26.40	1015.31	107.47	29.11	111.05	767.67
2027	43.51	0.00	0.00	0.00	0.00	0.00	43.51	53.34	26.29	1026.11	106.81	27.56	115.06	776.67
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	26.56	1009.31	105.10	28.75	118.34	757.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	29.04	983.31	103.34	29.01	120.80	730.16
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	25.13	967.62	102.09	28.69	119.91	716.92
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.96	953.98	100.51	29.32	122.63	701.52
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.60	924.64	98.94	29.56	123.08	673.05
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.67	887.74	97.32	29.76	119.94	640.72
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	24.78	857.78	95.71	30.02	121.98	610.07
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	26.81	831.33	94.12	30.28	118.26	588.67
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	53.34	23.97	798.92	92.58	30.72	119.55	556.06
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.34	23.97	765.06	91.04	30.68	121.46	521.87
2038	0.00	0.00	130.85	0.00	0.00	0.00	130.85	53.89	23.97	729.67	89.52	30.70	124.09	485.35
2039	0.00	0.00	171.17	0.00	11.87	0.00	183.04	54.69	26.81	718.53	88.35	29.06	137.85	463.27
2040	0.00	0.00	22.76	0.00	0.00	0.00	22.76	54.81	27.88	697.50	86.36	51.91	144.14	415.09
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.81	27.23	680.68	84.87	58.17	153.65	384.00
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	55.37	27.23	667.32	83.55	61.69	163.52	358.55
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	56.20	27.23	654.28	82.18	61.68	180.34	330.08
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	56.89	32.86	638.10	80.63	93.39	180.39	283.69
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	58.14	35.70	619.43	79.25	102.77	191.18	246.24
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	58.25	36.78	606.69	77.90	116.80	203.86	208.14
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.93	587.98	76.52	118.46	223.28	169.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.08	604.70	77.89	112.68	206.10	208.03
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	58.25	37.92	604.70	77.89	112.68	206.10	208.03
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	58.25	36.79	604.70	77.89	112.68	206.10	208.03
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	58.25	36.80	604.70	77.89	112.68	206.10	208.03
2052	0.00	0.00	0.00	0.00	34.18	1.89	36.07	58.25	36.80	604.70	77.89	112.68	206.10	208.03
2053	0.00	0.00	0.00	0.00	26.47	5.68	32.15	58.25	36.81	604.70	77.89	112.68	206.10	208.03
2054	0.00	0.00	0.00	0.00	22.62	5.68	28.30	58.25	36.81	604.70	77.89	112.68	206.10	208.03
2055	0.00	0.00	0.00	0.00	1.03	5.89	6.92	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	58.25	50.33	604.70	77.89	112.68	206.10	208.03
2057	0.00	0.00	0.00	0.00	6.17	0.00	6.17	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2058	0.00	0.00	0.00	0.00	10.28	0.00	10.28	58.25	50.33	604.70	77.89	112.68	206.10	208.03
2059	0.00	0.00	0.00	0.00	17.48	0.00	17.48	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2060	0.00	0.00	0.00	0.00	24.68	0.00	24.68	58.25	50.33	604.70	77.89	112.68	206.10	208.03
2061	0.00	0.00	0.00	0.00	29.83	0.00	29.83	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	65.55	604.70	77.89	112.68	206.10	208.03
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2064	0.00	0.00	0.00	0.00	13.42	3.90	17.32	58.25	65.55	604.70	77.89	112.68	206.10	208.03
2065	0.00	0.00	0.00	0.00	11.14	2.66	13.80	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2066	0.00	0.00	0.00	0.00	1.34	3.85	5.19	58.25	65.55	604.70	77.89	112.68	206.10	208.03
2067	0.00	0.00	0.00	0.00	11.62	5.77	17.38	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2068	0.00	0.00	109.42	0.00	24.84	17.30	151.57	58.25	65.55	604.70	77.89	112.68	206.10	208.03
2069	0.00	0.00	149.75	0.00	42.33	17.30	209.39	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2070	0.00	0.00	22.76	0.00	3.15	17.95	43.85	58.25	52.03	604.70	77.89	112.68	206.10	208.03
2071	0.00	0.00	0.00	0.00	38.41	0.00	38.41	58.25	36.81	604.70	77.89	112.68	206.10	208.03
2072	0.00	0.00	112.52	0.00	20.39	0.00	132.91	58.25	52.03	604.70	77.89	112.68	206.10	208.03
2073	0.00	0.00	153.98	0.00	34.51	0.00	188.49	58.25	35.95	604.70	77.89	112.68	206.10	208.03
2074	0.00	0.00	137.51	0.00	72.27	0.00	209.78	58.25	50.33	604.70	77.89	112.68	206.10	208.03
2075	0.00	0.00	156.15	0.00	78.40	0.00	234.54	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2076	0.00	0.00	23.73	0.00	90.91	0.00	114.65	58.25	52.03	604.70	77.89	112.68	206.10	208.03
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	36.81	604.70	77.89	112.68	206.10	208.03
2078	0.00	0.00	0.00	0.00	11.87	0.00	11.87	58.25	52.03	604.70	77.89	112.68	206.10	208.03
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	39.65	604.70	77.89	112.68	206.10	208.03
2080	0.00	0.00	0.00	0.00	70.10	0.00	70.10	58.25	52.03	604.70	77.89	112.68	206.10	208.03
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2084	0.00	0.00	0.00	0.00	10.63	0.21	10.84	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2087	0.00	0.00	0.00	0.00	34.18	1.89	36.07	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2088	0.00	0.00	0.00	0.00	26.47	5.68	32.15	58.25	35.10	604.70	77.89	112.68	206.10	208.03
2089	0.00	0.00	0.00	0.00	21.59	5.68	27.27	58.25	37.95	604.70	77.89	112.68	206.10	208.03
2090	0.00	0.00	0.00	0.00	0.00	5.89	5.89	58.25	37.95	604.70	77.89	112.68	206.10	208.03
Salvage Value	8.35	0.00	30.49	0.00	41.91	5.38	86.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4917.71	3326.34	462.38	0.00	669.89	95.07	9471.40	1283.55	692.55	19253.79	2586.67	1668.33	4349.24	10649.57

Net Present Value -798

K19/Gas24/250MW

TABLE 337
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	248.19	0.00	0.00	24.05	4.11	276.34	1.40	0.00	364.12	101.24	28.76	111.11	123.01
2015	0.00	537.27	0.00	0.00	21.36	3.08	561.71	4.20	0.00	415.02	99.36	32.87	116.83	165.96
2016	0.00	714.27	0.00	0.00	30.34	5.11	749.72	7.95	0.00	429.97	97.55	35.08	119.92	177.41
2017	0.00	866.06	0.00	0.00	45.80	7.66	919.51	12.55	0.00	464.64	95.59	37.63	126.80	204.62
2018	0.00	617.26	0.00	0.00	51.31	22.98	691.55	16.01	0.00	444.05	92.93	41.05	132.08	177.98
2019	0.00	433.17	0.00	0.00	60.79	22.98	516.94	18.59	12.78	473.80	92.57	40.84	132.67	207.73
2020	0.00	179.32	0.35	0.00	0.01	23.83	203.52	19.61	12.99	716.09	100.91	29.12	126.27	459.79
2021	0.00	62.33	0.00	0.00	0.00	0.00	62.33	19.92	12.75	760.54	101.59	29.64	133.21	496.10
2022	0.00	0.00	119.30	0.00	0.00	0.00	119.30	20.41	12.97	753.48	100.19	29.03	137.76	486.51
2023	0.00	0.00	155.36	0.00	11.87	0.00	167.23	21.14	12.80	748.58	99.12	24.37	143.10	481.99
2024	0.00	0.00	20.36	0.00	0.00	0.00	20.36	21.24	16.67	742.41	97.29	39.70	147.98	457.44
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	21.24	16.45	653.89	95.06	30.32	134.03	394.47
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.24	16.05	627.55	92.81	34.33	142.52	357.89
2027	0.00	0.00	101.34	0.00	0.00	0.00	101.34	21.75	16.07	594.16	90.79	37.25	145.09	321.04
2028	0.00	0.00	140.73	0.00	93.47	0.00	234.20	22.91	16.13	574.33	88.97	43.16	152.83	289.37
2029	0.00	0.00	236.37	0.00	0.00	0.00	236.37	24.09	22.71	560.66	87.26	59.57	159.48	254.35
2030	0.00	0.00	311.65	0.00	0.00	0.00	311.65	25.65	18.84	557.52	86.37	64.26	163.16	243.74
2031	0.00	0.00	139.86	0.00	11.87	0.00	151.73	26.41	18.84	583.78	86.94	55.79	164.76	276.30
2032	0.00	0.00	10.31	0.00	0.00	0.00	10.31	26.46	25.64	617.25	84.45	152.04	142.33	238.43
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.46	25.65	604.74	82.96	162.09	152.37	207.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.46	25.65	590.85	81.50	174.33	161.07	173.94
2035	0.00	0.00	224.49	0.00	0.00	0.00	224.49	27.58	25.01	522.23	79.52	174.91	152.06	115.74
2036	0.00	0.00	324.97	0.00	0.00	0.00	324.97	29.21	25.02	496.20	78.07	185.24	156.54	76.35
2037	0.00	0.00	145.84	0.00	0.00	0.00	145.84	29.93	25.02	513.46	78.51	178.17	155.47	101.31
2038	0.00	0.00	239.99	0.00	0.00	0.00	239.99	31.13	31.81	553.51	76.13	290.47	137.25	49.65
2039	0.00	0.00	331.84	0.00	0.00	0.00	331.84	32.79	34.66	538.34	74.77	304.17	154.06	5.35
2040	0.00	0.00	148.92	0.00	78.64	0.00	227.56	33.93	31.81	537.87	74.16	308.52	162.35	-7.16
2041	0.00	0.00	10.97	0.00	0.00	0.00	10.97	33.99	38.62	586.10	72.34	421.65	140.05	-47.94
2042	0.00	0.00	235.73	0.00	0.00	0.00	235.73	35.17	38.62	565.20	70.56	448.56	150.30	-104.22
2043	0.00	0.00	341.23	0.00	0.00	0.00	341.23	36.87	38.62	550.04	69.26	469.86	158.01	-147.09
2044	0.00	0.00	153.14	0.00	0.00	0.00	153.14	37.64	40.33	542.41	68.78	470.57	165.79	-162.73
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	37.69	47.13	586.09	66.51	604.11	148.26	-232.79
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	47.13	594.45	66.69	598.35	148.89	-219.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	46.28	566.97	64.76	640.01	161.35	-299.15
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	37.69	48.28	582.50	65.99	614.15	152.83	-250.47
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2052	0.00	0.00	97.87	0.00	34.18	1.89	133.94	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2053	0.00	0.00	133.93	0.00	26.47	5.68	166.08	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2054	0.00	0.00	20.36	0.00	21.59	5.68	47.63	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2055	0.00	0.00	0.00	0.00	0.00	5.89	5.89	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2057	0.00	0.00	101.34	0.00	0.00	0.00	101.34	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2058	0.00	0.00	138.69	0.00	11.87	0.00	150.56	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2059	0.00	0.00	236.37	0.00	0.00	0.00	236.37	37.69	48.28	582.50	65.99	614.15	152.83	-250.47
2060	0.00	0.00	311.65	0.00	0.00	0.00	311.65	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2061	0.00	0.00	139.86	0.00	0.00	0.00	139.86	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2062	0.00	0.00	10.31	0.00	0.00	0.00	10.31	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2063	0.00	0.00	0.00	0.00	70.10	2.76	72.86	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2064	0.00	0.00	0.00	0.00	13.42	3.90	17.32	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2065	0.00	0.00	224.49	0.00	11.14	2.66	238.29	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2066	0.00	0.00	324.97	0.00	13.21	3.85	342.03	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2067	0.00	0.00	145.84	0.00	11.62	5.77	163.22	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2068	0.00	0.00	239.99	0.00	24.84	17.30	282.14	37.69	60.66	582.50	65.99	614.15	152.83	-250.47
2069	0.00	0.00	331.84	0.00	39.20	17.30	388.35	37.69	48.28	582.50	65.99	614.15	152.83	-250.47
2070	0.00	0.00	148.92	0.00	0.01	17.95	166.88	37.69	47.14	582.50	65.99	614.15	152.83	-250.47
2071	0.00	0.00	10.97	0.00	0.00	0.00	10.97	37.69	47.14	582.50	65.99	614.15	152.83	-250.47
2072	0.00	0.00	235.73	0.00	0.00	0.00	235.73	37.69	47.14	582.50	65.99	614.15	152.83	-250.47
2073	0.00	0.00	341.23	0.00	0.00	0.00	341.23	37.69	46.29	582.50	65.99	614.15	152.83	-250.47
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2075	0.00	0.00	11.28	0.00	58.98	0.00	70.26	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2078	0.00	0.00	0.00	0.00	23.37	0.00	23.37	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	48.28	582.50	65.99	614.15	152.83	-250.47
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2082	0.00	0.00	97.87	0.00	0.00	0.00	97.87	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2083	0.00	0.00	133.93	0.00	0.00	0.00	133.93	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2084	0.00	0.00	20.36	0.00	10.63	0.21	31.20	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2087	0.00	0.00	101.34	0.00	34.18	1.89	137.41	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2088	0.00	0.00	138.69	0.00	26.47	5.68	170.83	37.69	45.44	582.50	65.99	614.15	152.83	-250.47
2089	0.00	0.00	21.08	0.00	21.59	5.68	48.35	37.69	48.28	582.50	65.99	614.15	152.83	-250.47
2090	0.00	0.00	0.00	0.00	19.66	5.89	25.55	37.69	48.28	582.50	65.99	614.15	152.83	-250.47
Salvage Value	0.00	0.00	105.04	0.00	22.51	5.38	132.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3326.34	2314.73	0.00	395.19	95.07	6131.33	745.49	744.62	16228.82	2345.57	7464.75	4106.85	2311.66

Net Present Value -5310

K19/C31/250MW

TABLE 338
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	248.19	0.00	0.00	24.05	4.11	307.07	1.55	0.00	364.12	101.24	28.76	111.11	123.01
2015	38.79	537.27	0.00	0.00	21.36	3.08	600.50	4.55	0.00	415.02	99.36	32.87	116.83	165.96
2016	10.56	714.27	0.00	0.00	30.34	5.11	760.28	8.35	0.00	429.97	97.55	35.08	119.92	177.41
2017	10.64	866.06	0.00	0.00	45.80	7.66	930.16	13.00	0.00	464.64	95.59	37.63	126.80	204.62
2018	12.67	617.26	0.00	0.00	51.31	22.98	704.22	16.52	0.00	444.05	92.93	41.05	132.08	177.98
2019	12.77	433.17	0.00	0.00	60.79	22.98	529.71	19.17	12.78	473.80	92.57	40.84	132.67	207.73
2020	12.87	179.32	0.35	0.00	0.01	23.83	216.39	20.25	12.99	716.09	100.91	29.12	126.27	459.79
2021	16.31	62.33	0.00	0.00	0.00	0.00	78.63	20.65	12.75	760.54	101.59	29.64	133.21	496.10
2022	181.28	0.00	119.30	0.00	0.00	0.00	300.57	22.04	12.97	753.31	100.16	29.07	137.81	486.26
2023	274.96	0.00	155.36	0.00	11.87	0.00	442.19	24.15	12.80	747.77	99.09	24.54	143.37	480.76
2024	301.80	0.00	20.36	0.00	0.00	0.00	322.16	25.76	16.67	741.62	97.27	39.96	148.49	455.90
2025	308.20	0.00	0.00	0.00	4.16	0.00	312.36	27.32	16.45	652.56	95.02	30.49	134.81	392.24
2026	836.68	0.00	0.00	0.00	4.16	0.00	840.85	31.52	16.05	625.91	92.80	34.57	143.10	355.43
2027	1332.35	0.00	101.34	0.00	50.75	0.00	1484.44	38.95	16.07	591.70	90.78	37.66	145.71	317.56
2028	1198.48	0.00	138.69	0.00	38.43	0.00	1375.59	45.82	16.13	570.67	88.90	44.30	153.60	283.87
2029	857.44	0.00	21.08	0.00	44.79	0.00	923.31	50.44	22.70	556.59	87.23	60.79	160.81	247.77
2030	594.94	0.00	0.00	0.00	77.88	0.00	672.82	53.80	18.83	584.67	88.28	53.13	154.99	288.27
2031	391.50	0.00	0.00	0.00	103.08	0.00	494.58	56.28	32.89	669.75	91.34	44.48	120.23	413.71
2032	144.46	0.00	0.00	0.00	120.74	0.00	265.20	57.60	33.10	892.75	98.34	42.94	112.95	638.52
2033	45.67	0.00	0.00	0.00	0.00	0.00	45.67	57.83	32.96	923.56	98.26	44.53	119.95	660.83
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	33.18	888.85	96.51	45.62	122.25	624.47
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.36	859.78	94.86	46.28	118.70	599.95
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.31	829.59	93.26	47.43	120.08	568.82
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	32.15	789.88	91.43	49.18	123.24	526.03
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.79	744.28	89.49	51.25	126.44	477.10
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	34.70	712.81	87.62	56.65	138.80	429.73
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.97	693.19	85.95	64.10	146.10	397.04
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	34.64	672.47	84.33	72.64	154.97	360.53
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	57.83	31.80	670.53	83.49	73.58	161.24	352.22
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.83	31.80	658.69	82.17	73.31	177.12	326.09
2044	0.00	0.00	114.10	0.00	0.00	0.00	114.10	58.40	33.50	638.36	80.64	93.34	180.38	283.99
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	59.65	33.50	619.54	79.25	102.74	191.13	246.43
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	59.77	37.43	606.81	77.90	116.79	203.85	208.28
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.93	587.99	76.52	118.46	223.28	169.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.08	604.78	77.89	112.66	206.08	208.15
2049	0.00	0.00	0.00	0.00	10.63	0.21	10.84	59.77	37.92	604.78	77.89	112.66	206.08	208.15
2050	0.00	0.00	0.00	0.00	10.22	0.42	10.64	59.77	35.08	604.78	77.89	112.66	206.08	208.15
2051	0.00	0.00	0.00	0.00	29.00	1.26	30.26	59.77	37.94	604.78	77.89	112.66	206.08	208.15
2052	0.00	0.00	97.87	0.00	34.18	1.89	133.94	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2053	0.00	0.00	133.93	0.00	26.47	5.68	166.08	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2054	0.00	0.00	20.36	0.00	21.59	5.68	47.63	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2055	0.00	0.00	0.00	0.00	0.00	5.89	5.89	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2057	0.00	0.00	101.34	0.00	0.00	0.00	101.34	59.77	36.81	604.78	77.89	112.66	206.08	208.15
2058	0.00	0.00	138.69	0.00	11.87	0.00	150.56	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2059	0.00	0.00	21.08	0.00	0.00	0.00	21.08	59.77	39.65	604.78	77.89	112.66	206.08	208.15
2060	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2061	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	37.95	604.78	77.89	112.66	206.08	208.15
2062	0.00	0.00	0.00	0.00	12.34	0.00	12.34	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2063	0.00	0.00	0.00	0.00	18.04	2.76	20.80	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2064	0.00	0.00	0.00	0.00	23.70	3.90	27.60	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2065	0.00	0.00	0.00	0.00	28.62	2.66	31.28	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2066	0.00	0.00	0.00	0.00	26.02	3.85	29.87	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2067	0.00	0.00	0.00	0.00	41.44	5.77	47.21	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2068	0.00	0.00	0.00	0.00	24.84	17.30	42.15	59.77	65.55	604.78	77.89	112.66	206.08	208.15
2069	0.00	0.00	0.00	0.00	39.20	17.30	56.50	59.77	37.95	604.78	77.89	112.66	206.08	208.15
2070	0.00	0.00	0.00	0.00	0.01	17.95	17.96	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	39.65	604.78	77.89	112.66	206.08	208.15
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	35.95	604.78	77.89	112.66	206.08	208.15
2074	0.00	0.00	114.10	0.00	0.00	0.00	114.10	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2075	0.00	0.00	156.15	0.00	3.13	0.00	159.28	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2076	0.00	0.00	23.73	0.00	3.13	0.00	26.87	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2077	0.00	0.00	0.00	0.00	38.41	0.00	38.41	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2078	0.00	0.00	0.00	0.00	20.39	0.00	20.39	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2079	0.00	0.00	0.00	0.00	34.51	0.00	34.51	59.77	37.95	604.78	77.89	112.66	206.08	208.15
2080	0.00	0.00	0.00	0.00	130.50	0.00	130.50	59.77	50.33	604.78	77.89	112.66	206.08	208.15
2081	0.00	0.00	0.00	0.00	78.40	0.00	78.40	59.77	37.95	604.78	77.89	112.66	206.08	208.15
2082	0.00	0.00	97.87	0.00	90.91	0.00	188.78	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2083	0.00	0.00	133.93	0.00	0.00	0.00	133.93	59.77	36.81	604.78	77.89	112.66	206.08	208.15
2084	0.00	0.00	20.36	0.00	10.63	0.21	31.20	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2085	0.00	0.00	0.00	0.00	10.22	0.42	10.64	59.77	36.81	604.78	77.89	112.66	206.08	208.15
2086	0.00	0.00	0.00	0.00	29.00	1.26	30.26	59.77	52.03	604.78	77.89	112.66	206.08	208.15
2087	0.00	0.00	101.34	0.00	34.18	1.89	137.41	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2088	0.00	0.00	138.69	0.00	26.47	5.68	170.83	59.77	35.10	604.78	77.89	112.66	206.08	208.15
2089	0.00	0.00	21.08	0.00	21.59	5.68	48.35	59.77	37.95	604.78	77.89	112.66	206.08	208.15
2090	0.00	0.00	0.00	0.00	0.00	5.89	5.89	59.77	37.95	604.78	77.89	112.66	206.08	208.15
Salvage Value	62.18	0.00	49.85	0.00	46.02	5.38	163.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4235.48	3326.34	667.69	0.00	606.43	95.07	8931.01	1193.56	699.58	17798.20	2533.08	1819.74	4442.85	9002.54

Net Present Value -1822

All Gas

TABLE 339
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	417.37	99.35	32.88	116.74	168.41
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	432.48	97.54	35.06	119.84	180.03
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	472.04	95.95	36.24	125.29	214.56
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	450.49	93.20	39.49	130.88	186.92
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	434.55	91.30	35.00	133.68	174.57
2020	0.00	0.00	117.94	0.00	0.00	0.00	117.94	0.99	0.00	464.76	91.36	27.64	139.70	206.06
2021	0.00	0.00	153.55	0.00	11.87	0.00	165.42	1.71	0.00	456.19	89.63	25.87	152.12	188.56
2022	0.00	0.00	20.08	0.00	0.00	0.00	20.08	1.81	3.92	444.19	87.41	48.06	157.42	151.30
2023	0.00	0.00	98.55	0.00	0.00	0.00	98.55	2.30	3.92	426.51	85.26	59.16	167.81	114.28
2024	0.00	0.00	136.91	0.00	93.47	0.00	230.38	3.44	3.92	418.40	83.81	67.54	176.64	90.42
2025	0.00	0.00	20.50	0.00	0.00	0.00	20.50	3.54	7.84	366.67	83.34	56.58	154.41	72.34
2026	0.00	0.00	100.64	0.00	0.00	0.00	100.64	4.05	7.84	348.07	82.05	58.54	159.24	48.24
2027	0.00	0.00	137.72	0.00	0.00	0.00	137.72	4.73	7.84	326.72	80.23	58.85	177.10	10.54
2028	0.00	0.00	234.73	0.00	0.00	0.00	234.73	5.91	11.76	303.98	78.32	91.77	175.78	-41.88
2029	0.00	0.00	309.48	0.00	0.00	0.00	309.48	7.46	11.76	283.25	76.88	104.34	183.37	-81.34
2030	0.00	0.00	138.89	0.00	11.87	0.00	150.76	8.21	11.77	301.37	77.81	97.10	177.81	-51.35
2031	0.00	0.00	10.23	0.00	0.00	0.00	10.23	8.26	18.57	325.92	75.44	181.14	158.48	-89.13
2032	0.00	0.00	104.94	0.00	0.00	0.00	104.94	8.79	18.58	296.32	73.56	198.16	168.41	-143.81
2033	0.00	0.00	143.61	0.00	78.64	0.00	222.24	9.90	18.58	269.85	71.85	215.19	178.86	-196.04
2034	0.00	0.00	244.76	0.00	0.00	0.00	244.76	11.12	22.50	252.39	70.46	241.38	185.05	-244.50
2035	0.00	0.00	322.71	0.00	0.00	0.00	322.71	12.73	22.50	236.87	69.58	253.62	190.94	-277.27
2036	0.00	0.00	144.82	0.00	0.00	0.00	144.82	13.46	22.50	235.84	69.54	246.68	200.75	-281.13
2037	0.00	0.00	238.32	0.00	0.00	0.00	238.32	14.65	29.30	246.22	67.58	337.14	170.48	-328.98
2038	0.00	0.00	329.54	0.00	0.00	0.00	329.54	16.30	29.31	224.90	66.39	355.09	179.98	-376.56
2039	0.00	0.00	147.89	0.00	0.00	0.00	147.89	17.04	29.31	220.98	66.34	360.65	187.89	-393.89
2040	0.00	0.00	10.90	0.00	0.00	0.00	10.90	17.09	36.11	239.48	64.44	449.71	167.20	-441.86
2041	0.00	0.00	234.09	0.00	0.00	0.00	234.09	18.26	36.12	223.77	62.69	486.50	182.92	-508.34
2042	0.00	0.00	338.86	0.00	0.00	0.00	338.86	19.96	36.12	214.26	61.66	511.92	194.66	-553.98
2043	0.00	0.00	152.07	0.00	78.64	0.00	230.71	21.11	36.12	217.37	61.66	517.10	199.03	-560.43
2044	0.00	0.00	11.21	0.00	0.00	0.00	11.21	21.17	42.93	238.17	60.11	609.93	174.01	-605.89
2045	0.00	0.00	50.54	0.00	0.00	0.00	50.54	21.42	42.93	225.49	58.61	649.76	189.27	-672.15
2046	0.00	0.00	69.17	0.00	0.00	0.00	69.17	21.76	42.93	215.92	57.53	682.72	200.93	-725.27
2047	0.00	0.00	10.51	0.00	0.00	0.00	10.51	21.82	44.34	212.11	56.68	719.52	206.88	-770.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.35	217.84	57.61	684.00	199.03	-722.80
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	21.82	44.35	217.84	57.61	684.00	199.03	-722.80
2050	0.00	0.00	96.51	0.00	9.69	0.00	106.21	21.82	44.36	217.84	57.61	684.00	199.03	-722.80
2051	0.00	0.00	132.08	0.00	9.69	0.00	141.77	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2052	0.00	0.00	20.08	0.00	9.69	0.00	29.77	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2053	0.00	0.00	98.55	0.00	0.00	0.00	98.55	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2054	0.00	0.00	134.87	0.00	0.00	0.00	134.87	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2055	0.00	0.00	20.50	0.00	0.00	0.00	20.50	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2056	0.00	0.00	100.64	0.00	11.87	0.00	112.51	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2057	0.00	0.00	137.72	0.00	0.00	0.00	137.72	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2058	0.00	0.00	234.73	0.00	0.00	0.00	234.73	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2059	0.00	0.00	309.48	0.00	70.10	0.00	379.59	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2060	0.00	0.00	138.89	0.00	0.00	0.00	138.89	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2061	0.00	0.00	10.23	0.00	0.00	0.00	10.23	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2062	0.00	0.00	104.94	0.00	0.00	0.00	104.94	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2063	0.00	0.00	143.61	0.00	0.00	0.00	143.61	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2064	0.00	0.00	244.76	0.00	0.00	0.00	244.76	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2065	0.00	0.00	322.71	0.00	11.87	0.00	334.58	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2066	0.00	0.00	144.82	0.00	0.00	0.00	144.82	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2067	0.00	0.00	238.32	0.00	0.00	0.00	238.32	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2068	0.00	0.00	329.54	0.00	58.98	0.00	388.51	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2069	0.00	0.00	147.89	0.00	0.00	0.00	147.89	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2070	0.00	0.00	10.90	0.00	0.00	0.00	10.90	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2071	0.00	0.00	234.09	0.00	0.00	0.00	234.09	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2072	0.00	0.00	338.86	0.00	0.00	0.00	338.86	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2073	0.00	0.00	152.07	0.00	0.00	0.00	152.07	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2074	0.00	0.00	11.21	0.00	23.37	0.00	34.57	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2075	0.00	0.00	50.54	0.00	0.00	0.00	50.54	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2076	0.00	0.00	69.17	0.00	0.00	0.00	69.17	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2077	0.00	0.00	10.51	0.00	0.00	0.00	10.51	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2078	0.00	0.00	0.00	0.00	58.98	0.00	58.98	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2080	0.00	0.00	96.51	0.00	0.00	0.00	96.51	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2081	0.00	0.00	132.08	0.00	0.00	0.00	132.08	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2082	0.00	0.00	20.08	0.00	0.00	0.00	20.08	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2083	0.00	0.00	98.55	0.00	19.66	0.00	118.21	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2084	0.00	0.00	134.87	0.00	9.69	0.00	144.56	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2085	0.00	0.00	20.50	0.00	9.69	0.00	30.19	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2086	0.00	0.00	100.64	0.00	9.69	0.00	110.33	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2087	0.00	0.00	137.72	0.00	9.69	0.00	147.42	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2088	0.00	0.00	20.93	0.00	0.00	0.00	20.93	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.82	44.37	217.84	57.61	684.00	199.03	-722.80
Salvage Value	0.00	0.00	134.34	0.00	11.05	0.00	145.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2900.43	0.00	240.64	0.00	3202.93	314.51	608.54	8823.77	2120.50	8784.17	4845.19	-6926.09

Net Present Value -11052

Wind/Gas

TABLE 340
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	417.37	99.35	32.88	116.76	168.39
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	432.48	97.54	35.06	119.86	180.01
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	472.09	95.95	36.24	125.31	214.59
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	450.49	93.20	39.49	130.88	186.92
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	434.55	91.30	35.00	133.68	174.57
2020	0.00	0.00	0.00	12.59	20.40	0.00	32.99	0.67	0.00	459.30	90.90	29.81	141.05	197.54
2021	0.00	0.00	0.35	384.42	34.00	0.00	418.77	2.76	0.00	450.67	89.18	28.63	153.02	179.83
2022	0.00	0.00	0.00	391.62	41.07	0.00	432.69	4.92	6.10	460.54	87.58	28.72	154.67	189.56
2023	0.00	0.00	218.54	379.03	21.49	0.00	619.05	7.91	12.20	457.54	85.14	32.85	160.25	179.30
2024	0.00	0.00	291.21	7.20	33.81	0.00	332.22	9.47	18.31	464.10	83.41	33.11	164.58	182.99
2025	0.00	0.00	41.00	6.30	6.55	0.00	53.85	9.73	26.14	426.41	83.49	38.69	136.32	167.91
2026	0.00	0.00	100.64	192.21	16.46	0.00	309.31	11.28	26.14	415.86	82.51	36.99	140.27	156.09
2027	0.00	0.00	139.76	195.81	119.62	0.00	455.20	13.55	29.19	398.37	80.18	45.44	148.04	124.71
2028	0.00	0.00	20.93	195.81	36.25	0.00	252.99	14.81	36.17	392.21	78.47	58.92	153.26	101.56
2029	0.00	0.00	102.77	195.81	36.38	0.00	334.96	16.49	39.22	381.26	76.92	63.97	158.74	81.63
2030	0.00	0.00	140.63	195.81	36.38	0.00	372.83	18.35	42.27	383.78	76.02	67.05	159.99	80.72
2031	0.00	0.00	125.59	195.81	36.38	0.00	357.78	20.14	49.24	388.65	74.83	79.51	163.68	70.63
2032	0.00	0.00	142.61	195.81	115.02	0.00	453.44	22.41	52.29	384.59	73.75	80.25	169.24	61.36
2033	0.00	0.00	21.68	195.81	36.38	0.00	253.87	23.68	59.28	393.17	73.11	85.49	172.68	61.89
2034	0.00	0.00	106.41	195.81	36.38	0.00	338.61	25.37	62.33	376.91	71.34	100.62	177.06	27.89
2035	0.00	0.00	145.63	195.81	36.38	0.00	377.82	27.26	65.39	360.58	69.71	108.56	185.65	-3.34
2036	0.00	0.00	130.04	195.81	36.38	0.00	362.24	29.07	72.36	353.97	68.38	124.77	190.28	-29.45
2037	0.00	0.00	147.67	195.81	36.38	0.00	379.87	30.97	75.41	342.96	67.12	132.20	197.18	-53.53
2038	0.00	0.00	131.87	195.81	36.38	0.00	364.06	32.79	82.39	342.52	66.12	145.67	202.67	-71.94
2039	0.00	0.00	149.75	195.81	115.02	0.00	460.58	35.09	85.44	336.07	65.00	146.10	222.66	-97.70
2040	0.00	0.00	22.76	208.40	36.38	0.00	267.55	36.43	92.43	342.56	64.23	154.71	231.65	-108.02
2041	0.00	0.00	111.74	580.23	36.38	0.00	728.36	40.07	95.48	325.35	62.75	185.74	228.96	-152.09
2042	0.00	0.00	152.91	587.43	36.38	0.00	776.72	43.96	98.53	311.34	61.41	198.72	239.21	-187.99
2043	0.00	0.00	136.55	574.84	36.11	0.00	747.50	47.69	105.50	305.23	60.27	219.76	245.75	-220.54
2044	0.00	0.00	155.06	203.00	35.29	0.00	393.36	49.66	108.55	299.68	59.37	228.45	253.66	-241.80
2045	0.00	0.00	74.11	202.11	33.11	0.00	309.33	51.21	115.53	295.90	58.31	241.87	266.65	-270.92
2046	0.00	0.00	69.17	381.72	29.84	0.00	480.73	53.61	118.58	289.57	57.30	243.38	285.94	-297.06
2047	0.00	0.00	10.51	199.41	19.92	0.00	229.84	54.76	123.06	281.51	56.28	251.68	290.30	-316.74
2048	0.00	0.00	0.00	195.81	10.23	0.00	206.04	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2049	0.00	0.00	0.00	195.81	9.83	0.00	205.64	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2050	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2051	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2052	0.00	0.00	0.00	195.81	9.69	0.00	205.50	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2053	0.00	0.00	197.11	195.81	0.00	0.00	392.92	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2054	0.00	0.00	269.74	195.81	0.00	0.00	465.55	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2055	0.00	0.00	41.00	195.81	5.10	0.00	241.91	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2056	0.00	0.00	100.64	195.81	8.50	0.00	304.95	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2057	0.00	0.00	137.72	195.81	10.34	0.00	343.87	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2058	0.00	0.00	20.93	195.81	5.78	0.00	222.52	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2059	0.00	0.00	102.77	195.81	26.67	0.00	325.24	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2060	0.00	0.00	140.63	208.40	2.87	0.00	351.90	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2061	0.00	0.00	125.59	580.23	4.59	0.00	710.41	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2062	0.00	0.00	142.61	587.43	76.74	0.00	806.78	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2063	0.00	0.00	21.68	574.84	9.10	0.00	605.61	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2064	0.00	0.00	106.41	203.00	9.10	0.00	318.51	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2065	0.00	0.00	145.63	202.11	9.10	0.00	356.83	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2066	0.00	0.00	130.04	381.72	9.10	0.00	520.86	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2067	0.00	0.00	147.67	199.41	68.07	0.00	415.15	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2068	0.00	0.00	131.87	195.81	9.10	0.00	336.78	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2069	0.00	0.00	149.75	195.81	9.10	0.00	354.65	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2070	0.00	0.00	22.76	195.81	24.40	0.00	242.97	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2071	0.00	0.00	111.74	195.81	34.59	0.00	342.14	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2072	0.00	0.00	152.91	195.81	39.83	0.00	388.55	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2073	0.00	0.00	136.55	195.81	24.80	0.00	357.16	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2074	0.00	0.00	155.06	195.81	75.22	0.00	426.09	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2075	0.00	0.00	74.11	195.81	12.78	0.00	282.70	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2076	0.00	0.00	69.17	195.81	20.97	0.00	285.94	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2077	0.00	0.00	10.51	195.81	51.98	0.00	258.30	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2078	0.00	0.00	0.00	195.81	36.11	0.00	231.92	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2079	0.00	0.00	0.00	195.81	35.70	0.00	231.51	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2080	0.00	0.00	0.00	208.40	35.16	0.00	243.56	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2081	0.00	0.00	0.00	580.23	33.52	0.00	613.75	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2082	0.00	0.00	0.00	587.43	51.45	0.00	638.88	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2083	0.00	0.00	197.11	574.84	29.74	0.00	801.69	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2084	0.00	0.00	269.74	203.00	36.85	0.00	509.59	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2085	0.00	0.00	41.00	202.11	36.57	0.00	279.68	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2086	0.00	0.00	100.64	381.72	34.94	0.00	517.30	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2087	0.00	0.00	137.72	199.41	33.30	0.00	370.43	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2088	0.00	0.00	20.93	195.81	15.42	0.00	232.16	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2089	0.00	0.00	0.00	189.51	27.44	0.00	216.95	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
2090	0.00	0.00	0.00	3.60	0.14	0.00	3.73	54.76	123.06	288.99	57.29	245.64	280.96	-294.91
Salvage Value	0.00	0.00	100.16	237.43	50.24	0.00	387.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	2085.14	5197.93	755.22	0.00	8100.16	756.52	1713.36	10462.25	2114.72	3519.28	5594.70	-766.45

Net Present Value -11336

K22/Gas

TABLE 341
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	103.56	0.00	0.00	9.69	0.00	113.25	0.57	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	34.13	0.00	0.00	10.88	0.00	45.01	0.79	0.00	417.37	99.35	32.88	116.74	168.41
2016	0.00	36.65	0.00	0.00	10.98	0.00	47.64	1.03	0.00	431.94	97.54	35.07	119.84	179.49
2017	0.00	239.36	0.00	0.00	31.97	0.00	271.33	2.39	0.00	470.70	95.96	36.26	125.36	213.13
2018	0.00	467.46	0.00	0.00	11.42	0.00	478.88	4.78	0.00	447.59	93.21	39.51	131.02	183.85
2019	0.00	747.62	0.00	0.00	19.89	0.00	767.50	8.62	0.00	431.58	91.31	35.01	133.82	171.44
2020	0.00	840.88	0.00	0.00	36.19	0.00	877.07	13.00	0.00	452.62	90.73	30.74	142.07	189.08
2021	0.00	683.97	0.00	0.00	51.33	0.00	735.30	16.68	0.00	447.69	89.13	29.22	155.23	174.10
2022	0.00	398.08	0.00	0.00	60.79	0.00	458.87	18.97	12.78	456.10	89.10	33.24	143.38	190.38
2023	0.00	185.31	0.00	0.00	0.01	0.00	185.32	19.90	12.99	603.65	94.69	32.69	127.31	348.96
2024	0.00	64.22	0.00	0.00	0.00	0.00	64.22	20.22	12.71	628.07	94.54	36.93	136.19	360.41
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	20.22	12.92	598.68	94.53	25.75	119.04	359.36
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.22	12.75	578.30	92.71	26.07	124.80	334.73
2027	0.00	0.00	122.77	0.00	0.00	0.00	122.77	20.73	12.70	534.04	90.90	24.94	121.49	296.71
2028	0.00	0.00	160.16	0.00	11.87	0.00	172.03	21.48	12.47	509.00	89.38	26.00	125.94	267.68
2029	0.00	0.00	21.08	0.00	0.00	0.00	21.08	21.59	15.96	502.32	88.56	32.79	127.50	253.47
2030	0.00	0.00	103.49	0.00	0.00	0.00	103.49	22.10	15.96	486.47	86.83	40.64	134.18	224.82
2031	0.00	0.00	361.98	0.00	93.47	0.00	455.45	24.37	16.00	474.16	85.20	47.65	142.60	198.71
2032	0.00	0.00	337.55	0.00	0.00	0.00	337.55	26.06	22.58	460.24	83.61	64.17	149.61	162.84
2033	0.00	0.00	141.82	0.00	11.87	0.00	153.69	26.83	18.71	474.38	83.80	56.50	153.08	181.00
2034	0.00	0.00	10.45	0.00	0.00	0.00	10.45	26.88	25.51	508.75	81.42	153.07	131.05	143.21
2035	0.00	0.00	224.49	0.00	0.00	0.00	224.49	28.00	25.51	482.09	79.40	167.88	141.09	93.72
2036	0.00	0.00	324.97	0.00	0.00	0.00	324.97	29.63	25.51	465.82	77.91	181.90	148.91	57.10
2037	0.00	0.00	145.84	0.00	0.00	0.00	145.84	30.36	25.52	481.81	78.35	172.47	149.06	81.93
2038	0.00	0.00	239.99	0.00	0.00	0.00	239.99	31.56	31.67	516.26	76.02	278.46	130.79	30.99
2039	0.00	0.00	331.84	0.00	0.00	0.00	331.84	33.22	31.68	501.83	74.68	292.94	147.27	-13.06
2040	0.00	0.00	148.92	0.00	78.64	0.00	227.56	34.35	31.68	504.68	74.21	295.76	154.84	-20.12
2041	0.00	0.00	10.97	0.00	0.00	0.00	10.97	34.41	38.49	545.60	72.27	406.02	132.81	-65.49
2042	0.00	0.00	235.73	0.00	0.00	0.00	235.73	35.59	41.33	524.77	70.49	433.91	143.24	-122.87
2043	0.00	0.00	341.23	0.00	0.00	0.00	341.23	37.29	38.49	510.12	69.17	455.42	151.44	-165.92
2044	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.06	38.49	507.30	68.83	455.51	158.28	-175.31
2045	0.00	0.00	11.28	0.00	0.00	0.00	11.28	38.12	45.29	556.66	67.26	571.57	136.43	-218.59
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.29	540.06	66.03	592.46	146.12	-264.55
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	47.01	524.64	64.69	621.61	155.79	-317.45
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	47.01	540.45	65.99	595.21	146.11	-266.87
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	47.01	540.45	65.99	595.21	146.11	-266.87
2050	0.00	0.00	0.00	0.00	10.22	0.00	10.22	38.12	46.16	540.45	65.99	595.21	146.11	-266.87
2051	0.00	0.00	0.00	0.00	10.29	0.00	10.29	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2052	0.00	0.00	0.00	0.00	10.30	0.00	10.30	38.12	48.15	540.45	65.99	595.21	146.11	-266.87
2053	0.00	0.00	0.00	0.00	0.56	0.00	0.56	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2054	0.00	0.00	0.00	0.00	18.46	0.00	18.46	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2055	0.00	0.00	0.00	0.00	24.49	0.00	24.49	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2056	0.00	0.00	0.00	0.00	26.47	0.00	26.47	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2057	0.00	0.00	101.34	0.00	21.59	0.00	122.94	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2058	0.00	0.00	138.69	0.00	0.00	0.00	138.69	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2059	0.00	0.00	21.08	0.00	0.00	0.00	21.08	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2060	0.00	0.00	103.49	0.00	0.00	0.00	103.49	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2061	0.00	0.00	359.94	0.00	0.00	0.00	359.94	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2062	0.00	0.00	337.55	0.00	0.00	0.00	337.55	38.12	48.15	540.45	65.99	595.21	146.11	-266.87
2063	0.00	0.00	141.82	0.00	11.87	0.00	153.69	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2064	0.00	0.00	10.45	0.00	0.00	0.00	10.45	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2065	0.00	0.00	224.49	0.00	0.66	0.00	225.16	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2066	0.00	0.00	324.97	0.00	70.80	0.00	395.77	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2067	0.00	0.00	145.84	0.00	21.67	0.00	167.50	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2068	0.00	0.00	239.99	0.00	22.73	0.00	262.72	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2069	0.00	0.00	331.84	0.00	1.43	0.00	333.27	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2070	0.00	0.00	148.92	0.00	11.70	0.00	160.62	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2071	0.00	0.00	10.97	0.00	24.86	0.00	35.84	38.12	60.53	540.45	65.99	595.21	146.11	-266.87
2072	0.00	0.00	235.73	0.00	39.20	0.00	274.93	38.12	48.15	540.45	65.99	595.21	146.11	-266.87
2073	0.00	0.00	341.23	0.00	0.01	0.00	341.24	38.12	47.01	540.45	65.99	595.21	146.11	-266.87
2074	0.00	0.00	153.14	0.00	0.00	0.00	153.14	38.12	47.01	540.45	65.99	595.21	146.11	-266.87
2075	0.00	0.00	11.28	0.00	58.98	0.00	70.26	38.12	47.01	540.45	65.99	595.21	146.11	-266.87
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	46.16	540.45	65.99	595.21	146.11	-266.87
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2081	0.00	0.00	0.00	0.00	23.37	0.00	23.37	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	48.15	540.45	65.99	595.21	146.11	-266.87
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2087	0.00	0.00	101.34	0.00	9.69	0.00	111.04	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2088	0.00	0.00	138.69	0.00	0.00	0.00	138.69	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2089	0.00	0.00	21.08	0.00	0.00	0.00	21.08	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
2090	0.00	0.00	0.00	0.00	19.66	0.00	19.66	38.12	45.30	540.45	65.99	595.21	146.11	-266.87
Salvage Value	0.00	0.00	93.33	0.00	17.07	0.00	110.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	3154.41	2218.51	0.00	372.80	0.00	5745.73	694.55	684.05	14310.50	2312.62	7075.72	3914.11	1008.05

Net Present Value: -6116

K22/C29

TABLE 342
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	Low
Capital Cost	High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	103.56	0.00	0.00	9.69	0.00	143.98	0.72	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.31	34.13	0.00	0.00	10.88	0.00	84.32	1.14	0.00	417.37	99.35	32.88	116.74	168.41
2016	11.08	36.65	0.00	0.00	10.98	0.00	58.72	1.44	0.00	431.94	97.54	35.07	119.84	179.49
2017	11.83	239.36	0.00	0.00	31.97	0.00	283.16	2.85	0.00	470.70	95.96	36.26	125.36	213.13
2018	11.92	467.46	0.00	0.00	11.42	0.00	490.80	5.30	0.00	447.59	93.21	39.51	131.02	183.85
2019	14.28	747.62	0.00	0.00	19.89	0.00	781.79	9.21	0.00	431.58	91.31	35.01	133.82	171.44
2020	181.67	840.88	0.00	0.00	36.19	0.00	1058.74	14.51	0.00	452.63	90.73	30.74	142.08	189.08
2021	273.94	683.97	0.00	0.00	51.33	0.00	1009.24	19.55	0.00	447.39	89.13	29.24	155.49	173.53
2022	297.17	398.08	0.00	0.00	60.79	0.00	756.04	23.33	12.78	455.73	89.11	33.19	143.64	189.78
2023	303.46	185.31	0.00	0.00	4.17	0.00	492.95	25.80	12.99	602.34	94.67	32.78	127.42	347.46
2024	823.83	64.22	0.00	0.00	4.16	0.00	892.22	30.26	12.71	625.42	94.53	36.94	136.28	357.67
2025	1311.89	0.00	0.00	0.00	50.75	0.00	1362.64	37.07	12.92	595.38	94.55	25.79	119.20	355.84
2026	1180.07	0.00	0.00	0.00	26.56	0.00	1206.63	43.11	12.75	574.21	92.71	26.14	125.09	330.27
2027	844.27	0.00	0.00	0.00	44.79	0.00	889.07	47.55	12.70	531.92	91.13	23.95	121.49	295.34
2028	585.80	0.00	0.00	0.00	77.88	0.00	663.68	50.87	12.47	499.70	89.28	26.32	127.13	256.97
2029	385.49	0.00	0.00	0.00	103.08	0.00	488.57	53.31	26.10	655.65	92.97	30.17	113.02	419.49
2030	142.25	0.00	0.00	0.00	120.74	0.00	262.98	54.63	26.31	870.86	100.00	29.35	103.81	637.70
2031	44.97	0.00	0.00	0.00	0.00	0.00	44.97	54.85	26.22	901.67	99.71	30.01	109.02	662.93
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	29.08	870.82	98.08	29.66	110.00	633.07
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	25.04	836.52	96.50	29.65	107.72	602.65
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	25.00	810.12	94.94	30.29	109.64	575.25
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	24.83	779.73	93.43	30.49	110.34	545.47
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	54.85	24.47	747.21	91.92	30.44	111.38	513.48
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.85	24.54	714.38	90.42	30.60	113.19	480.17
2038	0.00	0.00	130.85	0.00	0.00	0.00	130.85	55.40	24.00	682.57	88.94	30.65	116.57	446.40
2039	0.00	0.00	171.17	0.00	11.87	0.00	183.04	56.21	26.68	671.56	87.61	30.02	133.28	420.65
2040	0.00	0.00	22.76	0.00	0.00	0.00	22.76	56.32	27.75	656.24	85.92	53.45	135.68	381.20
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.32	27.75	639.69	84.49	59.64	143.94	351.62
2042	0.00	0.00	112.56	0.00	0.00	0.00	112.56	56.88	30.59	626.67	83.11	61.50	157.38	324.68
2043	0.00	0.00	153.98	0.00	11.87	0.00	165.85	57.71	27.75	610.85	81.66	62.68	173.91	292.59
2044	0.00	0.00	137.51	0.00	0.00	0.00	137.51	58.40	31.66	596.11	80.24	96.67	170.41	248.79
2045	0.00	0.00	158.19	0.00	93.47	0.00	251.66	59.65	31.02	582.77	79.00	103.59	180.95	219.23
2046	0.00	0.00	23.73	0.00	0.00	0.00	23.73	59.77	34.94	600.11	78.65	102.57	190.72	228.17
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.65	557.22	76.49	137.30	197.36	146.07
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.65	580.04	78.05	114.49	189.68	197.82
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	39.50	580.04	78.05	114.49	189.68	197.82
2050	0.00	0.00	0.00	0.00	10.22	0.00	10.22	59.77	35.80	580.04	78.05	114.49	189.68	197.82
2051	0.00	0.00	0.00	0.00	10.29	0.00	10.29	59.77	34.96	580.04	78.05	114.49	189.68	197.82
2052	0.00	0.00	0.00	0.00	10.30	0.00	10.30	59.77	37.81	580.04	78.05	114.49	189.68	197.82
2053	0.00	0.00	0.00	0.00	0.56	0.00	0.56	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2054	0.00	0.00	0.00	0.00	18.46	0.00	18.46	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2055	0.00	0.00	0.00	0.00	24.49	0.00	24.49	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2056	0.00	0.00	0.00	0.00	26.47	0.00	26.47	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2057	0.00	0.00	0.00	0.00	21.59	0.00	21.59	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2058	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2059	0.00	0.00	0.00	0.00	1.03	0.00	1.03	59.77	53.04	580.04	78.05	114.49	189.68	197.82
2060	0.00	0.00	0.00	0.00	12.34	0.00	12.34	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2061	0.00	0.00	0.00	0.00	6.17	0.00	6.17	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2062	0.00	0.00	0.00	0.00	10.28	0.00	10.28	59.77	37.81	580.04	78.05	114.49	189.68	197.82
2063	0.00	0.00	0.00	0.00	17.48	0.00	17.48	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2064	0.00	0.00	0.00	0.00	24.68	0.00	24.68	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2065	0.00	0.00	0.00	0.00	30.49	0.00	30.49	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2066	0.00	0.00	0.00	0.00	0.70	0.00	0.70	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2067	0.00	0.00	0.00	0.00	21.67	0.00	21.67	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2068	0.00	0.00	109.42	0.00	10.86	0.00	120.28	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2069	0.00	0.00	149.75	0.00	1.43	0.00	151.17	59.77	53.04	580.04	78.05	114.49	189.68	197.82
2070	0.00	0.00	22.76	0.00	11.70	0.00	34.46	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2071	0.00	0.00	0.00	0.00	24.86	0.00	24.86	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2072	0.00	0.00	112.52	0.00	39.20	0.00	151.72	59.77	53.04	580.04	78.05	114.49	189.68	197.82
2073	0.00	0.00	153.98	0.00	3.15	0.00	157.13	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2074	0.00	0.00	137.51	0.00	15.00	0.00	152.51	59.77	51.90	580.04	78.05	114.49	189.68	197.82
2075	0.00	0.00	156.15	0.00	38.41	0.00	194.55	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2076	0.00	0.00	23.73	0.00	20.39	0.00	44.12	59.77	51.05	580.04	78.05	114.49	189.68	197.82
2077	0.00	0.00	0.00	0.00	34.51	0.00	34.51	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2078	0.00	0.00	0.00	0.00	72.27	0.00	72.27	59.77	50.19	580.04	78.05	114.49	189.68	197.82
2079	0.00	0.00	0.00	0.00	78.40	0.00	78.40	59.77	37.81	580.04	78.05	114.49	189.68	197.82
2080	0.00	0.00	0.00	0.00	161.02	0.00	161.02	59.77	51.90	580.04	78.05	114.49	189.68	197.82
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	54.75	580.04	78.05	114.49	189.68	197.82
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	36.68	580.04	78.05	114.49	189.68	197.82
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	51.90	580.04	78.05	114.49	189.68	197.82
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	34.97	580.04	78.05	114.49	189.68	197.82
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	37.81	580.04	78.05	114.49	189.68	197.82
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.77	34.97	580.04	78.05	114.49	189.68	197.82
Salvage Value	43.51	0.00	30.49	0.00	38.99	0.00	112.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4453.86	3154.41	462.38	0.00	607.68	0.00	8678.34	1167.65	620.27	16538.29	2512.80	1679.12	4142.47	8203.91

Net Present Value -2262

SCGT/C26

TABLE 343
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	417.37	99.35	32.88	116.75	168.40
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	432.48	97.54	35.06	119.84	180.03
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	472.08	95.95	36.24	125.32	214.57
2018	233.71	0.00	0.35	0.00	0.00	0.00	234.06	3.44	0.00	449.90	93.20	39.51	130.92	186.28
2019	281.38	0.00	0.00	0.00	0.00	0.00	281.38	4.85	0.00	433.63	91.30	35.01	133.72	173.60
2020	288.58	0.00	117.94	0.00	0.00	0.00	406.52	6.78	0.00	463.06	91.33	27.80	139.80	204.14
2021	796.95	0.00	153.51	0.00	11.87	0.00	962.32	11.48	0.00	454.53	89.60	26.18	152.68	186.06
2022	1281.79	0.00	20.08	0.00	0.79	0.00	1302.66	17.99	3.92	442.53	87.43	48.67	158.09	148.33
2023	1153.00	0.00	0.00	0.00	1.58	0.00	1154.58	23.77	3.92	422.83	85.11	61.50	168.98	107.24
2024	824.90	0.00	0.00	0.00	3.16	0.00	828.06	27.91	3.92	417.90	83.98	66.96	176.55	90.41
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	30.80	3.92	373.67	84.48	41.54	158.31	89.34
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	32.70	17.97	476.70	88.35	31.60	125.97	230.78
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	33.40	18.18	682.76	96.00	29.25	114.02	443.50
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	33.62	17.90	717.67	96.01	32.02	125.14	464.50
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	18.11	685.72	94.33	33.00	127.35	431.05
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.94	658.21	93.16	32.54	122.79	409.72
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.89	630.93	91.23	35.45	128.29	375.96
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.66	587.75	89.37	37.75	128.64	331.99
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.23	559.21	87.48	44.34	133.99	293.40
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.23	545.29	85.95	51.17	142.67	265.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.62	17.27	532.02	84.67	56.93	148.35	242.06
2036	0.00	0.00	107.91	0.00	0.00	0.00	107.91	34.16	19.95	525.23	83.62	57.49	157.43	226.69
2037	0.00	0.00	147.72	0.00	11.87	0.00	159.58	34.96	17.10	510.36	82.15	58.52	174.19	195.50
2038	0.00	0.00	22.45	0.00	0.00	0.00	22.45	35.07	21.02	497.06	80.68	90.33	172.43	153.61
2039	0.00	0.00	110.19	0.00	0.00	0.00	110.19	35.62	21.02	484.58	79.45	98.10	188.30	118.73
2040	0.00	0.00	152.84	0.00	93.47	0.00	246.31	36.84	21.02	475.01	78.14	97.51	209.42	89.93
2041	0.00	0.00	134.66	0.00	0.00	0.00	134.66	37.51	24.95	457.56	76.52	137.67	208.98	34.39
2042	0.00	0.00	152.91	0.00	0.00	0.00	152.91	38.28	24.30	439.90	75.22	154.93	216.68	-6.92
2043	0.00	0.00	136.55	0.00	0.00	0.00	136.55	38.96	28.21	430.83	73.93	173.62	230.68	-47.40
2044	0.00	0.00	155.06	0.00	78.64	0.00	233.70	40.13	28.21	416.83	72.65	175.94	255.05	-86.82
2045	0.00	0.00	23.57	0.00	0.00	0.00	23.57	40.25	32.15	405.92	71.35	241.42	239.73	-146.57
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	35.00	392.99	70.21	266.39	247.14	-190.75
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.16	379.61	68.91	271.33	275.77	-236.40
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.17	392.84	70.15	259.71	254.21	-191.24
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.17	392.84	70.15	259.71	254.21	-191.24
2050	0.00	0.00	96.51	0.00	9.69	0.00	106.21	40.25	32.18	392.84	70.15	259.71	254.21	-191.24
2051	0.00	0.00	132.08	0.00	9.69	0.00	141.77	40.25	33.89	392.84	70.15	259.71	254.21	-191.24
2052	0.00	0.00	20.08	0.00	9.69	0.00	29.77	40.25	33.90	392.84	70.15	259.71	254.21	-191.24
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	392.84	70.15	259.71	254.21	-191.24
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	392.84	70.15	259.71	254.21	-191.24
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	392.84	70.15	259.71	254.21	-191.24
2056	0.00	0.00	0.00	0.00	11.87	0.00	11.87	40.25	35.04	392.84	70.15	259.71	254.21	-191.24
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2066	0.00	0.00	107.91	0.00	0.00	0.00	107.91	40.25	35.04	392.84	70.15	259.71	254.21	-191.24
2067	0.00	0.00	147.67	0.00	0.00	0.00	147.67	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2068	0.00	0.00	22.45	0.00	0.00	0.00	22.45	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2069	0.00	0.00	110.19	0.00	0.00	0.00	110.19	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2070	0.00	0.00	150.79	0.00	0.00	0.00	150.79	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2071	0.00	0.00	134.66	0.00	0.00	0.00	134.66	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2072	0.00	0.00	152.91	0.00	12.66	0.00	165.57	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2073	0.00	0.00	136.55	0.00	1.58	0.00	138.13	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2074	0.00	0.00	155.06	0.00	3.16	0.00	158.22	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2075	0.00	0.00	23.57	0.00	77.21	0.00	100.78	40.25	47.41	392.84	70.15	259.71	254.21	-191.24
2076	0.00	0.00	0.00	0.00	3.16	0.00	3.16	40.25	35.04	392.84	70.15	259.71	254.21	-191.24
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	49.12	392.84	70.15	259.71	254.21	-191.24
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	33.90	392.84	70.15	259.71	254.21	-191.24
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	40.25	49.12	392.84	70.15	259.71	254.21	-191.24
2080	0.00	0.00	96.51	0.00	0.00	0.00	96.51	40.25	33.90	392.84	70.15	259.71	254.21	-191.24
2081	0.00	0.00	132.08	0.00	0.00	0.00	132.08	40.25	49.12	392.84	70.15	259.71	254.21	-191.24
2082	0.00	0.00	20.08	0.00	0.00	0.00	20.08	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	35.04	392.84	70.15	259.71	254.21	-191.24
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
2090	0.00	0.00	0.00	0.00	23.37	0.00	23.37	40.25	32.19	392.84	70.15	259.71	254.21	-191.24
Salvage Value	16.99	0.00	49.93	0.00	12.59	0.00	79.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	944.22	0.00	159.84	0.00	5996.54	784.10	509.81	13099.53	2369.24	3295.94	5116.69	2317.66

Net Present Value -4973

CCGT/C26

TABLE 344
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	417.37	99.35	32.88	116.75	168.40
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	432.48	97.54	35.06	119.84	180.03
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	472.08	95.95	36.24	125.32	214.57
2018	233.71	0.00	0.35	0.00	0.00	0.00	234.06	3.44	0.00	449.90	93.20	39.51	130.92	186.28
2019	281.38	0.00	200.79	0.00	0.00	0.00	482.17	5.86	0.00	433.63	91.30	35.01	133.72	173.60
2020	288.58	0.00	312.08	0.00	0.00	0.00	600.66	8.75	0.00	463.06	91.33	27.80	139.80	204.14
2021	796.95	0.00	151.86	0.00	11.87	0.00	960.68	13.45	0.00	464.58	90.36	23.10	149.91	201.21
2022	1281.79	0.00	9.61	0.00	0.79	0.00	1292.19	19.91	6.79	486.98	87.94	95.03	126.85	177.16
2023	1153.00	0.00	0.00	0.00	1.58	0.00	1154.58	25.68	6.79	478.75	85.93	109.48	135.08	148.26
2024	824.90	0.00	0.00	0.00	3.16	0.00	828.06	29.82	6.79	479.19	84.97	116.52	139.78	137.92
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	32.72	6.79	433.88	84.66	98.43	131.09	119.70
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	34.62	20.85	524.93	88.28	84.40	108.75	243.50
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	35.31	21.06	725.38	95.98	74.05	99.84	455.51
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	35.53	20.78	762.17	96.15	76.03	108.92	481.07
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.99	734.01	94.46	83.35	108.26	447.95
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.82	695.03	92.38	90.70	108.06	403.89
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.77	706.29	92.35	86.43	104.48	423.03
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.54	651.79	89.53	97.59	108.57	356.10
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.11	625.02	87.92	103.53	109.10	324.46
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.11	601.47	85.95	114.07	116.00	285.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	20.15	588.12	84.52	122.60	121.10	259.89
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	22.83	571.41	82.92	134.48	127.99	226.01
2037	0.00	0.00	108.66	0.00	0.00	0.00	108.66	36.08	19.98	569.31	82.21	138.68	131.10	217.33
2038	0.00	0.00	148.75	0.00	11.87	0.00	160.62	36.88	19.98	561.54	81.04	141.27	143.09	196.14
2039	0.00	0.00	22.60	0.00	0.00	0.00	22.60	36.99	23.90	545.83	79.31	169.56	154.80	142.17
2040	0.00	0.00	110.96	0.00	0.00	0.00	110.96	37.55	23.90	531.91	77.91	181.35	164.51	108.13
2041	0.00	0.00	153.89	0.00	93.47	0.00	247.36	38.77	23.90	518.14	76.62	189.24	176.77	75.51
2042	0.00	0.00	135.60	0.00	0.00	0.00	135.60	39.45	27.18	508.67	75.32	205.72	190.05	37.58
2043	0.00	0.00	153.98	0.00	0.00	0.00	153.98	40.22	27.18	489.85	73.94	232.93	190.78	-7.80
2044	0.00	0.00	23.41	0.00	0.00	0.00	23.41	40.34	31.09	476.47	72.65	257.08	199.06	-52.33
2045	0.00	0.00	114.90	0.00	0.00	0.00	114.90	40.91	31.09	461.50	71.36	264.92	217.73	-92.51
2046	0.00	0.00	157.24	0.00	78.64	0.00	235.88	42.09	33.95	453.68	70.48	264.09	235.13	-116.01
2047	0.00	0.00	23.90	0.00	0.00	0.00	23.90	42.21	35.03	429.38	68.93	316.91	229.42	-185.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.04	448.19	70.26	281.97	227.42	-131.47
2049	0.00	0.00	200.79	0.00	9.69	0.00	210.48	42.21	35.05	448.19	70.26	281.97	227.42	-131.47
2050	0.00	0.00	290.65	0.00	9.69	0.00	300.35	42.21	35.05	448.19	70.26	281.97	227.42	-131.47
2051	0.00	0.00	130.44	0.00	9.69	0.00	140.13	42.21	36.76	448.19	70.26	281.97	227.42	-131.47
2052	0.00	0.00	9.61	0.00	9.69	0.00	19.30	42.21	36.77	448.19	70.26	281.97	227.42	-131.47
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.77	448.19	70.26	281.97	227.42	-131.47
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	448.19	70.26	281.97	227.42	-131.47
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	448.19	70.26	281.97	227.42	-131.47
2056	0.00	0.00	0.00	0.00	11.87	0.00	11.87	42.21	37.92	448.19	70.26	281.97	227.42	-131.47
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	37.92	448.19	70.26	281.97	227.42	-131.47
2067	0.00	0.00	108.66	0.00	0.00	0.00	108.66	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2068	0.00	0.00	148.71	0.00	0.00	0.00	148.71	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2069	0.00	0.00	22.60	0.00	0.00	0.00	22.60	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2070	0.00	0.00	110.96	0.00	0.00	0.00	110.96	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2071	0.00	0.00	151.85	0.00	0.00	0.00	151.85	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2072	0.00	0.00	135.60	0.00	0.79	0.00	136.39	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2073	0.00	0.00	153.98	0.00	13.45	0.00	167.43	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2074	0.00	0.00	23.41	0.00	3.16	0.00	26.56	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2075	0.00	0.00	114.90	0.00	7.11	0.00	122.01	42.21	50.29	448.19	70.26	281.97	227.42	-131.47
2076	0.00	0.00	157.24	0.00	73.26	0.00	230.50	42.21	37.92	448.19	70.26	281.97	227.42	-131.47
2077	0.00	0.00	23.90	0.00	0.00	0.00	23.90	42.21	52.00	448.19	70.26	281.97	227.42	-131.47
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	36.78	448.19	70.26	281.97	227.42	-131.47
2079	0.00	0.00	200.79	0.00	0.00	0.00	200.79	42.21	52.00	448.19	70.26	281.97	227.42	-131.47
2080	0.00	0.00	290.65	0.00	0.00	0.00	290.65	42.21	36.78	448.19	70.26	281.97	227.42	-131.47
2081	0.00	0.00	130.44	0.00	58.98	0.00	189.41	42.21	52.00	448.19	70.26	281.97	227.42	-131.47
2082	0.00	0.00	9.61	0.00	0.00	0.00	9.61	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	37.92	448.19	70.26	281.97	227.42	-131.47
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.21	35.07	448.19	70.26	281.97	227.42	-131.47
Salvage Value	16.99	0.00	78.22	0.00	11.25	0.00	106.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	1379.07	0.00	155.13	0.00	6426.68	825.88	563.34	14286.68	2372.87	4208.78	4529.64	3175.40

Net Present Value -4641

Wind/C26

TABLE 345
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.72	61.86	0.00	0.00	9.69	0.00	102.28	0.51	0.00	365.06	101.23	28.72	111.04	124.06
2015	39.31	0.00	0.00	0.00	9.69	0.00	49.00	0.76	0.00	417.37	99.35	32.88	116.76	168.39
2016	87.04	0.00	0.00	0.00	9.69	0.00	96.74	1.24	0.00	432.48	97.54	35.06	119.86	180.01
2017	197.42	0.00	0.00	0.00	9.69	0.00	207.11	2.28	0.00	472.09	95.95	36.24	125.31	214.59
2018	233.71	0.00	0.00	0.00	0.00	0.00	233.71	3.44	0.00	449.90	93.20	39.51	130.91	186.29
2019	281.38	0.00	0.00	0.00	0.00	0.00	281.38	4.85	0.00	433.63	91.30	35.01	133.73	173.59
2020	288.58	0.00	0.00	12.59	20.40	0.00	321.57	6.46	0.00	458.09	90.91	29.78	141.09	196.31
2021	796.95	0.00	0.00	384.42	34.00	0.00	1215.37	12.54	0.00	449.74	89.18	28.76	153.72	178.08
2022	1281.79	0.00	0.00	391.62	41.59	0.00	1715.00	21.11	6.10	459.01	87.58	28.68	155.99	186.75
2023	1153.00	0.00	0.00	379.03	21.98	0.00	1554.00	28.88	12.20	456.06	85.16	32.72	161.63	176.53
2024	824.90	0.00	0.00	7.20	9.96	0.00	842.06	33.09	18.31	460.30	83.31	33.45	168.02	175.52
2025	572.36	0.00	0.00	0.00	7.11	0.00	579.47	35.99	18.31	410.84	83.23	21.99	176.08	129.54
2026	376.65	0.00	0.00	0.00	3.16	0.00	379.80	37.89	32.36	551.05	87.13	26.12	125.10	312.69
2027	138.98	0.00	0.00	0.00	0.00	0.00	138.98	38.58	32.58	757.89	94.77	23.59	111.56	527.97
2028	43.94	0.00	0.00	0.00	0.00	0.00	43.94	38.80	32.29	785.25	94.57	25.71	121.53	543.43
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.50	755.15	92.95	26.10	123.95	512.15
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.33	734.51	91.92	25.49	121.16	495.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	32.28	718.71	90.51	26.40	123.83	477.98
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	38.80	32.05	685.54	89.14	26.33	122.65	447.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.80	31.62	645.23	87.67	26.20	119.47	411.88
2034	0.00	0.00	127.84	0.00	0.00	0.00	127.84	39.33	31.62	613.34	86.25	26.37	121.28	379.44
2035	0.00	0.00	167.05	0.00	11.87	0.00	178.92	40.12	31.66	602.17	85.26	24.40	126.91	365.61
2036	0.00	0.00	130.04	0.00	0.00	0.00	130.04	40.77	38.26	578.64	83.22	45.38	133.42	316.63
2037	0.00	0.00	147.72	0.00	11.87	0.00	159.58	41.57	35.41	562.13	81.78	51.23	142.69	286.44
2038	0.00	0.00	22.45	0.00	0.00	0.00	22.45	41.68	39.32	553.77	80.54	66.59	149.12	257.51
2039	0.00	0.00	110.19	0.00	0.00	0.00	110.19	42.23	39.32	545.18	79.39	65.63	169.96	230.20
2040	0.00	0.00	152.84	12.59	93.47	0.00	258.90	43.52	39.32	523.93	77.74	84.66	175.95	185.57
2041	0.00	0.00	134.66	384.42	0.00	0.00	519.08	46.11	43.25	511.51	76.37	103.64	185.14	146.36
2042	0.00	0.00	152.91	391.62	0.00	0.00	544.53	48.84	42.61	496.77	75.10	108.43	199.38	113.86
2043	0.00	0.00	136.55	379.03	0.00	0.00	515.58	51.41	46.52	487.15	73.83	121.18	216.06	76.08
2044	0.00	0.00	155.06	7.20	78.64	0.00	240.89	52.62	46.52	466.07	72.49	152.60	213.78	27.19
2045	0.00	0.00	23.57	0.00	0.00	0.00	23.57	52.74	50.45	453.80	71.25	178.11	222.37	-17.93
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	53.31	438.79	70.01	181.79	244.17	-57.17
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.47	425.17	68.79	184.57	270.53	-98.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.47	439.25	70.01	181.49	245.69	-57.94
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.48	439.25	70.01	181.49	245.69	-57.94
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.48	439.25	70.01	181.49	245.69	-57.94
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2055	0.00	0.00	0.00	0.00	5.10	0.00	5.10	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2056	0.00	0.00	0.00	0.00	8.50	0.00	8.50	52.74	53.34	439.25	70.01	181.49	245.69	-57.94
2057	0.00	0.00	0.00	0.00	10.20	0.00	10.20	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2058	0.00	0.00	0.00	0.00	5.10	0.00	5.10	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2059	0.00	0.00	0.00	0.00	1.70	0.00	1.70	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2060	0.00	0.00	0.00	12.59	0.00	0.00	12.59	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2061	0.00	0.00	0.00	384.42	0.00	0.00	384.42	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2062	0.00	0.00	0.00	391.62	0.00	0.00	391.62	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2063	0.00	0.00	0.00	379.03	0.00	0.00	379.03	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2064	0.00	0.00	106.41	7.20	0.00	0.00	113.61	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2065	0.00	0.00	145.63	0.00	0.00	0.00	145.63	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2066	0.00	0.00	130.04	0.00	0.00	0.00	130.04	52.74	53.34	439.25	70.01	181.49	245.69	-57.94
2067	0.00	0.00	147.67	0.00	0.00	0.00	147.67	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2068	0.00	0.00	22.45	0.00	0.00	0.00	22.45	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2069	0.00	0.00	110.19	0.00	0.00	0.00	110.19	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2070	0.00	0.00	150.79	0.00	27.17	0.00	177.96	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2071	0.00	0.00	134.66	0.00	25.50	0.00	160.16	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2072	0.00	0.00	152.91	0.00	43.26	0.00	196.17	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2073	0.00	0.00	136.55	0.00	16.88	0.00	153.43	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2074	0.00	0.00	155.06	0.00	8.26	0.00	163.32	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2075	0.00	0.00	23.57	0.00	77.21	0.00	100.78	52.74	65.72	439.25	70.01	181.49	245.69	-57.94
2076	0.00	0.00	0.00	0.00	3.16	0.00	3.16	52.74	53.34	439.25	70.01	181.49	245.69	-57.94
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	67.43	439.25	70.01	181.49	245.69	-57.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2079	0.00	0.00	0.00	0.00	58.98	0.00	58.98	52.74	67.43	439.25	70.01	181.49	245.69	-57.94
2080	0.00	0.00	0.00	12.59	0.00	0.00	12.59	52.74	52.20	439.25	70.01	181.49	245.69	-57.94
2081	0.00	0.00	0.00	384.42	0.00	0.00	384.42	52.74	67.43	439.25	70.01	181.49	245.69	-57.94
2082	0.00	0.00	0.00	391.62	0.00	0.00	391.62	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2083	0.00	0.00	0.00	379.03	0.00	0.00	379.03	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2084	0.00	0.00	0.00	7.20	9.69	0.00	16.89	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	53.34	439.25	70.01	181.49	245.69	-57.94
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
2090	0.00	0.00	0.00	0.00	23.37	0.00	23.37	52.74	50.50	439.25	70.01	181.49	245.69	-57.94
Salvage Value	16.99	0.00	38.97	59.57	18.14	0.00	133.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	4830.62	61.86	831.20	1678.05	266.07	0.00	7667.81	969.83	850.83	14245.21	2361.22	2376.29	4903.98	4603.72

Net Present Value -4885

K19/C25/750MW (WPS Sale &Inv)

TABLE 346
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**Low**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	2.97	249.43	1.25	0.00	358.24	101.24	28.78	111.56	116.66
2015	83.73	439.66	0.00	0.00	16.69	5.29	545.38	3.97	0.00	406.48	99.37	32.88	116.91	157.32
2016	166.43	579.79	0.00	0.00	22.08	13.33	781.64	7.88	0.00	421.54	97.56	35.11	120.12	168.74
2017	191.52	700.61	0.00	0.00	31.35	19.36	942.85	12.60	0.00	454.19	95.60	37.61	127.04	193.93
2018	228.68	492.58	0.00	0.00	30.79	81.40	833.45	16.76	0.00	437.33	93.52	38.51	130.21	175.09
2019	232.37	351.28	0.00	0.00	38.97	66.51	689.13	20.21	12.78	471.97	93.46	35.97	130.92	211.62
2020	638.66	143.03	0.00	0.00	2.50	125.91	910.10	24.76	44.08	743.40	100.59	28.16	149.83	464.81
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	30.27	42.24	812.89	101.21	30.70	165.27	515.71
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	34.93	40.92	815.51	100.07	30.71	170.12	514.60
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	38.32	39.11	776.92	97.80	30.33	175.50	473.29
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	40.80	37.57	750.59	95.59	33.47	184.95	436.58
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	42.59	50.01	840.45	100.09	29.55	138.22	572.59
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	43.49	48.49	1098.48	108.12	29.45	139.24	821.67
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	43.66	47.09	1143.10	108.03	28.82	153.34	852.91
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	46.10	1127.58	106.41	29.77	156.97	834.43
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	47.36	1099.01	104.53	29.84	161.29	803.35
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	42.28	1078.66	103.23	29.28	159.38	786.78
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	40.98	1066.18	101.61	29.88	164.57	770.11
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	39.52	1031.05	99.98	30.00	163.68	737.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	38.53	997.24	98.24	30.04	166.49	702.47
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	37.61	966.10	96.55	30.32	170.60	668.62
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	38.86	933.35	94.91	30.08	162.77	645.59
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	35.47	874.19	93.33	30.66	137.75	612.45
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	43.66	34.96	835.13	91.75	30.83	137.70	574.87
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.66	34.46	801.43	90.12	30.81	142.86	537.64
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	43.91	36.82	770.71	88.54	30.77	155.54	495.86
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	44.28	33.50	788.86	87.28	29.34	171.72	500.53
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	44.33	36.31	768.01	85.30	53.15	174.75	454.81
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	44.58	35.87	751.70	83.77	59.17	186.64	422.13
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	44.96	35.44	740.03	82.41	62.24	201.31	394.08
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	45.26	40.65	736.81	81.22	71.89	215.13	368.58
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.86	43.10	706.64	79.39	93.06	220.73	313.46
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.91	43.79	690.13	77.96	112.89	229.56	269.72
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	42.56	674.81	76.71	118.10	244.74	235.26
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	41.34	690.53	78.02	108.02	231.68	272.81
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	45.91	43.83	690.53	78.02	108.02	231.68	272.81
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	45.91	42.36	690.53	78.02	108.02	231.68	272.81
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	45.91	42.03	690.53	78.02	108.02	231.68	272.81
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	45.91	41.72	690.53	78.02	108.02	231.68	272.81
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	45.91	41.42	690.53	78.02	108.02	231.68	272.81
2054	0.00	0.00	0.00	0.00	13.57	14.35	27.92	45.91	41.12	690.53	78.02	108.02	231.68	272.81
2055	0.00	0.00	0.00	0.00	0.62	14.88	15.49	45.91	41.96	690.53	78.02	108.02	231.68	272.81
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.91	54.06	690.53	78.02	108.02	231.68	272.81
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	45.91	38.57	690.53	78.02	108.02	231.68	272.81
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	45.91	53.53	690.53	78.02	108.02	231.68	272.81
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	45.91	40.90	690.53	78.02	108.02	231.68	272.81
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	45.91	50.37	690.53	78.02	108.02	231.68	272.81
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	65.59	690.53	78.02	108.02	231.68	272.81
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	45.91	65.59	690.53	78.02	108.02	231.68	272.81
2065	0.00	0.00	0.00	0.00	6.68	3.24	9.92	45.91	37.99	690.53	78.02	108.02	231.68	272.81
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	45.91	65.59	690.53	78.02	108.02	231.68	272.81
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	45.91	65.59	690.53	78.02	108.02	231.68	272.81
2069	0.00	0.00	49.93	0.00	25.40	43.73	119.06	45.91	37.99	690.53	78.02	108.02	231.68	272.81
2070	0.00	0.00	67.93	0.00	1.89	45.35	115.16	45.91	52.08	690.53	78.02	108.02	231.68	272.81
2071	0.00	0.00	10.26	0.00	23.04	0.00	33.31	45.91	36.85	690.53	78.02	108.02	231.68	272.81
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	45.91	52.08	690.53	78.02	108.02	231.68	272.81
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	45.91	36.00	690.53	78.02	108.02	231.68	272.81
2074	0.00	0.00	60.48	0.00	36.24	0.00	96.72	45.91	50.37	690.53	78.02	108.02	231.68	272.81
2075	0.00	0.00	68.27	0.00	53.67	0.00	121.94	45.91	37.99	690.53	78.02	108.02	231.68	272.81
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	45.91	52.08	690.53	78.02	108.02	231.68	272.81
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	36.85	690.53	78.02	108.02	231.68	272.81
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	45.91	52.08	690.53	78.02	108.02	231.68	272.81
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	39.70	690.53	78.02	108.02	231.68	272.81
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	45.91	52.08	690.53	78.02	108.02	231.68	272.81
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	45.91	37.99	690.53	78.02	108.02	231.68	272.81
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	45.91	35.14	690.53	78.02	108.02	231.68	272.81
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	45.91	37.99	690.53	78.02	108.02	231.68	272.81
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	45.91	37.99	690.53	78.02	108.02	231.68	272.81
Salvage Value	6.76	0.00	13.89	0.00	26.13	12.50	59.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	213.74	0.00	419.51	302.60	7601.58	1036.41	974.39	21117.45	2597.27	1604.68	4998.85	11916.65

Net Present Value 2304

K19/C25/750MW

TABLE 347
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	4.21	250.66	1.25	0.00	364.12	101.24	28.76	111.11	123.01
2015	83.73	439.66	0.00	0.00	16.69	6.77	546.86	3.99	0.00	415.02	99.36	32.87	116.83	165.96
2016	166.43	579.79	0.00	0.00	22.08	13.97	782.28	7.90	0.00	429.97	97.55	35.07	119.93	177.41
2017	191.52	700.61	0.00	0.00	31.35	19.36	942.85	12.61	0.00	464.09	95.60	37.63	126.83	204.02
2018	228.68	492.58	0.00	0.00	30.79	116.38	868.43	16.96	0.00	447.37	93.51	38.40	130.05	185.41
2019	232.37	351.28	0.00	0.00	38.97	79.16	701.79	20.46	12.78	481.40	93.45	35.95	130.68	221.33
2020	638.66	143.03	0.00	0.00	2.50	224.44	1008.63	25.51	47.15	766.23	100.58	28.13	148.43	489.08
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	31.02	45.41	829.69	101.21	30.89	164.36	533.23
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	35.67	44.12	831.42	100.07	30.71	169.06	531.57
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	39.07	42.17	793.80	97.79	30.33	174.25	491.44
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	41.55	40.51	767.66	95.58	33.54	183.79	454.75
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	43.33	52.82	858.53	100.08	29.60	135.82	593.03
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	44.24	51.19	1110.18	108.13	29.59	133.39	839.06
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	44.41	49.67	1144.12	108.05	28.59	139.27	868.21
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	48.57	1130.08	106.42	29.74	142.08	851.84
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	49.73	1104.57	104.53	29.81	146.70	823.53
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	44.54	1087.85	103.23	29.28	145.60	809.75
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	43.14	1080.52	101.60	30.01	150.89	798.01
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	41.59	1049.49	99.98	30.06	150.63	768.82
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	40.50	1018.96	98.26	29.98	153.05	737.67
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	39.49	992.33	96.57	30.16	157.71	707.89
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	40.66	923.95	94.98	30.38	132.17	666.43
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	37.19	887.46	93.34	30.70	132.40	631.02
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	44.41	36.60	855.78	91.73	30.75	136.15	597.15
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.41	36.04	823.03	90.12	30.75	140.89	561.27
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	44.66	38.33	793.05	88.54	30.83	153.33	520.35
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	45.03	34.95	791.41	87.27	29.35	169.18	505.62
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	45.08	37.70	765.96	85.30	53.15	172.39	455.12
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	45.33	37.20	750.27	83.77	59.17	184.73	422.60
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	45.71	36.72	738.81	82.41	62.24	199.60	394.56
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	46.01	41.87	735.96	81.22	71.89	213.63	369.23
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	46.61	44.26	705.67	79.39	93.06	219.35	313.87
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	46.66	44.90	689.14	77.96	112.89	228.17	270.13
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	43.62	673.50	76.71	118.10	243.12	235.57
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	42.35	689.44	78.02	108.02	230.21	273.19
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	46.66	44.80	689.44	78.02	108.02	230.21	273.19
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	46.66	43.28	689.44	78.02	108.02	230.21	273.19
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	46.66	42.91	689.44	78.02	108.02	230.21	273.19
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	46.66	42.55	689.44	78.02	108.02	230.21	273.19
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	46.66	42.21	689.44	78.02	108.02	230.21	273.19
2054	0.00	0.00	0.00	0.00	13.57	14.35	27.92	46.66	41.87	689.44	78.02	108.02	230.21	273.19
2055	0.00	0.00	0.00	0.00	0.62	14.88	15.49	46.66	42.68	689.44	78.02	108.02	230.21	273.19
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	46.66	54.74	689.44	78.02	108.02	230.21	273.19
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	46.66	39.21	689.44	78.02	108.02	230.21	273.19
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	46.66	54.14	689.44	78.02	108.02	230.21	273.19
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	46.66	41.48	689.44	78.02	108.02	230.21	273.19
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	46.66	50.37	689.44	78.02	108.02	230.21	273.19
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	65.59	689.44	78.02	108.02	230.21	273.19
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	46.66	65.59	689.44	78.02	108.02	230.21	273.19
2065	0.00	0.00	0.00	0.00	6.68	3.24	9.92	46.66	37.99	689.44	78.02	108.02	230.21	273.19
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	46.66	65.59	689.44	78.02	108.02	230.21	273.19
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	46.66	65.59	689.44	78.02	108.02	230.21	273.19
2069	0.00	0.00	49.93	0.00	25.40	43.73	119.06	46.66	37.99	689.44	78.02	108.02	230.21	273.19
2070	0.00	0.00	67.93	0.00	1.89	45.35	115.16	46.66	52.08	689.44	78.02	108.02	230.21	273.19
2071	0.00	0.00	10.26	0.00	23.04	0.00	33.31	46.66	36.85	689.44	78.02	108.02	230.21	273.19
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	46.66	52.08	689.44	78.02	108.02	230.21	273.19
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	46.66	36.00	689.44	78.02	108.02	230.21	273.19
2074	0.00	0.00	60.48	0.00	36.24	0.00	96.72	46.66	50.37	689.44	78.02	108.02	230.21	273.19
2075	0.00	0.00	68.27	0.00	53.67	0.00	121.94	46.66	37.99	689.44	78.02	108.02	230.21	273.19
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	46.66	52.08	689.44	78.02	108.02	230.21	273.19
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	36.85	689.44	78.02	108.02	230.21	273.19
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	46.66	52.08	689.44	78.02	108.02	230.21	273.19
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	39.70	689.44	78.02	108.02	230.21	273.19
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	46.66	52.08	689.44	78.02	108.02	230.21	273.19
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	46.66	37.99	689.44	78.02	108.02	230.21	273.19
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	46.66	35.14	689.44	78.02	108.02	230.21	273.19
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	46.66	37.99	689.44	78.02	108.02	230.21	273.19
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	46.66	37.99	689.44	78.02	108.02	230.21	273.19
Salvage Value	6.76	0.00	13.89	0.00	26.13	12.50	59.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	213.74	0.00	419.51	428.11	7727.09	1053.94	1010.79	21329.91	2597.27	1604.77	4885.86	12242.02

Net Present Value 2450

K19/Gas25/750MW (WPS Sale & INV)

TABLE 348
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	2.97	219.60	1.10	0.00	358.24	101.24	28.78	111.56	116.66
2015	0.00	439.66	0.00	0.00	16.69	5.29	461.65	3.41	0.00	406.49	99.38	32.87	116.89	157.35
2016	0.00	579.79	0.00	0.00	22.08	13.33	615.21	6.48	0.00	421.47	97.56	35.09	120.03	168.78
2017	0.00	700.61	0.00	0.00	31.35	19.36	751.32	10.24	0.00	454.59	95.60	37.59	126.98	194.41
2018	0.00	492.58	0.00	0.00	30.79	81.40	604.76	13.26	0.00	438.03	93.52	38.43	130.13	175.94
2019	0.00	351.28	0.00	0.00	36.48	66.51	454.27	15.53	12.78	473.13	93.46	35.95	130.84	212.88
2020	0.00	143.03	0.00	0.00	0.01	125.91	268.95	16.88	44.08	745.25	100.58	28.13	149.64	466.88
2021	0.00	49.49	0.35	0.00	0.00	0.00	49.84	17.13	42.24	816.24	101.21	30.69	165.06	519.27
2022	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.13	40.92	819.13	100.07	30.64	169.82	518.60
2023	0.00	0.00	70.57	0.00	0.00	0.00	70.57	17.37	39.11	777.19	97.28	32.35	175.26	472.31
2024	0.00	0.00	137.47	0.00	6.64	0.00	144.10	17.99	37.57	755.28	95.25	35.33	183.57	441.13
2025	0.00	0.00	79.06	0.00	52.27	0.00	131.32	18.63	39.87	712.91	94.98	34.36	159.98	423.59
2026	0.00	0.00	59.40	0.00	0.00	0.00	59.40	18.93	42.07	718.94	93.68	41.19	172.48	411.58
2027	0.00	0.00	67.05	0.00	0.00	0.00	67.05	19.26	40.80	695.94	91.74	40.47	186.70	377.04
2028	0.00	0.00	10.13	0.00	0.00	0.00	10.13	19.31	43.51	673.36	89.43	61.56	194.28	328.09
2029	0.00	0.00	49.44	0.00	0.00	0.00	49.44	19.56	44.95	652.55	87.65	68.39	205.07	291.43
2030	0.00	0.00	67.25	0.00	43.97	0.00	111.22	20.12	39.91	647.89	86.58	75.06	212.02	274.22
2031	0.00	0.00	59.70	0.00	0.00	0.00	59.70	20.42	42.71	661.42	86.24	82.47	216.87	275.84
2032	0.00	0.00	67.39	0.00	0.00	0.00	67.39	20.75	41.62	631.49	83.87	99.79	229.78	218.05
2033	0.00	0.00	10.18	0.00	0.00	0.00	10.18	20.80	44.48	618.91	82.36	119.60	239.35	177.59
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	43.45	614.24	81.63	127.32	245.28	160.01
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	42.03	540.99	79.53	120.84	236.54	104.07
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	41.50	471.83	78.10	121.71	204.22	67.81
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	40.99	443.69	76.71	133.26	207.51	26.21
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80	40.49	440.26	75.98	132.10	221.70	10.48
2039	0.00	0.00	100.42	0.00	0.00	0.00	100.42	21.31	42.85	407.90	74.06	161.90	231.68	-59.74
2040	0.00	0.00	144.49	0.00	0.00	0.00	144.49	22.03	39.54	401.95	72.75	179.93	241.22	-91.94
2041	0.00	0.00	64.46	0.00	6.64	0.00	71.09	22.38	39.08	421.84	73.03	179.61	240.05	-70.86
2042	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.41	45.44	486.12	70.79	288.46	233.04	-106.17
2043	0.00	0.00	50.13	0.00	0.00	0.00	50.13	22.66	45.01	456.15	69.07	310.91	246.21	-170.04
2044	0.00	0.00	68.20	0.00	43.97	0.00	112.17	23.22	46.30	427.29	67.47	334.90	258.12	-233.20
2045	0.00	0.00	32.40	0.00	0.00	0.00	32.40	23.38	49.83	412.16	66.18	366.91	267.66	-288.60
2046	0.00	0.00	30.06	0.00	0.00	0.00	30.06	23.53	49.44	394.53	64.99	392.94	277.88	-341.29
2047	0.00	0.00	4.54	0.00	0.00	0.00	4.54	23.55	49.62	386.52	64.22	408.99	289.88	-376.57
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	48.40	397.73	65.13	389.61	278.47	-335.48
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	23.55	50.90	397.73	65.13	389.61	278.47	-335.48
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	23.55	47.72	397.73	65.13	389.61	278.47	-335.48
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	23.55	47.40	397.73	65.13	389.61	278.47	-335.48
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	23.55	47.08	397.73	65.13	389.61	278.47	-335.48
2053	0.00	0.00	49.14	0.00	15.88	14.35	79.37	23.55	46.77	397.73	65.13	389.61	278.47	-335.48
2054	0.00	0.00	116.04	0.00	12.96	14.35	143.34	23.55	46.47	397.73	65.13	389.61	278.47	-335.48
2055	0.00	0.00	77.02	0.00	0.00	14.88	91.89	23.55	46.18	397.73	65.13	389.61	278.47	-335.48
2056	0.00	0.00	59.40	0.00	0.00	0.00	59.40	23.55	61.13	397.73	65.13	389.61	278.47	-335.48
2057	0.00	0.00	67.05	0.00	0.00	0.00	67.05	23.55	45.63	397.73	65.13	389.61	278.47	-335.48
2058	0.00	0.00	10.13	0.00	0.00	0.00	10.13	23.55	60.60	397.73	65.13	389.61	278.47	-335.48
2059	0.00	0.00	49.44	0.00	6.64	0.00	56.07	23.55	47.96	397.73	65.13	389.61	278.47	-335.48
2060	0.00	0.00	67.25	0.00	39.20	0.00	106.45	23.55	57.43	397.73	65.13	389.61	278.47	-335.48
2061	0.00	0.00	59.70	0.00	0.00	0.00	59.70	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2062	0.00	0.00	67.39	0.00	0.00	0.00	67.39	23.55	57.43	397.73	65.13	389.61	278.47	-335.48
2063	0.00	0.00	10.18	0.00	0.00	0.00	10.18	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2064	0.00	0.00	0.00	0.00	8.05	1.62	9.67	23.55	57.43	397.73	65.13	389.61	278.47	-335.48
2065	0.00	0.00	0.00	0.00	39.66	3.24	42.90	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2066	0.00	0.00	0.00	0.00	0.80	9.72	10.52	23.55	57.43	397.73	65.13	389.61	278.47	-335.48
2067	0.00	0.00	0.00	0.00	6.97	14.58	21.55	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	23.55	57.43	397.73	65.13	389.61	278.47	-335.48
2069	0.00	0.00	100.42	0.00	23.52	43.73	167.66	23.55	45.05	397.73	65.13	389.61	278.47	-335.48
2070	0.00	0.00	144.49	0.00	0.01	45.35	189.85	23.55	43.92	397.73	65.13	389.61	278.47	-335.48
2071	0.00	0.00	64.46	0.00	0.00	0.00	64.46	23.55	43.92	397.73	65.13	389.61	278.47	-335.48
2072	0.00	0.00	4.72	0.00	0.00	0.00	4.72	23.55	43.92	397.73	65.13	389.61	278.47	-335.48
2073	0.00	0.00	50.13	0.00	0.00	0.00	50.13	23.55	43.06	397.73	65.13	389.61	278.47	-335.48
2074	0.00	0.00	68.20	0.00	0.00	0.00	68.20	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2075	0.00	0.00	32.40	0.00	13.07	0.00	45.47	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2076	0.00	0.00	30.06	0.00	6.64	0.00	36.70	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2077	0.00	0.00	4.54	0.00	0.00	0.00	4.54	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	23.55	45.05	397.73	65.13	389.61	278.47	-335.48
2080	0.00	0.00	0.00	0.00	10.99	0.00	10.99	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2083	0.00	0.00	49.14	0.00	0.00	0.00	49.14	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2084	0.00	0.00	116.04	0.00	10.26	0.53	126.83	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2085	0.00	0.00	77.02	0.00	10.01	1.06	88.09	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2086	0.00	0.00	59.40	0.00	21.28	3.19	83.87	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2087	0.00	0.00	67.05	0.00	24.39	4.78	96.22	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2088	0.00	0.00	10.13	0.00	15.88	14.35	40.36	23.55	42.21	397.73	65.13	389.61	278.47	-335.48
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	23.55	45.05	397.73	65.13	389.61	278.47	-335.48
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	23.55	45.05	397.73	65.13	389.61	278.47	-335.48
Salvage Value	0.00	0.00	45.82	0.00	15.10	12.50	73.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	864.04	0.00	283.12	302.60	4137.31	528.20	1020.30	14772.73	2334.79	4945.71	5966.11	1526.12

Net Present Value -4160

K19/C31/750MW

TABLE 349
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**Low**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	198.32	0.00	0.00	18.31	4.21	250.04	1.25	0.00	364.12	101.24	28.76	111.11	123.01
2015	36.79	439.66	0.00	0.00	16.69	6.77	499.92	3.75	0.00	415.02	99.36	32.87	116.83	165.96
2016	10.34	579.79	0.00	0.00	22.08	13.97	626.18	6.88	0.00	429.97	97.55	35.08	119.91	177.42
2017	10.37	700.61	0.00	0.00	31.35	19.36	761.69	10.69	0.00	464.64	95.59	37.63	126.80	204.62
2018	12.29	492.58	0.00	0.00	30.79	116.38	652.04	13.95	0.00	448.05	93.50	38.39	129.98	186.18
2019	12.32	351.28	0.00	0.00	36.48	79.16	479.24	16.35	12.78	482.55	93.44	36.00	130.67	222.44
2020	12.36	143.03	0.00	0.00	0.01	224.44	379.84	18.24	47.15	768.21	100.57	28.19	148.21	491.24
2021	15.59	49.49	0.00	0.00	0.00	0.00	65.07	18.57	45.41	832.49	101.20	30.82	163.98	536.50
2022	146.66	0.00	0.00	0.00	0.00	0.00	146.66	19.30	44.12	835.52	100.08	30.66	168.80	535.98
2023	225.28	0.00	0.00	0.00	0.00	0.00	225.28	20.43	42.17	791.90	97.17	32.75	174.57	487.40
2024	241.57	0.00	0.00	0.00	0.00	0.00	241.57	21.64	40.51	768.83	95.05	36.16	184.10	453.51
2025	244.26	0.00	0.00	0.00	2.50	0.00	246.76	22.87	38.77	726.85	95.00	26.02	167.05	438.77
2026	657.87	0.00	0.00	0.00	2.50	0.00	660.37	26.17	36.92	707.21	93.11	26.77	185.31	402.03
2027	1040.67	0.00	0.00	0.00	30.45	0.00	1071.12	31.53	35.54	654.18	91.26	25.33	178.67	358.93
2028	931.65	0.00	0.00	0.00	15.94	0.00	947.58	36.27	34.22	628.52	89.68	26.29	194.40	318.15
2029	663.37	0.00	0.00	0.00	26.88	0.00	690.24	39.72	35.55	607.20	88.09	27.07	215.61	276.43
2030	458.09	0.00	0.00	0.00	46.73	0.00	504.82	42.24	30.41	599.97	86.78	27.60	233.91	251.68
2031	300.01	0.00	0.00	0.00	61.85	0.00	361.86	44.05	43.23	720.18	90.74	31.91	150.70	446.84
2032	110.18	0.00	0.00	0.00	72.44	0.00	182.62	44.96	42.25	961.90	97.91	31.40	139.96	692.63
2033	34.67	0.00	0.00	0.00	0.00	0.00	34.67	45.14	40.96	1024.02	98.34	30.76	153.84	741.09
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	40.05	992.47	96.57	30.15	157.65	708.10
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	38.37	922.80	94.97	30.18	132.02	665.62
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	37.71	887.48	93.34	30.88	132.55	630.71
2037	0.00	0.00	0.35	0.00	0.00	0.00	0.35	45.14	36.95	856.38	91.74	30.82	136.24	597.59
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.14	36.03	823.12	90.12	30.74	140.87	561.40
2039	0.00	0.00	71.36	0.00	0.00	0.00	71.36	45.39	38.39	793.15	88.55	30.81	153.34	520.46
2040	0.00	0.00	89.36	0.00	6.64	0.00	95.99	45.76	35.12	791.42	87.27	29.34	169.18	505.64
2041	0.00	0.00	10.26	0.00	0.00	0.00	10.26	45.81	41.20	765.95	85.30	53.15	172.35	455.15
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	46.06	37.85	750.27	83.77	59.17	184.68	422.65
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	46.44	37.36	738.81	82.41	62.24	199.55	394.61
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	46.74	42.52	735.96	81.22	71.89	213.64	369.22
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	47.34	42.06	705.67	79.39	93.06	219.34	313.88
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	47.39	45.55	689.14	77.96	112.89	228.19	270.11
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	43.62	673.50	76.71	118.10	243.09	235.61
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	42.35	689.44	78.02	108.02	230.20	273.20
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	47.39	44.80	689.44	78.02	108.02	230.20	273.20
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	47.39	41.57	689.44	78.02	108.02	230.20	273.20
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	47.39	44.05	689.44	78.02	108.02	230.20	273.20
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	47.39	40.84	689.44	78.02	108.02	230.20	273.20
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	47.39	40.50	689.44	78.02	108.02	230.20	273.20
2054	0.00	0.00	0.00	0.00	12.96	14.35	27.30	47.39	40.16	689.44	78.02	108.02	230.20	273.20
2055	0.00	0.00	0.00	0.00	0.00	14.88	14.88	47.39	39.83	689.44	78.02	108.02	230.20	273.20
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	56.45	689.44	78.02	108.02	230.20	273.20
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	40.92	689.44	78.02	108.02	230.20	273.20
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	55.85	689.44	78.02	108.02	230.20	273.20
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	43.18	689.44	78.02	108.02	230.20	273.20
2060	0.00	0.00	0.00	0.00	0.62	0.00	0.62	47.39	52.08	689.44	78.02	108.02	230.20	273.20
2061	0.00	0.00	0.00	0.00	0.62	0.00	0.62	47.39	37.99	689.44	78.02	108.02	230.20	273.20
2062	0.00	0.00	0.00	0.00	7.40	0.00	7.40	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2063	0.00	0.00	0.00	0.00	3.70	0.00	3.70	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2064	0.00	0.00	0.00	0.00	14.22	1.62	15.84	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2065	0.00	0.00	0.00	0.00	17.17	3.24	20.41	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2066	0.00	0.00	0.00	0.00	15.61	9.72	25.33	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2067	0.00	0.00	0.00	0.00	24.86	14.58	39.44	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2068	0.00	0.00	0.00	0.00	14.91	43.73	58.63	47.39	65.59	689.44	78.02	108.02	230.20	273.20
2069	0.00	0.00	49.93	0.00	23.52	43.73	117.18	47.39	37.99	689.44	78.02	108.02	230.20	273.20
2070	0.00	0.00	67.93	0.00	0.01	45.35	113.28	47.39	52.08	689.44	78.02	108.02	230.20	273.20
2071	0.00	0.00	10.26	0.00	0.00	0.00	10.26	47.39	39.70	689.44	78.02	108.02	230.20	273.20
2072	0.00	0.00	50.08	0.00	0.00	0.00	50.08	47.39	52.08	689.44	78.02	108.02	230.20	273.20
2073	0.00	0.00	68.13	0.00	0.00	0.00	68.13	47.39	36.00	689.44	78.02	108.02	230.20	273.20
2074	0.00	0.00	60.48	0.00	0.00	0.00	60.48	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2075	0.00	0.00	68.27	0.00	8.52	0.00	76.78	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2076	0.00	0.00	10.31	0.00	1.88	0.00	12.20	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2077	0.00	0.00	0.00	0.00	23.04	0.00	23.04	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2078	0.00	0.00	0.00	0.00	18.87	0.00	18.87	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2079	0.00	0.00	0.00	0.00	20.70	0.00	20.70	47.39	37.99	689.44	78.02	108.02	230.20	273.20
2080	0.00	0.00	0.00	0.00	75.44	0.00	75.44	47.39	50.37	689.44	78.02	108.02	230.20	273.20
2081	0.00	0.00	0.00	0.00	47.04	0.00	47.04	47.39	37.99	689.44	78.02	108.02	230.20	273.20
2082	0.00	0.00	0.00	0.00	54.55	0.00	54.55	47.39	52.08	689.44	78.02	108.02	230.20	273.20
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.39	36.85	689.44	78.02	108.02	230.20	273.20
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	47.39	52.08	689.44	78.02	108.02	230.20	273.20
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	47.39	36.85	689.44	78.02	108.02	230.20	273.20
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	47.39	52.08	689.44	78.02	108.02	230.20	273.20
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2088	0.00	0.00	0.00	0.00	15.88	14.35	30.23	47.39	35.14	689.44	78.02	108.02	230.20	273.20
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	47.39	37.99	689.44	78.02	108.02	230.20	273.20
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	47.39	37.99	689.44	78.02	108.02	230.20	273.20
Salvage Value	48.98	0.00	13.89	0.00	29.11	12.50	104.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3336.80	2687.55	213.74	0.00	375.76	428.11	7041.96	954.59	953.49	19496.98	2534.21	1599.33	5089.34	10274.10

Net Present Value 1324

K19/Gas31/750MW

TABLE 350
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	4.21	220.83	1.10	0.00	364.12	101.24	28.76	111.11	123.01
2015	0.00	439.66	0.00	0.00	16.69	6.77	463.13	3.42	0.00	415.02	99.36	32.87	116.83	165.96
2016	0.00	579.79	0.00	0.00	22.08	13.97	615.84	6.50	0.00	429.97	97.55	35.08	119.91	177.42
2017	0.00	700.61	0.00	0.00	31.35	19.36	751.32	10.26	0.00	464.64	95.59	37.63	126.80	204.62
2018	0.00	492.58	0.00	0.00	30.79	116.38	639.75	13.45	0.00	448.05	93.50	38.39	129.98	186.18
2019	0.00	351.28	0.00	0.00	36.48	79.16	466.92	15.79	12.78	482.55	93.44	36.00	130.67	222.44
2020	0.00	143.03	0.00	0.00	0.01	224.44	367.48	17.63	47.15	768.21	100.57	28.19	148.21	491.24
2021	0.00	49.49	0.00	0.00	0.00	0.00	49.49	17.87	45.41	832.49	101.20	30.82	163.98	536.50
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	44.12	835.43	100.08	30.69	168.80	535.85
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	42.17	792.58	97.17	32.75	174.60	488.06
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	40.51	770.14	95.06	36.18	184.09	454.80
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	38.77	730.07	94.99	26.04	167.86	441.18
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.87	36.92	713.62	93.10	26.95	187.32	406.25
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.87	35.54	662.27	91.24	25.40	180.47	365.17
2028	0.00	0.00	0.04	0.00	0.00	0.00	0.04	17.87	34.22	640.43	89.66	26.31	198.25	326.21
2029	0.00	0.00	120.30	0.00	0.00	0.00	120.30	18.37	35.55	616.60	88.14	26.71	216.11	285.64
2030	0.00	0.00	205.42	0.00	13.27	0.00	218.69	19.35	30.41	618.20	87.57	23.63	227.51	279.48
2031	0.00	0.00	89.68	0.00	52.27	0.00	141.95	20.05	37.01	606.55	85.41	55.69	193.05	272.39
2032	0.00	0.00	59.76	0.00	0.00	0.00	59.76	20.35	39.74	593.40	83.86	70.99	201.58	236.96
2033	0.00	0.00	67.45	0.00	0.00	0.00	67.45	20.69	38.59	576.03	82.43	77.83	212.12	203.66
2034	0.00	0.00	10.19	0.00	0.00	0.00	10.19	20.74	41.38	578.06	81.65	84.93	221.84	189.64
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.74	39.87	499.99	79.57	102.56	193.13	124.73
2036	0.00	0.00	100.12	0.00	0.00	0.00	100.12	21.24	39.26	471.94	78.15	112.05	197.07	84.65
2037	0.00	0.00	144.06	0.00	0.00	0.00	144.06	21.96	38.68	453.77	76.85	122.83	205.73	48.37
2038	0.00	0.00	64.26	0.00	43.97	0.00	108.23	22.50	38.12	464.87	76.76	115.82	217.96	54.34
2039	0.00	0.00	4.71	0.00	0.00	0.00	4.71	22.53	47.22	529.94	74.52	238.26	202.09	15.06
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.53	43.85	501.96	72.65	256.41	215.79	-42.90
2041	0.00	0.00	50.03	0.00	0.00	0.00	50.03	22.78	43.33	479.82	71.21	273.36	226.88	-91.62
2042	0.00	0.00	168.78	0.00	0.00	0.00	168.78	23.62	42.83	459.10	69.87	292.46	236.96	-140.20
2043	0.00	0.00	155.21	0.00	0.00	0.00	155.21	24.40	46.26	453.15	69.02	310.21	245.80	-171.88
2044	0.00	0.00	64.65	0.00	43.97	0.00	108.62	24.94	47.51	456.46	68.72	300.86	261.99	-175.11
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.96	53.86	530.46	66.77	445.17	232.68	-214.16
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	53.43	509.64	65.57	461.02	244.50	-261.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	52.15	487.05	64.34	485.22	253.07	-315.59
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	50.88	509.05	65.56	463.80	243.42	-263.73
2049	0.00	0.00	0.00	0.00	10.26	0.53	10.79	24.96	53.33	509.05	65.56	463.80	243.42	-263.73
2050	0.00	0.00	0.00	0.00	10.01	1.06	11.07	24.96	50.10	509.05	65.56	463.80	243.42	-263.73
2051	0.00	0.00	0.00	0.00	21.28	3.19	24.47	24.96	49.74	509.05	65.56	463.80	243.42	-263.73
2052	0.00	0.00	0.00	0.00	24.39	4.78	29.17	24.96	49.38	509.05	65.56	463.80	243.42	-263.73
2053	0.00	0.00	0.00	0.00	15.88	14.35	30.23	24.96	49.03	509.05	65.56	463.80	243.42	-263.73
2054	0.00	0.00	0.00	0.00	12.96	14.35	27.30	24.96	48.69	509.05	65.56	463.80	243.42	-263.73
2055	0.00	0.00	0.00	0.00	0.00	14.88	14.88	24.96	48.36	509.05	65.56	463.80	243.42	-263.73
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	63.27	509.05	65.56	463.80	243.42	-263.73
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	47.74	509.05	65.56	463.80	243.42	-263.73
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	62.67	509.05	65.56	463.80	243.42	-263.73
2059	0.00	0.00	98.87	0.00	0.00	0.00	98.87	24.96	50.00	509.05	65.56	463.80	243.42	-263.73
2060	0.00	0.00	183.99	0.00	0.00	0.00	183.99	24.96	58.90	509.05	65.56	463.80	243.42	-263.73
2061	0.00	0.00	87.64	0.00	0.00	0.00	87.64	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2062	0.00	0.00	59.76	0.00	0.00	0.00	59.76	24.96	58.90	509.05	65.56	463.80	243.42	-263.73
2063	0.00	0.00	67.45	0.00	0.00	0.00	67.45	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2064	0.00	0.00	10.19	0.00	8.05	1.62	19.86	24.96	58.90	509.05	65.56	463.80	243.42	-263.73
2065	0.00	0.00	0.00	0.00	19.96	3.24	23.20	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2066	0.00	0.00	100.12	0.00	40.00	9.72	149.84	24.96	58.90	509.05	65.56	463.80	243.42	-263.73
2067	0.00	0.00	144.06	0.00	6.97	14.58	165.61	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2068	0.00	0.00	64.26	0.00	14.91	43.73	122.90	24.96	58.90	509.05	65.56	463.80	243.42	-263.73
2069	0.00	0.00	4.71	0.00	23.52	43.73	71.96	24.96	46.52	509.05	65.56	463.80	243.42	-263.73
2070	0.00	0.00	0.00	0.00	0.01	45.35	45.36	24.96	45.38	509.05	65.56	463.80	243.42	-263.73
2071	0.00	0.00	50.03	0.00	0.00	0.00	50.03	24.96	45.38	509.05	65.56	463.80	243.42	-263.73
2072	0.00	0.00	168.78	0.00	0.00	0.00	168.78	24.96	45.38	509.05	65.56	463.80	243.42	-263.73
2073	0.00	0.00	155.21	0.00	32.98	0.00	188.19	24.96	44.53	509.05	65.56	463.80	243.42	-263.73
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2075	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	24.96	46.52	509.05	65.56	463.80	243.42	-263.73
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2081	0.00	0.00	0.00	0.00	13.07	0.00	13.07	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2084	0.00	0.00	0.00	0.00	10.26	0.53	10.79	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2085	0.00	0.00	0.00	0.00	10.01	1.06	11.07	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2086	0.00	0.00	0.00	0.00	21.28	3.19	24.47	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2087	0.00	0.00	0.00	0.00	24.39	4.78	29.17	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2088	0.00	0.00	0.00	0.00	26.87	14.35	41.22	24.96	43.67	509.05	65.56	463.80	243.42	-263.73
2089	0.00	0.00	0.00	0.00	12.96	14.35	27.30	24.96	46.52	509.05	65.56	463.80	243.42	-263.73
2090	0.00	0.00	0.00	0.00	0.00	14.88	14.88	24.96	46.52	509.05	65.56	463.80	243.42	-263.73
Salvage Value	0.00	0.00	26.02	0.00	16.46	12.50	54.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	843.11	0.00	266.09	428.11	4224.86	542.43	1017.33	15798.59	2338.07	5478.29	5578.11	2404.12

Net Present Value -3380

K19/C25/250MW

TABLE 351
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.83	198.32	0.00	0.00	18.31	3.72	250.18	1.26	0.00	364.12	101.24	28.76	111.11	123.01
2015	83.73	439.66	0.00	0.00	16.69	2.31	542.40	3.98	0.00	415.02	99.36	32.87	116.83	165.96
2016	166.43	579.79	0.00	0.00	22.08	2.80	771.11	7.83	0.00	429.97	97.55	35.07	119.93	177.41
2017	191.52	700.61	0.00	0.00	31.35	4.20	927.68	12.47	0.00	464.09	95.60	37.63	126.83	204.02
2018	228.68	492.58	0.00	0.00	30.79	12.59	764.64	16.29	0.00	443.29	92.93	41.10	132.18	177.08
2019	232.37	351.28	0.00	0.00	38.97	12.59	635.21	19.47	12.78	472.56	92.58	40.85	132.74	206.39
2020	638.66	143.03	0.00	0.00	2.50	13.05	797.24	23.46	12.99	714.03	100.92	29.10	126.26	457.75
2021	1022.31	49.49	0.00	0.00	30.45	0.00	1102.25	28.97	12.75	757.29	101.61	29.64	133.34	492.69
2022	915.21	0.00	0.00	0.00	15.94	0.00	931.15	33.62	12.97	743.63	99.74	30.76	139.16	473.99
2023	651.67	0.00	0.00	0.00	26.88	0.00	678.54	37.02	12.80	725.53	97.56	30.53	152.59	444.84
2024	450.01	0.00	0.00	0.00	46.73	0.00	496.74	39.50	12.75	713.09	95.28	33.65	170.08	414.08
2025	294.72	0.00	0.00	0.00	61.85	0.00	356.57	41.28	26.59	792.09	99.89	29.94	115.54	546.72
2026	108.23	0.00	0.00	0.00	72.44	0.00	180.68	42.19	26.40	1015.31	107.47	29.11	111.05	767.67
2027	34.06	0.00	0.00	0.00	0.00	0.00	34.06	42.36	26.29	1026.11	106.81	27.56	115.06	776.67
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	26.56	1009.31	105.10	28.75	118.34	757.12
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	29.04	983.31	103.34	29.01	120.80	730.16
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	25.13	967.62	102.09	28.69	119.91	716.92
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.96	953.98	100.51	29.32	122.63	701.52
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.60	924.64	98.94	29.56	123.08	673.05
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.67	887.74	97.32	29.76	119.94	640.72
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	24.78	857.78	95.71	30.02	121.98	610.07
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	26.81	831.33	94.12	30.28	118.26	588.67
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	42.36	23.97	798.92	92.58	30.72	119.55	556.06
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.36	23.97	765.06	91.04	30.68	121.46	521.87
2038	0.00	0.00	71.31	0.00	0.00	0.00	71.31	42.61	23.97	729.67	89.52	30.70	124.09	485.35
2039	0.00	0.00	89.29	0.00	6.64	0.00	95.92	42.98	26.81	718.53	88.35	29.06	137.85	463.27
2040	0.00	0.00	10.25	0.00	0.00	0.00	10.25	43.03	27.88	697.50	86.36	51.91	144.14	415.09
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.03	27.23	680.68	84.87	58.17	153.65	384.00
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	43.28	27.23	667.32	83.55	61.69	163.52	358.55
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	43.65	27.23	654.28	82.18	61.68	180.34	330.08
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	43.96	32.86	638.10	80.63	93.39	180.39	283.69
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	44.56	35.70	619.43	79.25	102.77	191.18	246.24
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	44.61	36.78	606.69	77.90	116.80	203.86	208.14
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.93	587.98	76.52	118.46	223.28	169.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.08	604.70	77.89	112.68	206.10	208.03
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	44.61	37.92	604.70	77.89	112.68	206.10	208.03
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	44.61	36.79	604.70	77.89	112.68	206.10	208.03
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	44.61	36.80	604.70	77.89	112.68	206.10	208.03
2052	0.00	0.00	0.00	0.00	24.39	1.04	25.42	44.61	36.80	604.70	77.89	112.68	206.10	208.03
2053	0.00	0.00	0.00	0.00	15.88	3.11	18.99	44.61	36.81	604.70	77.89	112.68	206.10	208.03
2054	0.00	0.00	0.00	0.00	13.57	3.11	16.68	44.61	36.81	604.70	77.89	112.68	206.10	208.03
2055	0.00	0.00	0.00	0.00	0.62	3.22	3.84	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2056	0.00	0.00	0.00	0.00	7.40	0.00	7.40	44.61	50.33	604.70	77.89	112.68	206.10	208.03
2057	0.00	0.00	0.00	0.00	3.70	0.00	3.70	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2058	0.00	0.00	0.00	0.00	6.17	0.00	6.17	44.61	50.33	604.70	77.89	112.68	206.10	208.03
2059	0.00	0.00	0.00	0.00	10.49	0.00	10.49	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2060	0.00	0.00	0.00	0.00	14.81	0.00	14.81	44.61	50.33	604.70	77.89	112.68	206.10	208.03
2061	0.00	0.00	0.00	0.00	17.90	0.00	17.90	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	65.55	604.70	77.89	112.68	206.10	208.03
2063	0.00	0.00	0.00	0.00	0.00	2.76	2.76	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2064	0.00	0.00	0.00	0.00	8.05	3.61	11.66	44.61	65.55	604.70	77.89	112.68	206.10	208.03
2065	0.00	0.00	0.00	0.00	6.68	2.08	8.76	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2066	0.00	0.00	0.00	0.00	0.80	2.11	2.91	44.61	65.55	604.70	77.89	112.68	206.10	208.03
2067	0.00	0.00	0.00	0.00	6.97	3.16	10.13	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2068	0.00	0.00	49.88	0.00	14.91	9.48	74.27	44.61	65.55	604.70	77.89	112.68	206.10	208.03
2069	0.00	0.00	67.86	0.00	25.40	9.48	102.74	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2070	0.00	0.00	10.25	0.00	1.89	9.83	21.97	44.61	52.03	604.70	77.89	112.68	206.10	208.03
2071	0.00	0.00	0.00	0.00	23.04	0.00	23.04	44.61	36.81	604.70	77.89	112.68	206.10	208.03
2072	0.00	0.00	50.08	0.00	12.23	0.00	62.32	44.61	52.03	604.70	77.89	112.68	206.10	208.03
2073	0.00	0.00	68.13	0.00	20.70	0.00	88.83	44.61	35.95	604.70	77.89	112.68	206.10	208.03
2074	0.00	0.00	60.48	0.00	42.88	0.00	103.35	44.61	50.33	604.70	77.89	112.68	206.10	208.03
2075	0.00	0.00	68.27	0.00	47.04	0.00	115.30	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2076	0.00	0.00	10.31	0.00	54.55	0.00	64.86	44.61	52.03	604.70	77.89	112.68	206.10	208.03
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	36.81	604.70	77.89	112.68	206.10	208.03
2078	0.00	0.00	0.00	0.00	6.64	0.00	6.64	44.61	52.03	604.70	77.89	112.68	206.10	208.03
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	39.65	604.70	77.89	112.68	206.10	208.03
2080	0.00	0.00	0.00	0.00	39.20	0.00	39.20	44.61	52.03	604.70	77.89	112.68	206.10	208.03
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2084	0.00	0.00	0.00	0.00	10.26	0.12	10.37	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2087	0.00	0.00	0.00	0.00	24.39	1.04	25.42	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2088	0.00	0.00	0.00	0.00	15.88	3.11	18.99	44.61	35.10	604.70	77.89	112.68	206.10	208.03
2089	0.00	0.00	0.00	0.00	12.96	3.11	16.07	44.61	37.95	604.70	77.89	112.68	206.10	208.03
2090	0.00	0.00	0.00	0.00	0.00	3.22	3.22	44.61	37.95	604.70	77.89	112.68	206.10	208.03
Salvage Value	6.76	0.00	13.53	0.00	26.11	3.14	49.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3978.18	2687.55	217.19	0.00	419.65	55.88	7358.44	1005.71	692.55	19253.79	2586.67	1668.33	4349.24	10649.57

Net Present Value 1593

K19/Gas24/250MW

TABLE 352
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	198.32	0.00	0.00	18.31	3.72	220.34	1.12	0.00	364.12	101.24	28.76	111.11	123.01
2015	0.00	439.66	0.00	0.00	16.69	2.31	458.67	3.41	0.00	415.02	99.36	32.87	116.83	165.96
2016	0.00	579.79	0.00	0.00	22.08	2.80	604.67	6.43	0.00	429.97	97.55	35.08	119.92	177.41
2017	0.00	700.61	0.00	0.00	31.35	4.20	736.16	10.11	0.00	464.64	95.59	37.63	126.80	204.62
2018	0.00	492.58	0.00	0.00	30.79	12.59	535.95	12.79	0.00	444.05	92.93	41.05	132.08	177.98
2019	0.00	351.28	0.00	0.00	36.48	12.59	400.34	14.79	12.78	473.80	92.57	40.84	132.67	207.73
2020	0.00	143.03	0.35	0.00	0.01	13.05	156.44	15.57	12.99	716.09	100.91	29.12	126.27	459.79
2021	0.00	49.49	0.00	0.00	0.00	0.00	49.49	15.82	12.75	760.54	101.59	29.64	133.21	496.10
2022	0.00	0.00	70.52	0.00	0.00	0.00	70.52	16.07	12.97	753.48	100.19	29.03	137.76	486.51
2023	0.00	0.00	88.21	0.00	6.64	0.00	94.85	16.43	12.80	748.58	99.12	24.37	143.10	481.99
2024	0.00	0.00	10.09	0.00	0.00	0.00	10.09	16.49	16.67	742.41	97.29	39.70	147.98	457.44
2025	0.00	0.00	0.04	0.00	0.00	0.00	0.04	16.49	16.45	653.89	95.06	30.32	134.03	394.47
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.49	16.05	627.55	92.81	34.33	142.52	357.89
2027	0.00	0.00	49.34	0.00	0.00	0.00	49.34	16.73	16.07	594.16	90.79	37.25	145.09	321.04
2028	0.00	0.00	69.16	0.00	52.27	0.00	121.42	17.33	16.13	574.33	88.97	43.16	152.83	289.37
2029	0.00	0.00	109.56	0.00	0.00	0.00	109.56	17.88	22.71	560.66	87.26	59.57	159.48	254.35
2030	0.00	0.00	143.06	0.00	0.00	0.00	143.06	18.59	18.84	557.52	86.37	64.26	163.16	243.74
2031	0.00	0.00	63.82	0.00	6.64	0.00	70.45	18.94	18.84	583.78	86.94	55.79	164.76	276.30
2032	0.00	0.00	4.67	0.00	0.00	0.00	4.67	18.97	25.64	617.25	84.45	152.04	142.33	238.43
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.97	25.65	604.74	82.96	162.09	152.37	207.32
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.97	25.65	590.85	81.50	174.33	161.07	173.94
2035	0.00	0.00	100.02	0.00	0.00	0.00	100.02	19.47	25.01	522.23	79.52	174.91	152.06	115.74
2036	0.00	0.00	143.92	0.00	0.00	0.00	143.92	20.19	25.02	496.20	78.07	185.24	156.54	76.35
2037	0.00	0.00	64.20	0.00	0.00	0.00	64.20	20.51	25.02	513.46	78.51	178.17	155.47	101.31
2038	0.00	0.00	105.02	0.00	0.00	0.00	105.02	21.03	31.81	553.51	76.13	290.47	137.25	49.65
2039	0.00	0.00	144.35	0.00	0.00	0.00	144.35	21.76	34.66	538.34	74.77	304.17	154.06	5.35
2040	0.00	0.00	64.39	0.00	43.97	0.00	108.36	22.30	31.81	537.87	74.16	308.52	162.35	-7.16
2041	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.32	38.62	586.10	72.34	421.65	140.05	-47.94
2042	0.00	0.00	100.72	0.00	0.00	0.00	100.72	22.82	38.62	565.20	70.56	448.56	150.30	-104.22
2043	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.55	38.62	550.04	69.26	469.86	158.01	-147.09
2044	0.00	0.00	64.65	0.00	0.00	0.00	64.65	23.87	40.33	542.41	68.78	470.57	165.79	-162.73
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	23.90	47.13	586.09	66.51	604.11	148.26	-232.79
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	47.13	594.45	66.69	598.35	148.89	-219.48
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	46.28	566.97	64.76	640.01	161.35	-299.15
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	23.90	48.28	582.50	65.99	614.15	152.83	-250.47
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2052	0.00	0.00	49.09	0.00	24.39	1.04	74.51	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2053	0.00	0.00	66.78	0.00	15.88	3.11	85.77	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2054	0.00	0.00	10.09	0.00	12.96	3.11	26.16	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2055	0.00	0.00	0.00	0.00	0.00	3.22	3.22	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2057	0.00	0.00	49.34	0.00	0.00	0.00	49.34	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2058	0.00	0.00	67.12	0.00	6.64	0.00	73.75	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2059	0.00	0.00	109.56	0.00	0.00	0.00	109.56	23.90	48.28	582.50	65.99	614.15	152.83	-250.47
2060	0.00	0.00	143.06	0.00	0.00	0.00	143.06	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2061	0.00	0.00	63.82	0.00	0.00	0.00	63.82	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2062	0.00	0.00	4.67	0.00	0.00	0.00	4.67	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2063	0.00	0.00	0.00	0.00	39.20	2.76	41.95	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2064	0.00	0.00	0.00	0.00	8.05	3.61	11.66	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2065	0.00	0.00	100.02	0.00	6.68	2.08	108.78	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2066	0.00	0.00	143.92	0.00	7.44	2.11	153.46	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2067	0.00	0.00	64.20	0.00	6.97	3.16	74.33	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2068	0.00	0.00	105.02	0.00	14.91	9.48	129.40	23.90	60.66	582.50	65.99	614.15	152.83	-250.47
2069	0.00	0.00	144.35	0.00	23.52	9.48	177.34	23.90	48.28	582.50	65.99	614.15	152.83	-250.47
2070	0.00	0.00	64.39	0.00	0.01	9.83	74.23	23.90	47.14	582.50	65.99	614.15	152.83	-250.47
2071	0.00	0.00	4.72	0.00	0.00	0.00	4.72	23.90	47.14	582.50	65.99	614.15	152.83	-250.47
2072	0.00	0.00	100.72	0.00	0.00	0.00	100.72	23.90	47.14	582.50	65.99	614.15	152.83	-250.47
2073	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.90	46.29	582.50	65.99	614.15	152.83	-250.47
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2075	0.00	0.00	4.74	0.00	32.98	0.00	37.71	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2078	0.00	0.00	0.00	0.00	13.07	0.00	13.07	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	48.28	582.50	65.99	614.15	152.83	-250.47
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2082	0.00	0.00	49.09	0.00	0.00	0.00	49.09	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2083	0.00	0.00	66.78	0.00	0.00	0.00	66.78	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2084	0.00	0.00	10.09	0.00	10.26	0.12	20.46	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2087	0.00	0.00	49.34	0.00	24.39	1.04	74.76	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2088	0.00	0.00	67.12	0.00	15.88	3.11	86.11	23.90	45.44	582.50	65.99	614.15	152.83	-250.47
2089	0.00	0.00	10.14	0.00	12.96	3.11	26.21	23.90	48.28	582.50	65.99	614.15	152.83	-250.47
2090	0.00	0.00	0.00	0.00	10.99	3.22	14.22	23.90	48.28	582.50	65.99	614.15	152.83	-250.47
Salvage Value	0.00	0.00	47.66	0.00	14.40	3.14	65.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2687.55	1068.52	0.00	251.44	55.88	4063.40	513.67	744.62	16228.82	2345.57	7464.75	4106.85	2311.66

Net Present Value -3010

K19/C31/250MW

TABLE 353
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.76	2.76	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	198.32	0.00	0.00	18.31	3.72	249.56	1.26	0.00	364.12	101.24	28.76	111.11	123.01
2015	36.79	439.66	0.00	0.00	16.69	2.31	495.46	3.74	0.00	415.02	99.36	32.87	116.83	165.96
2016	10.34	579.79	0.00	0.00	22.08	2.80	615.01	6.81	0.00	429.97	97.55	35.08	119.92	177.41
2017	10.37	700.61	0.00	0.00	31.35	4.20	746.53	10.55	0.00	464.64	95.59	37.63	126.80	204.62
2018	12.29	492.58	0.00	0.00	30.79	12.59	548.24	13.29	0.00	444.05	92.93	41.05	132.08	177.98
2019	12.32	351.28	0.00	0.00	36.48	12.59	412.67	15.35	12.78	473.80	92.57	40.84	132.67	207.73
2020	12.36	143.03	0.35	0.00	0.01	13.05	168.80	16.19	12.99	716.09	100.91	29.12	126.27	459.79
2021	15.59	49.49	0.00	0.00	0.00	0.00	65.07	16.52	12.75	760.54	101.59	29.64	133.21	496.10
2022	146.66	0.00	70.52	0.00	0.00	0.00	217.18	17.50	12.97	753.31	100.16	29.07	137.81	486.26
2023	225.28	0.00	88.21	0.00	6.64	0.00	320.13	18.99	12.80	747.77	99.09	24.54	143.37	480.76
2024	241.57	0.00	10.09	0.00	0.00	0.00	251.66	20.25	16.67	741.62	97.27	39.96	148.49	455.90
2025	244.26	0.00	0.00	0.00	2.50	0.00	246.76	21.48	16.45	652.56	95.02	30.49	134.81	392.24
2026	657.87	0.00	0.00	0.00	2.50	0.00	660.37	24.78	16.05	625.91	92.80	34.57	143.10	355.43
2027	1040.67	0.00	49.34	0.00	30.45	0.00	1120.46	30.39	16.07	591.70	90.78	37.66	145.71	317.56
2028	931.65	0.00	67.12	0.00	22.57	0.00	1021.34	35.49	16.13	570.67	88.90	44.30	153.60	283.87
2029	663.37	0.00	10.14	0.00	26.88	0.00	700.38	39.00	22.70	556.59	87.23	60.79	160.81	247.77
2030	458.09	0.00	0.00	0.00	46.73	0.00	504.82	41.52	18.83	584.67	88.28	53.13	154.99	288.27
2031	300.01	0.00	0.00	0.00	61.85	0.00	361.86	43.33	32.89	669.75	91.34	44.48	120.23	413.71
2032	110.18	0.00	0.00	0.00	72.44	0.00	182.62	44.24	33.10	892.75	98.34	42.94	112.95	638.52
2033	34.67	0.00	0.00	0.00	0.00	0.00	34.67	44.42	32.96	923.56	98.26	44.53	119.95	660.83
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	33.18	888.85	96.51	45.62	122.25	624.47
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.36	859.78	94.86	46.28	118.70	599.95
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.31	829.59	93.26	47.43	120.08	568.82
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	32.15	789.88	91.43	49.18	123.24	526.03
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.79	744.28	89.49	51.25	126.44	477.10
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	34.70	712.81	87.62	56.65	138.80	429.73
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.97	693.19	85.95	64.10	146.10	397.04
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	34.64	672.47	84.33	72.64	154.97	360.53
2042	0.00	0.00	0.04	0.00	0.00	0.00	0.04	44.42	31.80	670.53	83.49	73.58	161.24	352.22
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.42	31.80	658.69	82.17	73.31	177.12	326.09
2044	0.00	0.00	50.18	0.00	0.00	0.00	50.18	44.67	33.50	638.36	80.64	93.34	180.38	283.99
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.27	33.50	619.54	79.25	102.74	191.13	246.43
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.32	37.43	606.81	77.90	116.79	203.85	208.28
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.93	587.99	76.52	118.46	223.28	169.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.08	604.78	77.89	112.66	206.08	208.15
2049	0.00	0.00	0.00	0.00	10.26	0.12	10.37	45.32	37.92	604.78	77.89	112.66	206.08	208.15
2050	0.00	0.00	0.00	0.00	10.01	0.23	10.24	45.32	35.08	604.78	77.89	112.66	206.08	208.15
2051	0.00	0.00	0.00	0.00	21.28	0.69	21.97	45.32	37.94	604.78	77.89	112.66	206.08	208.15
2052	0.00	0.00	49.09	0.00	24.39	1.04	74.51	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2053	0.00	0.00	66.78	0.00	15.88	3.11	85.77	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2054	0.00	0.00	10.09	0.00	12.96	3.11	26.16	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2055	0.00	0.00	0.00	0.00	0.00	3.22	3.22	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2057	0.00	0.00	49.34	0.00	0.00	0.00	49.34	45.32	36.81	604.78	77.89	112.66	206.08	208.15
2058	0.00	0.00	67.12	0.00	6.64	0.00	73.75	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2059	0.00	0.00	10.14	0.00	0.00	0.00	10.14	45.32	39.65	604.78	77.89	112.66	206.08	208.15
2060	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2061	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.32	37.95	604.78	77.89	112.66	206.08	208.15
2062	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2063	0.00	0.00	0.00	0.00	10.34	2.76	13.09	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2064	0.00	0.00	0.00	0.00	14.22	3.61	17.83	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2065	0.00	0.00	0.00	0.00	17.17	2.08	19.25	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2066	0.00	0.00	0.00	0.00	15.61	2.11	17.72	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2067	0.00	0.00	0.00	0.00	24.86	3.16	28.02	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2068	0.00	0.00	0.00	0.00	14.91	9.48	24.38	45.32	65.55	604.78	77.89	112.66	206.08	208.15
2069	0.00	0.00	0.00	0.00	23.52	9.48	33.00	45.32	37.95	604.78	77.89	112.66	206.08	208.15
2070	0.00	0.00	0.00	0.00	0.01	9.83	9.83	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	39.65	604.78	77.89	112.66	206.08	208.15
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.32	35.95	604.78	77.89	112.66	206.08	208.15
2074	0.00	0.00	50.18	0.00	0.00	0.00	50.18	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2075	0.00	0.00	68.27	0.00	1.88	0.00	70.15	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2076	0.00	0.00	10.31	0.00	1.88	0.00	12.20	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2077	0.00	0.00	0.00	0.00	23.04	0.00	23.04	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2078	0.00	0.00	0.00	0.00	12.23	0.00	12.23	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2079	0.00	0.00	0.00	0.00	20.70	0.00	20.70	45.32	37.95	604.78	77.89	112.66	206.08	208.15
2080	0.00	0.00	0.00	0.00	75.44	0.00	75.44	45.32	50.33	604.78	77.89	112.66	206.08	208.15
2081	0.00	0.00	0.00	0.00	47.04	0.00	47.04	45.32	37.95	604.78	77.89	112.66	206.08	208.15
2082	0.00	0.00	49.09	0.00	54.55	0.00	103.64	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2083	0.00	0.00	66.78	0.00	0.00	0.00	66.78	45.32	36.81	604.78	77.89	112.66	206.08	208.15
2084	0.00	0.00	10.09	0.00	10.26	0.12	20.46	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2085	0.00	0.00	0.00	0.00	10.01	0.23	10.24	45.32	36.81	604.78	77.89	112.66	206.08	208.15
2086	0.00	0.00	0.00	0.00	21.28	0.69	21.97	45.32	52.03	604.78	77.89	112.66	206.08	208.15
2087	0.00	0.00	49.34	0.00	24.39	1.04	74.76	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2088	0.00	0.00	67.12	0.00	15.88	3.11	86.11	45.32	35.10	604.78	77.89	112.66	206.08	208.15
2089	0.00	0.00	10.14	0.00	12.96	3.11	26.21	45.32	37.95	604.78	77.89	112.66	206.08	208.15
2090	0.00	0.00	0.00	0.00	0.00	3.22	3.22	45.32	37.95	604.78	77.89	112.66	206.08	208.15
Salvage Value	48.98	0.00	23.82	0.00	28.62	3.14	104.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3336.80	2687.55	338.65	0.00	381.19	55.88	6800.06	917.54	699.58	17798.20	2533.08	1819.74	4442.85	9002.54

Net Present Value 585

All Gas

TABLE 354
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	417.37	99.35	32.88	116.74	168.41
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	432.48	97.54	35.06	119.84	180.03
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	472.04	95.95	36.24	125.29	214.56
2018	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.50	0.00	450.49	93.20	39.49	130.88	186.92
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	434.55	91.30	35.00	133.68	174.57
2020	0.00	0.00	70.42	0.00	0.00	0.00	70.42	0.75	0.00	464.76	91.36	27.64	139.70	206.06
2021	0.00	0.00	88.12	0.00	6.64	0.00	94.76	1.11	0.00	456.19	89.63	25.87	152.12	188.56
2022	0.00	0.00	10.07	0.00	0.00	0.00	10.07	1.16	3.92	444.19	87.41	48.06	157.42	151.30
2023	0.00	0.00	49.14	0.00	0.00	0.00	49.14	1.41	3.92	426.51	85.26	59.16	167.81	114.28
2024	0.00	0.00	68.89	0.00	52.27	0.00	121.15	2.01	3.92	418.40	83.81	67.54	176.64	90.42
2025	0.00	0.00	10.10	0.00	0.00	0.00	10.10	2.06	7.84	366.67	83.34	56.58	154.41	72.34
2026	0.00	0.00	49.29	0.00	0.00	0.00	49.29	2.30	7.84	348.07	82.05	58.54	159.24	48.24
2027	0.00	0.00	67.05	0.00	0.00	0.00	67.05	2.64	7.84	326.72	80.23	58.85	177.10	10.54
2028	0.00	0.00	109.45	0.00	0.00	0.00	109.45	3.19	11.76	303.98	78.32	91.77	175.78	-41.88
2029	0.00	0.00	142.91	0.00	0.00	0.00	142.91	3.90	11.76	283.25	76.88	104.34	183.37	-81.34
2030	0.00	0.00	63.75	0.00	6.64	0.00	70.39	4.25	11.77	301.37	77.81	97.10	177.81	-51.35
2031	0.00	0.00	4.67	0.00	0.00	0.00	4.67	4.28	18.57	325.92	75.44	181.14	158.48	-89.13
2032	0.00	0.00	49.59	0.00	0.00	0.00	49.59	4.52	18.58	296.32	73.56	198.16	168.41	-143.81
2033	0.00	0.00	67.45	0.00	43.97	0.00	111.42	5.08	18.58	269.85	71.85	215.19	178.86	-196.04
2034	0.00	0.00	110.11	0.00	0.00	0.00	110.11	5.63	22.50	252.39	70.46	241.38	185.05	-244.50
2035	0.00	0.00	143.77	0.00	0.00	0.00	143.77	6.35	22.50	236.87	69.58	253.62	190.94	-277.27
2036	0.00	0.00	64.14	0.00	0.00	0.00	64.14	6.67	22.50	235.84	69.54	246.68	200.75	-281.13
2037	0.00	0.00	104.91	0.00	0.00	0.00	104.91	7.20	29.30	246.22	67.58	337.14	170.48	-328.98
2038	0.00	0.00	144.20	0.00	0.00	0.00	144.20	7.92	29.31	224.90	66.39	355.09	179.98	-376.56
2039	0.00	0.00	64.33	0.00	0.00	0.00	64.33	8.24	29.31	220.98	66.34	360.65	187.89	-393.89
2040	0.00	0.00	4.71	0.00	0.00	0.00	4.71	8.26	36.11	239.48	64.44	449.71	167.20	-441.86
2041	0.00	0.00	100.62	0.00	0.00	0.00	100.62	8.76	36.12	223.77	62.69	486.50	182.92	-508.34
2042	0.00	0.00	144.78	0.00	0.00	0.00	144.78	9.49	36.12	214.26	61.66	511.92	194.66	-553.98
2043	0.00	0.00	64.59	0.00	43.97	0.00	108.56	10.03	36.12	217.37	61.66	517.10	199.03	-560.43
2044	0.00	0.00	4.73	0.00	0.00	0.00	4.73	10.05	42.93	238.17	60.11	609.93	174.01	-605.89
2045	0.00	0.00	22.10	0.00	0.00	0.00	22.10	10.17	42.93	225.49	58.61	649.76	189.27	-672.15
2046	0.00	0.00	30.06	0.00	0.00	0.00	30.06	10.32	42.93	215.92	57.53	682.72	200.93	-725.27
2047	0.00	0.00	4.54	0.00	0.00	0.00	4.54	10.34	44.34	212.11	56.68	719.52	206.88	-770.98
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.35	217.84	57.61	684.00	199.03	-722.80
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	10.34	44.35	217.84	57.61	684.00	199.03	-722.80
2050	0.00	0.00	48.99	0.00	9.69	0.00	58.69	10.34	44.36	217.84	57.61	684.00	199.03	-722.80
2051	0.00	0.00	66.65	0.00	9.69	0.00	76.34	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2052	0.00	0.00	10.07	0.00	9.69	0.00	19.76	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2053	0.00	0.00	49.14	0.00	0.00	0.00	49.14	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2054	0.00	0.00	66.85	0.00	0.00	0.00	66.85	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2055	0.00	0.00	10.10	0.00	0.00	0.00	10.10	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2056	0.00	0.00	49.29	0.00	6.64	0.00	55.93	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2057	0.00	0.00	67.05	0.00	0.00	0.00	67.05	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2058	0.00	0.00	109.45	0.00	0.00	0.00	109.45	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2059	0.00	0.00	142.91	0.00	39.20	0.00	182.11	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2060	0.00	0.00	63.75	0.00	0.00	0.00	63.75	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2061	0.00	0.00	4.67	0.00	0.00	0.00	4.67	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2062	0.00	0.00	49.59	0.00	0.00	0.00	49.59	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2063	0.00	0.00	67.45	0.00	0.00	0.00	67.45	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2064	0.00	0.00	110.11	0.00	0.00	0.00	110.11	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2065	0.00	0.00	143.77	0.00	6.64	0.00	150.41	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2066	0.00	0.00	64.14	0.00	0.00	0.00	64.14	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2067	0.00	0.00	104.91	0.00	0.00	0.00	104.91	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2068	0.00	0.00	144.20	0.00	32.98	0.00	177.18	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2069	0.00	0.00	64.33	0.00	0.00	0.00	64.33	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2070	0.00	0.00	4.71	0.00	0.00	0.00	4.71	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2071	0.00	0.00	100.62	0.00	0.00	0.00	100.62	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2072	0.00	0.00	144.78	0.00	0.00	0.00	144.78	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2073	0.00	0.00	64.59	0.00	0.00	0.00	64.59	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2074	0.00	0.00	4.73	0.00	13.07	0.00	17.80	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2075	0.00	0.00	22.10	0.00	0.00	0.00	22.10	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2076	0.00	0.00	30.06	0.00	0.00	0.00	30.06	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2077	0.00	0.00	4.54	0.00	0.00	0.00	4.54	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2078	0.00	0.00	0.00	0.00	32.98	0.00	32.98	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2080	0.00	0.00	48.99	0.00	0.00	0.00	48.99	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2081	0.00	0.00	66.65	0.00	0.00	0.00	66.65	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2082	0.00	0.00	10.07	0.00	0.00	0.00	10.07	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2083	0.00	0.00	49.14	0.00	10.99	0.00	60.13	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2084	0.00	0.00	66.85	0.00	9.69	0.00	76.54	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2085	0.00	0.00	10.10	0.00	9.69	0.00	19.79	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2086	0.00	0.00	49.29	0.00	9.69	0.00	58.98	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2087	0.00	0.00	67.05	0.00	9.69	0.00	76.74	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2088	0.00	0.00	10.13	0.00	0.00	0.00	10.13	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.34	44.37	217.84	57.61	684.00	199.03	-722.80
Salvage Value	0.00	0.00	70.13	0.00	7.48	0.00	77.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1348.54	0.00	156.29	0.00	1566.69	154.57	608.54	8823.77	2120.50	8784.17	4845.19	-6926.09

Net Present Value -9256

Wind/Gas

TABLE 355
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	61.86	0.00	0.00	9.69	0.00	71.56	0.36	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.41	0.00	417.37	99.35	32.88	116.76	168.39
2016	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.45	0.00	432.48	97.54	35.06	119.86	180.01
2017	0.00	0.00	0.00	0.00	9.69	0.00	9.69	0.50	0.00	472.09	95.95	36.24	125.31	214.59
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	450.49	93.20	39.49	130.88	186.92
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	434.55	91.30	35.00	133.68	174.57
2020	0.00	0.00	0.00	6.94	10.37	0.00	17.31	0.59	0.00	459.30	90.90	29.81	141.05	197.54
2021	0.00	0.00	0.35	211.88	17.29	0.00	229.52	1.74	0.00	450.67	89.18	28.63	153.02	179.83
2022	0.00	0.00	0.00	215.84	20.88	0.00	236.73	2.92	6.10	460.54	87.58	28.72	154.67	189.56
2023	0.00	0.00	119.71	208.90	10.93	0.00	339.54	4.51	12.20	457.54	85.14	32.85	160.25	179.30
2024	0.00	0.00	155.17	3.97	18.40	0.00	177.53	5.29	18.31	464.10	83.41	33.11	164.58	182.99
2025	0.00	0.00	20.20	3.47	3.33	0.00	27.00	5.43	26.14	426.41	83.49	38.69	136.32	167.91
2026	0.00	0.00	49.29	105.94	8.37	0.00	163.60	6.24	26.14	415.86	82.51	36.99	140.27	156.09
2027	0.00	0.00	69.09	107.92	65.56	0.00	242.57	7.45	29.19	398.37	80.18	45.44	148.04	124.71
2028	0.00	0.00	10.13	107.92	18.43	0.00	136.48	8.13	36.17	392.21	78.47	58.92	153.26	101.56
2029	0.00	0.00	49.44	107.92	18.50	0.00	175.86	9.01	39.22	381.26	76.92	63.97	158.74	81.63
2030	0.00	0.00	67.25	107.92	18.50	0.00	193.67	9.98	42.27	383.78	76.02	67.05	159.99	80.72
2031	0.00	0.00	59.70	107.92	18.50	0.00	186.12	10.91	49.24	388.65	74.83	79.51	163.68	70.63
2032	0.00	0.00	67.39	107.92	62.47	0.00	237.78	12.10	52.29	384.59	73.75	80.25	169.24	61.36
2033	0.00	0.00	10.18	107.92	18.50	0.00	136.60	12.78	59.28	393.17	73.11	85.49	172.68	61.89
2034	0.00	0.00	49.68	107.92	18.50	0.00	176.11	13.66	62.33	376.91	71.34	100.62	177.06	27.89
2035	0.00	0.00	67.59	107.92	18.50	0.00	194.01	14.63	65.39	360.58	69.71	108.56	185.65	-3.34
2036	0.00	0.00	60.00	107.92	18.50	0.00	186.42	15.56	72.36	353.97	68.38	124.77	190.28	-29.45
2037	0.00	0.00	67.72	107.92	18.50	0.00	194.15	16.53	75.41	342.96	67.12	132.20	197.18	-53.53
2038	0.00	0.00	60.12	107.92	18.50	0.00	186.54	17.46	82.39	342.52	66.12	145.67	202.67	-71.94
2039	0.00	0.00	67.86	107.92	62.47	0.00	238.25	18.66	85.44	336.07	65.00	146.10	222.66	-97.70
2040	0.00	0.00	10.25	114.86	18.50	0.00	143.62	19.37	92.43	342.56	64.23	154.71	231.65	-108.02
2041	0.00	0.00	50.03	319.80	18.50	0.00	388.33	21.32	95.48	325.35	62.75	185.74	228.96	-152.09
2042	0.00	0.00	68.06	323.77	18.50	0.00	410.33	23.37	98.53	311.34	61.41	198.72	239.21	-187.99
2043	0.00	0.00	60.42	316.83	18.36	0.00	395.61	25.35	105.50	305.23	60.27	219.76	245.75	-220.54
2044	0.00	0.00	68.20	111.89	17.95	0.00	198.03	26.34	108.55	299.68	59.37	228.45	253.66	-241.80
2045	0.00	0.00	32.40	111.39	16.84	0.00	160.63	27.14	115.53	295.90	58.31	241.87	266.65	-270.92
2046	0.00	0.00	30.06	210.39	15.17	0.00	255.62	28.42	118.58	289.57	57.30	243.38	285.94	-297.06
2047	0.00	0.00	4.54	109.91	10.13	0.00	124.58	29.04	123.06	281.51	56.28	251.68	290.30	-316.74
2048	0.00	0.00	0.00	107.92	5.20	0.00	113.13	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2049	0.00	0.00	0.00	107.92	9.76	0.00	117.69	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2050	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2051	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2052	0.00	0.00	0.00	107.92	9.69	0.00	117.62	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2053	0.00	0.00	98.28	107.92	0.00	0.00	206.20	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2054	0.00	0.00	133.70	107.92	0.00	0.00	241.62	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2055	0.00	0.00	20.20	107.92	2.59	0.00	130.72	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2056	0.00	0.00	49.29	107.92	4.32	0.00	161.53	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2057	0.00	0.00	67.05	107.92	5.26	0.00	180.23	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2058	0.00	0.00	10.13	107.92	2.94	0.00	120.99	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2059	0.00	0.00	49.44	107.92	14.76	0.00	172.12	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2060	0.00	0.00	67.25	114.86	1.46	0.00	183.57	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2061	0.00	0.00	59.70	319.80	2.34	0.00	381.83	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2062	0.00	0.00	67.39	323.77	42.58	0.00	433.73	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2063	0.00	0.00	10.18	316.83	4.63	0.00	331.63	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2064	0.00	0.00	49.68	111.89	4.63	0.00	166.20	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2065	0.00	0.00	67.59	111.39	4.63	0.00	183.61	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2066	0.00	0.00	60.00	210.39	4.63	0.00	275.01	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2067	0.00	0.00	67.72	109.91	37.60	0.00	215.23	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2068	0.00	0.00	60.12	107.92	4.63	0.00	172.66	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2069	0.00	0.00	67.86	107.92	4.63	0.00	180.41	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2070	0.00	0.00	10.25	107.92	12.40	0.00	130.58	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2071	0.00	0.00	50.03	107.92	17.59	0.00	175.55	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2072	0.00	0.00	68.06	107.92	20.25	0.00	196.24	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2073	0.00	0.00	60.42	107.92	12.61	0.00	180.95	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2074	0.00	0.00	68.20	107.92	41.24	0.00	217.36	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2075	0.00	0.00	32.40	107.92	6.50	0.00	146.82	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2076	0.00	0.00	30.06	107.92	10.66	0.00	148.64	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2077	0.00	0.00	4.54	107.92	27.61	0.00	140.08	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2078	0.00	0.00	0.00	107.92	18.36	0.00	126.28	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2079	0.00	0.00	0.00	107.92	18.15	0.00	126.08	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2080	0.00	0.00	0.00	114.86	17.88	0.00	132.74	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2081	0.00	0.00	0.00	319.80	17.04	0.00	336.84	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2082	0.00	0.00	0.00	323.77	27.16	0.00	350.92	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2083	0.00	0.00	98.28	316.83	15.12	0.00	430.23	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2084	0.00	0.00	133.70	111.89	23.50	0.00	269.09	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2085	0.00	0.00	20.20	111.39	23.36	0.00	154.95	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2086	0.00	0.00	49.29	210.39	22.53	0.00	282.21	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2087	0.00	0.00	67.05	109.91	21.70	0.00	198.65	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2088	0.00	0.00	10.13	107.92	7.84	0.00	125.89	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2089	0.00	0.00	0.00	104.45	14.95	0.00	119.40	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
2090	0.00	0.00	0.00	1.98	0.07	0.00	2.05	29.04	123.06	288.99	57.29	245.64	280.96	-294.91
Salvage Value	0.00	0.00	47.38	130.86	27.47	0.00	205.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	61.86	1003.30	2864.89	417.95	0.00	4348.00	405.26	1713.36	10462.25	2114.72	3519.28	5594.70	-766.45

Net Present Value -7233

K22/Gas

TABLE 356
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: Low
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	98.15	0.00	0.00	9.69	0.00	107.84	0.54	0.00	365.06	101.23	28.72	111.04	124.06
2015	0.00	29.32	0.00	0.00	10.40	0.00	39.72	0.74	0.00	417.37	99.35	32.88	116.74	168.41
2016	0.00	25.47	0.00	0.00	10.47	0.00	35.94	0.92	0.00	431.94	97.54	35.07	119.84	179.49
2017	0.00	189.44	0.00	0.00	23.06	0.00	212.50	1.98	0.00	470.70	95.96	36.26	125.36	213.13
2018	0.00	368.39	0.00	0.00	6.85	0.00	375.25	3.86	0.00	447.59	93.21	39.51	131.02	183.85
2019	0.00	599.13	0.00	0.00	11.93	0.00	611.06	6.91	0.00	431.58	91.31	35.01	133.82	171.44
2020	0.00	665.27	0.00	0.00	21.71	0.00	686.99	10.35	0.00	452.62	90.73	30.74	142.07	189.08
2021	0.00	542.28	0.00	0.00	30.80	0.00	573.08	13.21	0.00	447.69	89.13	29.22	155.23	174.10
2022	0.00	314.02	0.00	0.00	36.48	0.00	350.50	14.96	12.78	456.10	89.10	33.24	143.38	190.38
2023	0.00	145.56	0.00	0.00	0.01	0.00	145.57	15.69	12.99	603.65	94.69	32.69	127.31	348.96
2024	0.00	50.19	0.00	0.00	0.00	0.00	50.19	15.94	12.71	628.07	94.54	36.93	136.19	360.41
2025	0.00	0.00	0.35	0.00	0.00	0.00	0.35	15.94	12.92	598.68	94.53	25.75	119.04	359.36
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.94	12.75	578.30	92.71	26.07	124.80	334.73
2027	0.00	0.00	70.77	0.00	0.00	0.00	70.77	16.19	12.70	534.04	90.90	24.94	121.49	296.71
2028	0.00	0.00	88.59	0.00	6.64	0.00	95.23	16.56	12.47	509.00	89.38	26.00	125.94	267.68
2029	0.00	0.00	10.14	0.00	0.00	0.00	10.14	16.61	15.96	502.32	88.56	32.79	127.50	253.47
2030	0.00	0.00	49.49	0.00	0.00	0.00	49.49	16.86	15.96	486.47	86.83	40.64	134.18	224.82
2031	0.00	0.00	168.98	0.00	52.27	0.00	221.24	17.95	16.00	474.16	85.20	47.65	142.60	198.71
2032	0.00	0.00	153.51	0.00	0.00	0.00	153.51	18.72	22.58	460.24	83.61	64.17	149.61	162.84
2033	0.00	0.00	63.94	0.00	6.64	0.00	70.58	19.07	18.71	474.38	83.80	56.50	153.08	181.00
2034	0.00	0.00	4.68	0.00	0.00	0.00	4.68	19.10	25.51	508.75	81.42	153.07	131.05	143.21
2035	0.00	0.00	100.02	0.00	0.00	0.00	100.02	19.60	25.51	482.09	79.40	167.88	141.09	93.72
2036	0.00	0.00	143.92	0.00	0.00	0.00	143.92	20.32	25.51	465.82	77.91	181.90	148.91	57.10
2037	0.00	0.00	64.20	0.00	0.00	0.00	64.20	20.64	25.52	481.81	78.35	172.47	149.06	81.93
2038	0.00	0.00	105.02	0.00	0.00	0.00	105.02	21.16	31.67	516.26	76.02	278.46	130.79	30.99
2039	0.00	0.00	144.35	0.00	0.00	0.00	144.35	21.88	31.68	501.83	74.68	292.94	147.27	-13.06
2040	0.00	0.00	64.39	0.00	43.97	0.00	108.36	22.43	31.68	504.68	74.21	295.76	154.84	-20.12
2041	0.00	0.00	4.72	0.00	0.00	0.00	4.72	22.45	38.49	545.60	72.27	406.02	132.81	-65.49
2042	0.00	0.00	100.72	0.00	0.00	0.00	100.72	22.95	41.33	524.77	70.49	433.91	143.24	-122.87
2043	0.00	0.00	144.93	0.00	0.00	0.00	144.93	23.68	38.49	510.12	69.17	455.42	151.44	-165.92
2044	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.00	38.49	507.30	68.83	455.51	158.28	-175.31
2045	0.00	0.00	4.74	0.00	0.00	0.00	4.74	24.02	45.29	556.66	67.26	571.57	136.43	-218.59
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.29	540.06	66.03	592.46	146.12	-264.55
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	47.01	524.64	64.69	621.61	155.79	-317.45
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	47.01	540.45	65.99	595.21	146.11	-266.87
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	47.01	540.45	65.99	595.21	146.11	-266.87
2050	0.00	0.00	0.00	0.00	10.01	0.00	10.01	24.02	46.16	540.45	65.99	595.21	146.11	-266.87
2051	0.00	0.00	0.00	0.00	10.05	0.00	10.05	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2052	0.00	0.00	0.00	0.00	10.06	0.00	10.06	24.02	48.15	540.45	65.99	595.21	146.11	-266.87
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2054	0.00	0.00	0.00	0.00	11.08	0.00	11.08	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2055	0.00	0.00	0.00	0.00	14.69	0.00	14.69	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2056	0.00	0.00	0.00	0.00	15.88	0.00	15.88	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2057	0.00	0.00	49.34	0.00	12.96	0.00	62.29	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2058	0.00	0.00	67.12	0.00	0.00	0.00	67.12	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2059	0.00	0.00	10.14	0.00	0.00	0.00	10.14	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2060	0.00	0.00	49.49	0.00	0.00	0.00	49.49	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2061	0.00	0.00	166.93	0.00	0.00	0.00	166.93	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2062	0.00	0.00	153.51	0.00	0.00	0.00	153.51	24.02	48.15	540.45	65.99	595.21	146.11	-266.87
2063	0.00	0.00	63.94	0.00	6.64	0.00	70.58	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2064	0.00	0.00	4.68	0.00	0.00	0.00	4.68	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2065	0.00	0.00	100.02	0.00	0.40	0.00	100.41	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2066	0.00	0.00	143.92	0.00	39.62	0.00	183.53	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2067	0.00	0.00	64.20	0.00	13.00	0.00	77.20	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2068	0.00	0.00	105.02	0.00	13.15	0.00	118.17	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2069	0.00	0.00	144.35	0.00	0.86	0.00	145.20	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2070	0.00	0.00	64.39	0.00	7.02	0.00	71.41	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2071	0.00	0.00	4.72	0.00	14.92	0.00	19.63	24.02	60.53	540.45	65.99	595.21	146.11	-266.87
2072	0.00	0.00	100.72	0.00	23.52	0.00	124.24	24.02	48.15	540.45	65.99	595.21	146.11	-266.87
2073	0.00	0.00	144.93	0.00	0.01	0.00	144.93	24.02	47.01	540.45	65.99	595.21	146.11	-266.87
2074	0.00	0.00	64.65	0.00	0.00	0.00	64.65	24.02	47.01	540.45	65.99	595.21	146.11	-266.87
2075	0.00	0.00	4.74	0.00	32.98	0.00	37.71	24.02	47.01	540.45	65.99	595.21	146.11	-266.87
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	46.16	540.45	65.99	595.21	146.11	-266.87
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2081	0.00	0.00	0.00	0.00	13.07	0.00	13.07	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	48.15	540.45	65.99	595.21	146.11	-266.87
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2087	0.00	0.00	49.34	0.00	9.69	0.00	59.03	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2088	0.00	0.00	67.12	0.00	0.00	0.00	67.12	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2089	0.00	0.00	10.14	0.00	0.00	0.00	10.14	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
2090	0.00	0.00	0.00	0.00	10.99	0.00	10.99	24.02	45.30	540.45	65.99	595.21	146.11	-266.87
Salvage Value	0.00	0.00	41.60	0.00	11.10	0.00	52.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	0.00	2515.06	1011.47	0.00	238.43	0.00	3764.96	473.01	684.05	14310.50	2312.62	7075.72	3914.11	1008.05

Net Present Value: -3914

K22/C29

TABLE 357
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	98.15	0.00	0.00	9.69	0.00	137.06	0.69	0.00	365.06	101.23	28.72	111.04	124.06
2015	37.30	29.32	0.00	0.00	10.40	0.00	77.02	1.07	0.00	417.37	99.35	32.88	116.74	168.41
2016	10.85	25.47	0.00	0.00	10.47	0.00	46.79	1.30	0.00	431.94	97.54	35.07	119.84	179.49
2017	11.52	189.44	0.00	0.00	23.06	0.00	224.03	2.42	0.00	470.70	95.96	36.26	125.36	213.13
2018	11.56	368.39	0.00	0.00	6.85	0.00	386.80	4.36	0.00	447.59	93.21	39.51	131.02	183.85
2019	13.78	599.13	0.00	0.00	11.93	0.00	624.84	7.48	0.00	431.58	91.31	35.01	133.82	171.44
2020	148.85	665.27	0.00	0.00	21.71	0.00	835.83	11.66	0.00	452.63	90.73	30.74	142.08	189.08
2021	227.01	542.28	0.00	0.00	30.80	0.00	800.10	15.66	0.00	447.39	89.13	29.24	155.49	173.53
2022	240.14	314.02	0.00	0.00	36.48	0.00	590.64	18.62	12.78	455.73	89.11	33.19	143.64	189.78
2023	242.82	145.56	0.00	0.00	2.50	0.00	390.88	20.57	12.99	602.34	94.67	32.78	127.42	347.46
2024	653.98	50.19	0.00	0.00	2.50	0.00	706.66	24.10	12.71	625.42	94.53	36.94	136.28	357.67
2025	1034.51	0.00	0.00	0.00	30.45	0.00	1064.96	29.43	12.92	595.38	94.55	25.79	119.20	355.84
2026	926.14	0.00	0.00	0.00	15.94	0.00	942.07	34.14	12.75	574.21	92.71	26.14	125.09	330.27
2027	659.44	0.00	0.00	0.00	26.88	0.00	686.32	37.57	12.70	531.92	91.13	23.95	121.49	295.34
2028	455.38	0.00	0.00	0.00	46.73	0.00	502.11	40.08	12.47	499.70	89.28	26.32	127.13	256.97
2029	298.24	0.00	0.00	0.00	61.85	0.00	360.08	41.88	26.10	655.65	92.97	30.17	113.02	419.49
2030	109.53	0.00	0.00	0.00	72.44	0.00	181.97	42.79	26.31	870.86	100.00	29.35	103.81	637.70
2031	34.46	0.00	0.00	0.00	0.00	0.00	34.46	42.96	26.22	901.67	99.71	30.01	109.02	662.93
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	29.08	870.82	98.08	29.66	110.00	633.07
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	25.04	836.52	96.50	29.65	107.72	602.65
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	25.00	810.12	94.94	30.29	109.64	575.25
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	24.83	779.73	93.43	30.49	110.34	545.47
2036	0.00	0.00	0.35	0.00	0.00	0.00	0.35	42.96	24.47	747.21	91.92	30.44	111.38	513.48
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.96	24.54	714.38	90.42	30.60	113.19	480.17
2038	0.00	0.00	71.31	0.00	0.00	0.00	71.31	43.21	24.00	682.57	88.94	30.65	116.57	446.40
2039	0.00	0.00	89.29	0.00	6.64	0.00	95.92	43.59	26.68	671.56	87.61	30.02	133.28	420.65
2040	0.00	0.00	10.25	0.00	0.00	0.00	10.25	43.64	27.75	656.24	85.92	53.45	135.68	381.20
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.64	27.75	639.69	84.49	59.64	143.94	351.62
2042	0.00	0.00	50.13	0.00	0.00	0.00	50.13	43.89	30.59	626.67	83.11	61.50	157.38	324.68
2043	0.00	0.00	68.13	0.00	6.64	0.00	74.77	44.26	27.75	610.85	81.66	62.68	173.91	292.59
2044	0.00	0.00	60.48	0.00	0.00	0.00	60.48	44.56	31.66	596.11	80.24	96.67	170.41	248.79
2045	0.00	0.00	70.31	0.00	52.27	0.00	122.57	45.17	31.02	582.77	79.00	103.59	180.95	219.23
2046	0.00	0.00	10.31	0.00	0.00	0.00	10.31	45.22	34.94	600.11	78.65	102.57	190.72	228.17
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.65	557.22	76.49	137.30	197.36	146.07
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.65	580.04	78.05	114.49	189.68	197.82
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	39.50	580.04	78.05	114.49	189.68	197.82
2050	0.00	0.00	0.00	0.00	10.01	0.00	10.01	45.22	35.80	580.04	78.05	114.49	189.68	197.82
2051	0.00	0.00	0.00	0.00	10.05	0.00	10.05	45.22	34.96	580.04	78.05	114.49	189.68	197.82
2052	0.00	0.00	0.00	0.00	10.06	0.00	10.06	45.22	37.81	580.04	78.05	114.49	189.68	197.82
2053	0.00	0.00	0.00	0.00	0.34	0.00	0.34	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2054	0.00	0.00	0.00	0.00	11.08	0.00	11.08	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2055	0.00	0.00	0.00	0.00	14.69	0.00	14.69	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2056	0.00	0.00	0.00	0.00	15.88	0.00	15.88	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2057	0.00	0.00	0.00	0.00	12.96	0.00	12.96	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2058	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2059	0.00	0.00	0.00	0.00	0.62	0.00	0.62	45.22	53.04	580.04	78.05	114.49	189.68	197.82
2060	0.00	0.00	0.00	0.00	7.40	0.00	7.40	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2061	0.00	0.00	0.00	0.00	3.70	0.00	3.70	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2062	0.00	0.00	0.00	0.00	6.17	0.00	6.17	45.22	37.81	580.04	78.05	114.49	189.68	197.82
2063	0.00	0.00	0.00	0.00	10.49	0.00	10.49	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2064	0.00	0.00	0.00	0.00	14.81	0.00	14.81	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2065	0.00	0.00	0.00	0.00	18.29	0.00	18.29	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2066	0.00	0.00	0.00	0.00	0.42	0.00	0.42	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2067	0.00	0.00	0.00	0.00	13.00	0.00	13.00	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2068	0.00	0.00	49.88	0.00	6.52	0.00	56.40	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2069	0.00	0.00	67.86	0.00	0.86	0.00	68.71	45.22	53.04	580.04	78.05	114.49	189.68	197.82
2070	0.00	0.00	10.25	0.00	7.02	0.00	17.27	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2071	0.00	0.00	0.00	0.00	14.92	0.00	14.92	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2072	0.00	0.00	50.08	0.00	23.52	0.00	73.60	45.22	53.04	580.04	78.05	114.49	189.68	197.82
2073	0.00	0.00	68.13	0.00	1.89	0.00	70.02	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2074	0.00	0.00	60.48	0.00	8.52	0.00	69.00	45.22	51.90	580.04	78.05	114.49	189.68	197.82
2075	0.00	0.00	68.27	0.00	23.04	0.00	91.31	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2076	0.00	0.00	10.31	0.00	12.23	0.00	22.55	45.22	51.05	580.04	78.05	114.49	189.68	197.82
2077	0.00	0.00	0.00	0.00	20.70	0.00	20.70	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2078	0.00	0.00	0.00	0.00	42.88	0.00	42.88	45.22	50.19	580.04	78.05	114.49	189.68	197.82
2079	0.00	0.00	0.00	0.00	47.04	0.00	47.04	45.22	37.81	580.04	78.05	114.49	189.68	197.82
2080	0.00	0.00	0.00	0.00	93.75	0.00	93.75	45.22	51.90	580.04	78.05	114.49	189.68	197.82
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	54.75	580.04	78.05	114.49	189.68	197.82
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	36.68	580.04	78.05	114.49	189.68	197.82
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	51.90	580.04	78.05	114.49	189.68	197.82
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	34.97	580.04	78.05	114.49	189.68	197.82
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	37.81	580.04	78.05	114.49	189.68	197.82
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.22	34.97	580.04	78.05	114.49	189.68	197.82
Salvage Value	34.56	0.00	13.53	0.00	24.36	0.00	72.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3537.62	2515.06	217.19	0.00	382.32	0.00	6652.19	902.35	620.27	16538.29	2512.80	1679.12	4142.47	8203.91

Net Present Value 29

SCGT/C26

TABLE 358
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	365.06	101.23	28.72	111.04	124.06
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	417.37	99.35	32.88	116.75	168.40
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	432.48	97.54	35.06	119.84	180.03
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	472.08	95.95	36.24	125.32	214.57
2018	192.09	0.00	0.35	0.00	0.00	0.00	192.45	3.06	0.00	449.90	93.20	39.51	130.92	186.28
2019	229.36	0.00	0.00	0.00	0.00	0.00	229.36	4.20	0.00	433.63	91.30	35.01	133.72	173.60
2020	233.06	0.00	70.42	0.00	0.00	0.00	303.48	5.61	0.00	463.06	91.33	27.80	139.80	204.14
2021	640.56	0.00	88.08	0.00	6.64	0.00	735.27	9.18	0.00	454.53	89.60	26.18	152.68	186.06
2022	1025.35	0.00	10.07	0.00	0.47	0.00	1035.89	14.36	3.92	442.53	87.43	48.67	158.09	148.33
2023	917.93	0.00	0.00	0.00	0.95	0.00	918.88	18.96	3.92	422.83	85.11	61.50	168.98	107.24
2024	653.60	0.00	0.00	0.00	1.90	0.00	655.50	22.23	3.92	417.90	83.98	66.96	176.55	90.41
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	24.51	3.92	373.67	84.48	41.54	158.31	89.34
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	26.00	17.97	476.70	88.35	31.60	125.97	230.78
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	26.54	18.18	682.76	96.00	29.25	114.02	443.50
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	26.71	17.90	717.67	96.01	32.02	125.14	464.50
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	18.11	685.72	94.33	33.00	127.35	431.05
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.94	658.21	93.16	32.54	122.79	409.72
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.89	630.93	91.23	35.45	128.29	375.96
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.66	587.75	89.37	37.75	128.64	331.99
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.23	559.21	87.48	44.34	133.99	293.40
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.23	545.29	85.95	51.17	142.67	265.50
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.71	17.27	532.02	84.67	56.93	148.35	242.06
2036	0.00	0.00	49.78	0.00	0.00	0.00	49.78	26.96	19.95	525.23	83.62	57.49	157.43	226.69
2037	0.00	0.00	67.77	0.00	6.64	0.00	74.40	27.33	17.10	510.36	82.15	58.52	174.19	195.50
2038	0.00	0.00	10.23	0.00	0.00	0.00	10.23	27.39	21.02	497.06	80.68	90.33	172.43	153.61
2039	0.00	0.00	49.93	0.00	0.00	0.00	49.93	27.64	21.02	484.58	79.45	98.10	188.30	118.73
2040	0.00	0.00	69.97	0.00	52.27	0.00	122.23	28.24	21.02	475.01	78.14	97.51	209.42	89.93
2041	0.00	0.00	60.30	0.00	0.00	0.00	60.30	28.54	24.95	457.56	76.52	137.67	208.98	34.39
2042	0.00	0.00	68.06	0.00	0.00	0.00	68.06	28.88	24.30	439.90	75.22	154.93	216.68	-6.92
2043	0.00	0.00	60.42	0.00	0.00	0.00	60.42	29.18	28.21	430.83	73.93	173.62	230.68	-47.40
2044	0.00	0.00	68.20	0.00	43.97	0.00	112.17	29.74	28.21	416.83	72.65	175.94	255.05	-86.82
2045	0.00	0.00	10.30	0.00	0.00	0.00	10.30	29.79	32.15	405.92	71.35	241.42	239.73	-146.57
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	35.00	392.99	70.21	266.39	247.14	-190.75
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.16	379.61	68.91	271.33	275.77	-236.40
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.17	392.84	70.15	259.71	254.21	-191.24
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.17	392.84	70.15	259.71	254.21	-191.24
2050	0.00	0.00	48.99	0.00	9.69	0.00	58.69	29.79	32.18	392.84	70.15	259.71	254.21	-191.24
2051	0.00	0.00	66.65	0.00	9.69	0.00	76.34	29.79	33.89	392.84	70.15	259.71	254.21	-191.24
2052	0.00	0.00	10.07	0.00	9.69	0.00	19.76	29.79	33.90	392.84	70.15	259.71	254.21	-191.24
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	392.84	70.15	259.71	254.21	-191.24
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	392.84	70.15	259.71	254.21	-191.24
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	392.84	70.15	259.71	254.21	-191.24
2056	0.00	0.00	0.00	0.00	6.64	0.00	6.64	29.79	35.04	392.84	70.15	259.71	254.21	-191.24
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2066	0.00	0.00	49.78	0.00	0.00	0.00	49.78	29.79	35.04	392.84	70.15	259.71	254.21	-191.24
2067	0.00	0.00	67.72	0.00	0.00	0.00	67.72	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2068	0.00	0.00	10.23	0.00	0.00	0.00	10.23	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2069	0.00	0.00	49.93	0.00	0.00	0.00	49.93	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2070	0.00	0.00	67.93	0.00	0.00	0.00	67.93	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2071	0.00	0.00	60.30	0.00	0.00	0.00	60.30	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2072	0.00	0.00	68.06	0.00	7.11	0.00	75.17	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2073	0.00	0.00	60.42	0.00	0.95	0.00	61.37	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2074	0.00	0.00	68.20	0.00	1.90	0.00	70.09	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2075	0.00	0.00	10.30	0.00	43.46	0.00	53.77	29.79	47.41	392.84	70.15	259.71	254.21	-191.24
2076	0.00	0.00	0.00	0.00	1.90	0.00	1.90	29.79	35.04	392.84	70.15	259.71	254.21	-191.24
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	49.12	392.84	70.15	259.71	254.21	-191.24
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	33.90	392.84	70.15	259.71	254.21	-191.24
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	29.79	49.12	392.84	70.15	259.71	254.21	-191.24
2080	0.00	0.00	48.99	0.00	0.00	0.00	48.99	29.79	33.90	392.84	70.15	259.71	254.21	-191.24
2081	0.00	0.00	66.65	0.00	0.00	0.00	66.65	29.79	49.12	392.84	70.15	259.71	254.21	-191.24
2082	0.00	0.00	10.07	0.00	0.00	0.00	10.07	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	35.04	392.84	70.15	259.71	254.21	-191.24
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
2090	0.00	0.00	0.00	0.00	13.07	0.00	13.07	29.79	32.19	392.84	70.15	259.71	254.21	-191.24
Salvage Value	13.69	0.00	23.21	0.00	8.38	0.00	45.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	460.49	0.00	111.62	0.00	4525.00	601.92	509.81	13099.53	2369.24	3295.94	5116.69	2317.66

Net Present Value -3319

CCGT/C26

TABLE 359
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	Low
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	365.06	101.23	28.72	111.04	124.06
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	417.37	99.35	32.88	116.75	168.40
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	432.48	97.54	35.06	119.84	180.03
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	472.08	95.95	36.24	125.32	214.57
2018	192.09	0.00	0.35	0.00	0.00	0.00	192.45	3.06	0.00	449.90	93.20	39.51	130.92	186.28
2019	229.36	0.00	98.43	0.00	0.00	0.00	327.79	4.70	0.00	433.63	91.30	35.01	133.72	173.60
2020	233.06	0.00	163.06	0.00	0.00	0.00	396.12	6.57	0.00	463.06	91.33	27.80	139.80	204.14
2021	640.56	0.00	84.61	0.00	6.64	0.00	731.80	10.12	0.00	464.58	90.36	23.10	149.91	201.21
2022	1025.35	0.00	4.63	0.00	0.47	0.00	1030.45	15.27	6.79	486.98	87.94	95.03	126.85	177.16
2023	917.93	0.00	0.00	0.00	0.95	0.00	918.88	19.87	6.79	478.75	85.93	109.48	135.08	148.26
2024	653.60	0.00	0.00	0.00	1.90	0.00	655.50	23.15	6.79	479.19	84.97	116.52	139.78	137.92
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	25.42	6.79	433.88	84.66	98.43	131.09	119.70
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	26.91	20.85	524.93	88.28	84.40	108.75	243.50
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	27.45	21.06	725.38	95.98	74.05	99.84	455.51
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	27.62	20.78	762.17	96.15	76.03	108.92	481.07
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.99	734.01	94.46	83.35	108.26	447.95
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.82	695.03	92.38	90.70	108.06	403.89
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.77	706.29	92.35	86.43	104.48	423.03
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.54	651.79	89.53	97.59	108.57	356.10
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.11	625.02	87.92	103.53	109.10	324.46
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.11	601.47	85.95	114.07	116.00	285.44
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	20.15	588.12	84.52	122.60	121.10	259.89
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.62	22.83	571.41	82.92	134.48	127.99	226.01
2037	0.00	0.00	49.83	0.00	0.00	0.00	49.83	27.87	19.98	569.31	82.21	138.68	131.10	217.33
2038	0.00	0.00	67.83	0.00	6.64	0.00	74.47	28.25	19.98	561.54	81.04	141.27	143.09	196.14
2039	0.00	0.00	10.24	0.00	0.00	0.00	10.24	28.30	23.90	545.83	79.31	169.56	154.80	142.17
2040	0.00	0.00	49.98	0.00	0.00	0.00	49.98	28.55	23.90	531.91	77.91	181.35	164.51	108.13
2041	0.00	0.00	70.04	0.00	52.27	0.00	122.30	29.15	23.90	518.14	76.62	189.24	176.77	75.51
2042	0.00	0.00	60.36	0.00	0.00	0.00	60.36	29.45	27.18	508.67	75.32	205.72	190.05	37.58
2043	0.00	0.00	68.13	0.00	0.00	0.00	68.13	29.79	27.18	489.85	73.94	232.93	190.78	-7.80
2044	0.00	0.00	10.29	0.00	0.00	0.00	10.29	29.84	31.09	476.47	72.65	257.08	199.06	-52.33
2045	0.00	0.00	50.23	0.00	0.00	0.00	50.23	30.09	31.09	461.50	71.36	264.92	217.73	-92.51
2046	0.00	0.00	68.33	0.00	43.97	0.00	112.30	30.65	33.95	453.68	70.48	264.09	235.13	-116.01
2047	0.00	0.00	10.33	0.00	0.00	0.00	10.33	30.71	35.03	429.38	68.93	316.91	229.42	-185.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.04	448.19	70.26	281.97	227.42	-131.47
2049	0.00	0.00	98.43	0.00	9.69	0.00	108.12	30.71	35.05	448.19	70.26	281.97	227.42	-131.47
2050	0.00	0.00	141.63	0.00	9.69	0.00	151.33	30.71	35.05	448.19	70.26	281.97	227.42	-131.47
2051	0.00	0.00	63.18	0.00	9.69	0.00	72.88	30.71	36.76	448.19	70.26	281.97	227.42	-131.47
2052	0.00	0.00	4.63	0.00	9.69	0.00	14.32	30.71	36.77	448.19	70.26	281.97	227.42	-131.47
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.77	448.19	70.26	281.97	227.42	-131.47
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	448.19	70.26	281.97	227.42	-131.47
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	448.19	70.26	281.97	227.42	-131.47
2056	0.00	0.00	0.00	0.00	6.64	0.00	6.64	30.71	37.92	448.19	70.26	281.97	227.42	-131.47
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	37.92	448.19	70.26	281.97	227.42	-131.47
2067	0.00	0.00	49.83	0.00	0.00	0.00	49.83	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2068	0.00	0.00	67.79	0.00	0.00	0.00	67.79	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2069	0.00	0.00	10.24	0.00	0.00	0.00	10.24	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2070	0.00	0.00	49.98	0.00	0.00	0.00	49.98	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2071	0.00	0.00	67.99	0.00	0.00	0.00	67.99	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2072	0.00	0.00	60.36	0.00	0.47	0.00	60.83	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2073	0.00	0.00	68.13	0.00	7.58	0.00	75.71	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2074	0.00	0.00	10.29	0.00	1.90	0.00	12.19	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2075	0.00	0.00	50.23	0.00	4.26	0.00	54.50	30.71	50.29	448.19	70.26	281.97	227.42	-131.47
2076	0.00	0.00	68.33	0.00	41.09	0.00	109.43	30.71	37.92	448.19	70.26	281.97	227.42	-131.47
2077	0.00	0.00	10.33	0.00	0.00	0.00	10.33	30.71	52.00	448.19	70.26	281.97	227.42	-131.47
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	36.78	448.19	70.26	281.97	227.42	-131.47
2079	0.00	0.00	98.43	0.00	0.00	0.00	98.43	30.71	52.00	448.19	70.26	281.97	227.42	-131.47
2080	0.00	0.00	141.63	0.00	0.00	0.00	141.63	30.71	36.78	448.19	70.26	281.97	227.42	-131.47
2081	0.00	0.00	63.18	0.00	32.98	0.00	96.16	30.71	52.00	448.19	70.26	281.97	227.42	-131.47
2082	0.00	0.00	4.63	0.00	0.00	0.00	4.63	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2084	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	37.92	448.19	70.26	281.97	227.42	-131.47
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.71	35.07	448.19	70.26	281.97	227.42	-131.47
Salvage Value	13.69	0.00	36.42	0.00	7.63	0.00	57.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	666.39	0.00	108.99	0.00	4728.28	621.66	563.34	14286.68	2372.87	4208.78	4529.64	3175.40

Net Present Value -2738

Wind/C26

TABLE 360
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate Low
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	29.22	61.86	0.00	0.00	9.69	0.00	100.77	0.50	0.00	365.06	101.23	28.72	111.04	124.06
2015	37.30	0.00	0.00	0.00	9.69	0.00	46.99	0.74	0.00	417.37	99.35	32.88	116.76	168.39
2016	85.21	0.00	0.00	0.00	9.69	0.00	94.90	1.21	0.00	432.48	97.54	35.06	119.86	180.01
2017	166.93	0.00	0.00	0.00	9.69	0.00	176.62	2.10	0.00	472.09	95.95	36.24	125.31	214.59
2018	192.09	0.00	0.00	0.00	0.00	0.00	192.09	3.06	0.00	449.90	93.20	39.51	130.91	186.29
2019	229.36	0.00	0.00	0.00	0.00	0.00	229.36	4.20	0.00	433.63	91.30	35.01	133.73	173.59
2020	233.06	0.00	0.00	6.94	10.37	0.00	250.37	5.46	0.00	458.09	90.91	29.78	141.09	196.31
2021	640.56	0.00	0.00	211.88	17.29	0.00	869.72	9.80	0.00	449.74	89.18	28.76	153.72	178.08
2022	1025.35	0.00	0.00	215.84	21.22	0.00	1262.41	16.12	6.10	459.01	87.58	28.68	155.99	186.75
2023	917.93	0.00	0.00	208.90	11.32	0.00	1138.16	21.81	12.20	456.06	85.16	32.72	161.63	176.53
2024	653.60	0.00	0.00	3.97	5.35	0.00	662.92	25.12	18.31	460.30	83.31	33.45	168.02	175.52
2025	451.35	0.00	0.00	0.00	4.26	0.00	455.61	27.40	18.31	410.84	83.23	21.99	176.08	129.54
2026	295.60	0.00	0.00	0.00	1.90	0.00	297.49	28.89	32.36	551.05	87.13	26.12	125.10	312.69
2027	108.56	0.00	0.00	0.00	0.00	0.00	108.56	29.43	32.58	757.89	94.77	23.59	111.56	527.97
2028	34.16	0.00	0.00	0.00	0.00	0.00	34.16	29.60	32.29	785.25	94.57	25.71	121.53	543.43
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.50	755.15	92.95	26.10	123.95	512.15
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.33	734.51	91.92	25.49	121.16	495.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	32.28	718.71	90.51	26.40	123.83	477.98
2032	0.00	0.00	0.35	0.00	0.00	0.00	0.35	29.60	32.05	685.54	89.14	26.33	122.65	447.41
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.60	31.62	645.23	87.67	26.20	119.47	411.88
2034	0.00	0.00	71.11	0.00	0.00	0.00	71.11	29.85	31.62	613.34	86.25	26.37	121.28	379.44
2035	0.00	0.00	89.02	0.00	6.64	0.00	95.65	30.22	31.66	602.17	85.26	24.40	126.91	365.61
2036	0.00	0.00	60.00	0.00	0.00	0.00	60.00	30.52	38.26	578.64	83.22	45.38	133.42	316.63
2037	0.00	0.00	67.77	0.00	6.64	0.00	74.40	30.89	35.41	562.13	81.78	51.23	142.69	286.44
2038	0.00	0.00	10.23	0.00	0.00	0.00	10.23	30.94	39.32	553.77	80.54	66.59	149.12	257.51
2039	0.00	0.00	49.93	0.00	0.00	0.00	49.93	31.19	39.32	545.18	79.39	65.63	169.96	230.20
2040	0.00	0.00	69.97	6.94	52.27	0.00	129.17	31.83	39.32	523.93	77.74	84.66	175.95	185.57
2041	0.00	0.00	60.30	211.88	0.00	0.00	272.18	33.19	43.25	511.51	76.37	103.64	185.14	146.36
2042	0.00	0.00	68.06	215.84	0.00	0.00	283.91	34.61	42.61	496.77	75.10	108.43	199.38	113.86
2043	0.00	0.00	60.42	208.90	0.00	0.00	269.32	35.96	46.52	487.15	73.83	121.18	216.06	76.08
2044	0.00	0.00	68.20	3.97	43.97	0.00	116.13	36.54	46.52	466.07	72.49	152.60	213.78	27.19
2045	0.00	0.00	10.30	0.00	0.00	0.00	10.30	36.59	50.45	453.80	71.25	178.11	222.37	-17.93
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	53.31	438.79	70.01	181.79	244.17	-57.17
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.47	425.17	68.79	184.57	270.53	-98.73
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.47	439.25	70.01	181.49	245.69	-57.94
2049	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.48	439.25	70.01	181.49	245.69	-57.94
2050	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.48	439.25	70.01	181.49	245.69	-57.94
2051	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2052	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2055	0.00	0.00	0.00	0.00	2.59	0.00	2.59	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2056	0.00	0.00	0.00	0.00	4.32	0.00	4.32	36.59	53.34	439.25	70.01	181.49	245.69	-57.94
2057	0.00	0.00	0.00	0.00	5.19	0.00	5.19	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2058	0.00	0.00	0.00	0.00	2.59	0.00	2.59	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2059	0.00	0.00	0.00	0.00	0.86	0.00	0.86	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2060	0.00	0.00	0.00	6.94	0.00	0.00	6.94	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2061	0.00	0.00	0.00	211.88	0.00	0.00	211.88	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2062	0.00	0.00	0.00	215.84	0.00	0.00	215.84	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2063	0.00	0.00	0.00	208.90	0.00	0.00	208.90	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2064	0.00	0.00	49.68	3.97	0.00	0.00	53.65	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2065	0.00	0.00	67.59	0.00	0.00	0.00	67.59	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2066	0.00	0.00	60.00	0.00	0.00	0.00	60.00	36.59	53.34	439.25	70.01	181.49	245.69	-57.94
2067	0.00	0.00	67.72	0.00	0.00	0.00	67.72	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2068	0.00	0.00	10.23	0.00	0.00	0.00	10.23	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2069	0.00	0.00	49.93	0.00	0.00	0.00	49.93	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2070	0.00	0.00	67.93	0.00	14.42	0.00	82.34	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2071	0.00	0.00	60.30	0.00	12.97	0.00	73.26	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2072	0.00	0.00	68.06	0.00	22.67	0.00	90.73	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2073	0.00	0.00	60.42	0.00	8.73	0.00	69.14	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2074	0.00	0.00	68.20	0.00	4.49	0.00	72.69	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2075	0.00	0.00	10.30	0.00	43.46	0.00	53.77	36.59	65.72	439.25	70.01	181.49	245.69	-57.94
2076	0.00	0.00	0.00	0.00	1.90	0.00	1.90	36.59	53.34	439.25	70.01	181.49	245.69	-57.94
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	67.43	439.25	70.01	181.49	245.69	-57.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2079	0.00	0.00	0.00	0.00	32.98	0.00	32.98	36.59	67.43	439.25	70.01	181.49	245.69	-57.94
2080	0.00	0.00	0.00	6.94	0.00	0.00	6.94	36.59	52.20	439.25	70.01	181.49	245.69	-57.94
2081	0.00	0.00	0.00	211.88	0.00	0.00	211.88	36.59	67.43	439.25	70.01	181.49	245.69	-57.94
2082	0.00	0.00	0.00	215.84	0.00	0.00	215.84	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2083	0.00	0.00	0.00	208.90	0.00	0.00	208.90	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2084	0.00	0.00	0.00	3.97	9.69	0.00	13.66	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2085	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2086	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	53.34	439.25	70.01	181.49	245.69	-57.94
2087	0.00	0.00	0.00	0.00	9.69	0.00	9.69	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
2090	0.00	0.00	0.00	0.00	13.07	0.00	13.07	36.59	50.50	439.25	70.01	181.49	245.69	-57.94
Salvage Value	13.69	0.00	17.51	32.83	11.22	0.00	75.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 3.35%	3891.03	61.86	389.40	924.88	165.38	0.00	5432.56	703.43	850.83	14245.21	2361.22	2376.29	4903.98	4603.72

Net Present Value -2383

K19/C25/750MW (WPS Sale &Inv)

TABLE 361
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	3.86	283.93	1.42	0.00	372.48	105.26	29.92	116.00	121.30
2015	89.38	496.39	0.00	0.00	19.33	6.90	611.99	4.48	0.00	422.64	103.32	34.19	121.56	163.57
2016	186.20	657.29	0.00	0.00	26.45	17.53	887.47	8.92	0.00	438.30	101.44	36.51	124.90	175.45
2017	216.63	796.58	0.00	0.00	38.71	25.50	1077.42	14.30	0.00	472.25	99.40	39.11	132.09	201.64
2018	260.39	561.68	0.00	0.00	40.69	105.59	968.35	19.15	0.00	454.72	97.24	40.04	135.38	182.06
2019	266.64	401.73	0.00	0.00	51.81	87.01	807.19	23.18	13.29	490.73	97.18	37.40	136.13	220.03
2020	734.99	164.04	0.00	0.00	3.62	161.28	1063.92	28.50	45.83	772.96	104.59	29.28	155.79	483.29
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	34.90	43.92	845.21	105.23	31.93	171.84	536.22
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	40.32	42.55	847.94	104.05	31.94	176.89	535.06
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	44.29	40.67	807.81	101.69	31.53	182.48	492.11
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	47.24	39.07	780.44	99.39	34.80	192.31	453.94
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	49.40	52.00	873.87	104.07	30.73	143.71	595.36
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	50.56	50.42	1142.16	112.42	30.62	144.77	854.35
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	50.76	48.96	1188.55	112.33	29.96	159.44	886.82
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	47.93	1172.41	110.64	30.95	163.21	867.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	49.25	1142.70	108.69	31.02	167.70	835.29
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	43.96	1121.55	107.33	30.44	165.72	818.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	42.61	1108.57	105.65	31.07	171.12	800.73
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	41.09	1072.04	103.96	31.19	170.18	766.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	40.06	1036.89	102.14	31.24	173.11	730.40
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	39.10	1004.51	100.39	31.52	177.39	695.21
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	40.40	970.46	98.68	31.28	169.24	671.26
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	36.88	908.95	97.04	31.88	143.22	636.80
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	50.76	36.35	868.34	95.39	32.05	143.17	597.72
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.76	35.83	833.30	93.71	32.03	148.54	559.02
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	51.16	38.28	801.36	92.06	31.99	161.73	515.58
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	51.76	34.83	820.22	90.75	30.50	178.54	520.43
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	51.84	37.76	798.55	88.69	55.27	181.70	472.90
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	52.24	37.30	781.59	87.10	61.53	194.06	438.91
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	52.85	36.85	769.46	85.69	64.71	209.31	409.75
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	53.34	42.27	766.10	84.44	74.75	223.68	383.23
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	54.27	44.81	734.74	82.55	96.76	229.50	325.93
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	54.36	45.53	717.57	81.06	117.38	238.69	280.44
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	44.25	701.64	79.76	122.80	254.47	244.61
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	42.98	717.98	81.12	112.31	240.89	283.66
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	54.36	45.58	717.98	81.12	112.31	240.89	283.66
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	54.36	44.04	717.98	81.12	112.31	240.89	283.66
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	54.36	43.70	717.98	81.12	112.31	240.89	283.66
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	54.36	43.38	717.98	81.12	112.31	240.89	283.66
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	54.36	43.06	717.98	81.12	112.31	240.89	283.66
2054	0.00	0.00	0.00	0.00	18.01	18.89	36.91	54.36	42.75	717.98	81.12	112.31	240.89	283.66
2055	0.00	0.00	0.00	0.00	0.89	19.59	20.49	54.36	43.63	717.98	81.12	112.31	240.89	283.66
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	54.36	56.21	717.98	81.12	112.31	240.89	283.66
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	54.36	40.10	717.98	81.12	112.31	240.89	283.66
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	54.36	55.66	717.98	81.12	112.31	240.89	283.66
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	54.36	42.53	717.98	81.12	112.31	240.89	283.66
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	54.36	52.37	717.98	81.12	112.31	240.89	283.66
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	68.20	717.98	81.12	112.31	240.89	283.66
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	54.36	68.20	717.98	81.12	112.31	240.89	283.66
2065	0.00	0.00	0.00	0.00	8.83	4.27	13.10	54.36	39.50	717.98	81.12	112.31	240.89	283.66
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	54.36	68.20	717.98	81.12	112.31	240.89	283.66
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	54.36	68.20	717.98	81.12	112.31	240.89	283.66
2069	0.00	0.00	80.00	0.00	33.80	57.59	171.40	54.36	39.50	717.98	81.12	112.31	240.89	283.66
2070	0.00	0.00	109.27	0.00	2.73	59.73	171.72	54.36	54.15	717.98	81.12	112.31	240.89	283.66
2071	0.00	0.00	16.58	0.00	33.14	0.00	49.72	54.36	38.32	717.98	81.12	112.31	240.89	283.66
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	54.36	54.15	717.98	81.12	112.31	240.89	283.66
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	54.36	37.43	717.98	81.12	112.31	240.89	283.66
2074	0.00	0.00	98.85	0.00	51.10	0.00	149.95	54.36	52.37	717.98	81.12	112.31	240.89	283.66
2075	0.00	0.00	112.03	0.00	76.86	0.00	188.89	54.36	39.50	717.98	81.12	112.31	240.89	283.66
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	54.36	54.15	717.98	81.12	112.31	240.89	283.66
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	38.32	717.98	81.12	112.31	240.89	283.66
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	54.36	54.15	717.98	81.12	112.31	240.89	283.66
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	41.28	717.98	81.12	112.31	240.89	283.66
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	54.36	54.15	717.98	81.12	112.31	240.89	283.66
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	54.36	39.50	717.98	81.12	112.31	240.89	283.66
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	54.36	36.54	717.98	81.12	112.31	240.89	283.66
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	54.36	39.50	717.98	81.12	112.31	240.89	283.66
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	54.36	39.50	717.98	81.12	112.31	240.89	283.66
Salvage Value	0.87	0.00	2.40	0.00	3.80	1.76	8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	128.68	0.00	397.09	314.63	7367.28	591.87	494.22	12176.07	1610.50	731.81	2682.71	7151.05

Net Present Value -1302

K19/C25/750MW | **TABLE 362** | **Energy Price** High
ECONOMIC SUMMARY | **Discount Rate** High
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	5.40	285.47	1.43	0.00	378.60	105.26	29.90	115.53	127.90
2015	89.38	496.39	0.00	0.00	19.33	8.74	613.84	4.50	0.00	431.52	103.31	34.17	121.47	172.56
2016	186.20	657.29	0.00	0.00	26.45	18.32	888.26	8.94	0.00	447.06	101.43	36.47	124.70	184.46
2017	216.63	796.58	0.00	0.00	38.71	25.50	1077.42	14.32	0.00	482.54	99.40	39.13	131.87	212.14
2018	260.39	561.68	0.00	0.00	40.69	149.24	1012.00	19.39	0.00	465.16	97.23	39.93	135.22	192.78
2019	266.64	401.73	0.00	0.00	51.81	102.80	822.98	23.50	13.29	500.55	97.17	37.38	135.87	230.13
2020	734.99	164.04	0.00	0.00	3.62	284.21	1186.86	29.43	49.02	796.69	104.58	29.25	154.33	508.53
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	35.84	47.22	862.68	105.23	32.12	170.89	554.43
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	41.25	45.88	864.48	104.05	31.94	175.79	552.71
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	45.22	43.85	825.36	101.68	31.53	181.18	510.98
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	48.17	42.12	798.19	99.38	34.87	191.10	472.83
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	50.34	54.92	892.67	104.06	30.78	141.22	616.61
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	51.49	53.22	1154.32	112.43	30.77	138.69	872.43
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	51.69	51.65	1189.61	112.35	29.73	144.80	902.73
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	50.50	1175.01	110.65	30.92	147.73	885.71
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	51.71	1148.49	108.69	30.99	152.53	856.28
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	46.31	1131.11	107.33	30.44	151.39	841.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	44.86	1123.48	105.64	31.20	156.89	829.74
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	43.24	1091.22	103.96	31.26	156.62	799.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	42.11	1059.48	102.16	31.17	159.14	767.01
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	41.06	1031.79	100.41	31.36	163.98	736.03
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	42.27	960.69	98.76	31.59	137.42	692.93
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	38.67	922.75	97.05	31.93	137.66	656.11
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	51.69	38.06	889.80	95.37	31.97	141.57	620.90
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.69	37.47	855.76	93.71	31.97	146.49	583.59
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	52.09	39.86	824.59	92.06	32.05	159.43	541.04
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	52.69	36.34	822.88	90.74	30.51	175.90	525.72
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	52.77	39.20	796.42	88.69	55.27	179.24	473.22
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	53.18	38.68	780.10	87.10	61.53	192.07	439.40
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	53.78	38.18	768.18	85.69	64.71	207.54	410.24
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	54.27	43.53	765.22	84.44	74.75	222.12	383.91
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	55.21	46.02	733.73	82.55	96.76	228.07	326.35
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	55.29	46.69	716.54	81.06	117.38	237.24	280.87
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	45.35	700.28	79.76	122.80	252.78	244.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	44.04	716.85	81.12	112.31	239.36	284.05
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	55.29	46.58	716.85	81.12	112.31	239.36	284.05
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	55.29	45.00	716.85	81.12	112.31	239.36	284.05
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	55.29	44.62	716.85	81.12	112.31	239.36	284.05
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	55.29	44.24	716.85	81.12	112.31	239.36	284.05
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	55.29	43.89	716.85	81.12	112.31	239.36	284.05
2054	0.00	0.00	0.00	0.00	18.01	18.89	36.91	55.29	43.53	716.85	81.12	112.31	239.36	284.05
2055	0.00	0.00	0.00	0.00	0.89	19.59	20.49	55.29	44.38	716.85	81.12	112.31	239.36	284.05
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	55.29	56.92	716.85	81.12	112.31	239.36	284.05
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	55.29	40.77	716.85	81.12	112.31	239.36	284.05
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	55.29	56.29	716.85	81.12	112.31	239.36	284.05
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	55.29	43.13	716.85	81.12	112.31	239.36	284.05
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	55.29	52.37	716.85	81.12	112.31	239.36	284.05
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	68.20	716.85	81.12	112.31	239.36	284.05
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	55.29	68.20	716.85	81.12	112.31	239.36	284.05
2065	0.00	0.00	0.00	0.00	8.83	4.27	13.10	55.29	39.50	716.85	81.12	112.31	239.36	284.05
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	55.29	68.20	716.85	81.12	112.31	239.36	284.05
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	55.29	68.20	716.85	81.12	112.31	239.36	284.05
2069	0.00	0.00	80.00	0.00	33.80	57.59	171.40	55.29	39.50	716.85	81.12	112.31	239.36	284.05
2070	0.00	0.00	109.27	0.00	2.73	59.73	171.72	55.29	54.15	716.85	81.12	112.31	239.36	284.05
2071	0.00	0.00	16.58	0.00	33.14	0.00	49.72	55.29	38.32	716.85	81.12	112.31	239.36	284.05
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	55.29	54.15	716.85	81.12	112.31	239.36	284.05
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	55.29	37.43	716.85	81.12	112.31	239.36	284.05
2074	0.00	0.00	98.85	0.00	51.10	0.00	149.95	55.29	52.37	716.85	81.12	112.31	239.36	284.05
2075	0.00	0.00	112.03	0.00	76.86	0.00	188.89	55.29	39.50	716.85	81.12	112.31	239.36	284.05
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	55.29	54.15	716.85	81.12	112.31	239.36	284.05
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	38.32	716.85	81.12	112.31	239.36	284.05
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	55.29	54.15	716.85	81.12	112.31	239.36	284.05
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	41.28	716.85	81.12	112.31	239.36	284.05
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	55.29	54.15	716.85	81.12	112.31	239.36	284.05
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	55.29	39.50	716.85	81.12	112.31	239.36	284.05
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	55.29	36.54	716.85	81.12	112.31	239.36	284.05
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	55.29	39.50	716.85	81.12	112.31	239.36	284.05
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	55.29	39.50	716.85	81.12	112.31	239.36	284.05
Salvage Value	0.87	0.00	2.40	0.00	3.80	1.76	8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	128.68	0.00	397.09	448.31	7500.96	602.70	518.00	12339.92	1610.49	731.84	2616.12	7381.47

Net Present Value -1240

K19/Gas25/750MW (WPS Sale & INV)

TABLE 363
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	3.86	251.54	1.26	0.00	372.48	105.26	29.92	116.00	121.30
2015	0.00	496.39	0.00	0.00	19.33	6.90	522.61	3.87	0.00	422.65	103.33	34.17	121.54	163.61
2016	0.00	657.29	0.00	0.00	26.45	17.53	701.27	7.38	0.00	438.22	101.44	36.49	124.81	175.49
2017	0.00	796.58	0.00	0.00	38.71	25.50	860.79	11.68	0.00	472.66	99.40	39.09	132.03	202.14
2018	0.00	561.68	0.00	0.00	40.69	105.59	707.96	15.22	0.00	455.44	97.24	39.96	135.31	182.94
2019	0.00	401.73	0.00	0.00	48.21	87.01	536.95	17.91	13.29	491.94	97.18	37.38	136.04	221.35
2020	0.00	164.04	0.00	0.00	0.01	161.28	325.33	19.53	45.83	774.88	104.58	29.25	155.60	485.45
2021	0.00	56.92	0.37	0.00	0.00	0.00	57.29	19.82	43.92	848.69	105.23	31.91	171.63	539.92
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	19.82	42.55	851.70	104.05	31.86	176.57	539.22
2023	0.00	0.00	96.15	0.00	0.00	0.00	96.15	20.19	40.67	808.10	101.14	33.63	182.23	491.09
2024	0.00	0.00	197.40	0.00	9.48	0.00	206.89	21.11	39.07	785.31	99.03	36.73	190.87	458.67
2025	0.00	0.00	118.82	0.00	74.66	0.00	193.48	22.07	41.46	741.25	98.76	35.72	166.34	440.43
2026	0.00	0.00	90.36	0.00	0.00	0.00	90.36	22.52	43.74	747.53	97.41	42.83	179.34	427.94
2027	0.00	0.00	102.41	0.00	0.00	0.00	102.41	23.03	42.42	723.61	95.38	42.08	194.12	392.03
2028	0.00	0.00	15.54	0.00	0.00	0.00	15.54	23.11	45.24	700.13	92.99	64.01	202.00	341.13
2029	0.00	0.00	76.11	0.00	0.00	0.00	76.11	23.49	46.73	678.50	91.14	71.11	213.23	303.02
2030	0.00	0.00	103.95	0.00	62.81	0.00	166.76	24.32	41.50	673.65	90.03	78.05	220.45	285.12
2031	0.00	0.00	92.64	0.00	0.00	0.00	92.64	24.79	44.41	687.72	89.66	85.75	225.49	286.81
2032	0.00	0.00	104.99	0.00	0.00	0.00	104.99	25.31	43.28	656.60	87.20	103.75	238.92	226.72
2033	0.00	0.00	15.93	0.00	0.00	0.00	15.93	25.39	46.25	643.52	85.63	124.36	248.87	184.66
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	45.18	638.67	84.88	132.38	255.03	166.37
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	43.70	562.50	82.69	125.64	245.95	108.21
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	43.15	490.59	81.21	126.55	212.34	70.50
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	42.62	461.33	79.76	138.56	215.76	27.26
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.39	42.10	457.77	79.00	137.36	230.51	10.90
2039	0.00	0.00	164.92	0.00	0.00	0.00	164.92	26.21	44.56	424.12	77.01	168.34	240.89	-62.11
2040	0.00	0.00	238.26	0.00	0.00	0.00	238.26	27.41	41.11	417.94	75.64	187.09	250.81	-95.60
2041	0.00	0.00	106.71	0.00	9.48	0.00	116.19	27.99	40.64	438.62	75.94	186.76	249.60	-73.68
2042	0.00	0.00	7.85	0.00	0.00	0.00	7.85	28.03	47.24	505.45	73.60	299.93	242.31	-110.40
2043	0.00	0.00	81.62	0.00	0.00	0.00	81.62	28.43	46.80	474.29	71.82	323.28	256.00	-176.80
2044	0.00	0.00	111.47	0.00	62.81	0.00	174.28	29.31	48.14	444.28	70.15	348.22	268.38	-242.47
2045	0.00	0.00	53.17	0.00	0.00	0.00	53.17	29.57	51.81	428.55	68.82	381.50	278.30	-300.07
2046	0.00	0.00	49.52	0.00	0.00	0.00	49.52	29.82	51.40	410.21	67.57	408.57	288.93	-354.86
2047	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.86	51.60	401.88	66.77	425.25	301.41	-391.54
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	50.33	413.55	67.72	405.11	289.55	-348.82
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	29.86	52.93	413.55	67.72	405.11	289.55	-348.82
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	29.86	49.62	413.55	67.72	405.11	289.55	-348.82
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	29.86	49.28	413.55	67.72	405.11	289.55	-348.82
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	29.86	48.95	413.55	67.72	405.11	289.55	-348.82
2053	0.00	0.00	73.87	0.00	20.99	18.89	113.75	29.86	48.63	413.55	67.72	405.11	289.55	-348.82
2054	0.00	0.00	175.12	0.00	17.12	18.89	211.14	29.86	48.32	413.55	67.72	405.11	289.55	-348.82
2055	0.00	0.00	116.70	0.00	0.00	19.59	136.29	29.86	48.02	413.55	67.72	405.11	289.55	-348.82
2056	0.00	0.00	90.36	0.00	0.00	0.00	90.36	29.86	63.56	413.55	67.72	405.11	289.55	-348.82
2057	0.00	0.00	102.41	0.00	0.00	0.00	102.41	29.86	47.45	413.55	67.72	405.11	289.55	-348.82
2058	0.00	0.00	15.54	0.00	0.00	0.00	15.54	29.86	63.01	413.55	67.72	405.11	289.55	-348.82
2059	0.00	0.00	76.11	0.00	9.48	0.00	85.59	29.86	49.87	413.55	67.72	405.11	289.55	-348.82
2060	0.00	0.00	103.95	0.00	56.00	0.00	159.95	29.86	59.72	413.55	67.72	405.11	289.55	-348.82
2061	0.00	0.00	92.64	0.00	0.00	0.00	92.64	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2062	0.00	0.00	104.99	0.00	0.00	0.00	104.99	29.86	59.72	413.55	67.72	405.11	289.55	-348.82
2063	0.00	0.00	15.93	0.00	0.00	0.00	15.93	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2064	0.00	0.00	0.00	0.00	10.64	2.13	12.77	29.86	59.72	413.55	67.72	405.11	289.55	-348.82
2065	0.00	0.00	0.00	0.00	55.94	4.27	60.21	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2066	0.00	0.00	0.00	0.00	1.06	12.80	13.86	29.86	59.72	413.55	67.72	405.11	289.55	-348.82
2067	0.00	0.00	0.00	0.00	9.21	19.20	28.41	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	29.86	59.72	413.55	67.72	405.11	289.55	-348.82
2069	0.00	0.00	164.92	0.00	31.08	57.59	253.60	29.86	46.85	413.55	67.72	405.11	289.55	-348.82
2070	0.00	0.00	238.26	0.00	0.01	59.73	298.00	29.86	45.66	413.55	67.72	405.11	289.55	-348.82
2071	0.00	0.00	106.71	0.00	0.00	0.00	106.71	29.86	45.66	413.55	67.72	405.11	289.55	-348.82
2072	0.00	0.00	7.85	0.00	0.00	0.00	7.85	29.86	45.66	413.55	67.72	405.11	289.55	-348.82
2073	0.00	0.00	81.62	0.00	0.00	0.00	81.62	29.86	44.77	413.55	67.72	405.11	289.55	-348.82
2074	0.00	0.00	111.47	0.00	0.00	0.00	111.47	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2075	0.00	0.00	53.17	0.00	18.67	0.00	71.84	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2076	0.00	0.00	49.52	0.00	9.48	0.00	59.01	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2077	0.00	0.00	7.51	0.00	0.00	0.00	7.51	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	29.86	46.85	413.55	67.72	405.11	289.55	-348.82
2080	0.00	0.00	0.00	0.00	15.70	0.00	15.70	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2083	0.00	0.00	73.87	0.00	0.00	0.00	73.87	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2084	0.00	0.00	175.12	0.00	10.82	0.70	186.65	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2085	0.00	0.00	116.70	0.00	10.50	1.40	128.59	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2086	0.00	0.00	90.36	0.00	25.39	4.20	119.95	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2087	0.00	0.00	102.41	0.00	29.50	6.30	138.20	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2088	0.00	0.00	15.54	0.00	20.99	18.89	55.42	29.86	43.89	413.55	67.72	405.11	289.55	-348.82
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	29.86	46.85	413.55	67.72	405.11	289.55	-348.82
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	29.86	46.85	413.55	67.72	405.11	289.55	-348.82
Salvage Value	0.00	0.00	7.66	0.00	2.07	1.76	11.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	683.17	0.00	258.06	314.63	4066.00	317.59	507.22	9262.77	1492.42	1839.87	3108.58	2821.89

Net Present Value -2069

K19/C31/750MW | **TABLE 364** | **Energy Price** High
ECONOMIC SUMMARY | **Discount Rate** High
NFAT 2012 | **Capital Cost** Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	226.22	0.00	0.00	21.46	5.40	284.83	1.42	0.00	378.60	105.26	29.90	115.53	127.90
2015	40.08	496.39	0.00	0.00	19.33	8.74	564.54	4.25	0.00	431.52	103.31	34.17	121.47	172.56
2016	10.89	657.29	0.00	0.00	26.45	18.32	712.95	7.81	0.00	447.06	101.43	36.48	124.68	184.48
2017	10.95	796.58	0.00	0.00	38.71	25.50	871.74	12.17	0.00	483.11	99.39	39.13	131.84	212.75
2018	13.02	561.68	0.00	0.00	40.69	149.24	764.63	15.99	0.00	465.86	97.22	39.91	135.15	193.58
2019	13.09	401.73	0.00	0.00	48.21	102.80	565.83	18.82	13.29	501.73	97.16	37.43	135.86	231.29
2020	13.17	164.04	0.00	0.00	0.01	284.21	461.44	21.13	49.02	798.76	104.57	29.32	154.10	510.77
2021	16.66	56.92	0.00	0.00	0.00	0.00	73.58	21.50	47.22	865.59	105.22	32.04	170.50	557.83
2022	168.48	0.00	0.00	0.00	0.00	0.00	168.48	22.34	45.88	868.74	104.06	31.88	175.51	557.29
2023	257.00	0.00	0.00	0.00	0.00	0.00	257.00	23.63	43.85	823.39	101.04	34.05	181.52	506.79
2024	279.20	0.00	0.00	0.00	0.00	0.00	279.20	25.02	42.12	799.40	98.83	37.60	191.43	471.54
2025	284.55	0.00	0.00	0.00	3.61	0.00	288.16	26.46	40.31	755.75	98.78	27.06	173.70	456.22
2026	769.74	0.00	0.00	0.00	3.61	0.00	773.35	30.33	38.38	735.33	96.82	27.83	192.68	418.01
2027	1222.24	0.00	0.00	0.00	43.84	0.00	1266.08	36.66	36.95	680.19	94.88	26.33	185.77	373.21
2028	1097.38	0.00	0.00	0.00	22.74	0.00	1120.12	42.26	35.58	653.51	93.25	27.33	202.13	330.80
2029	783.65	0.00	0.00	0.00	38.26	0.00	821.91	46.37	36.97	631.35	91.60	28.15	224.18	287.42
2030	542.72	0.00	0.00	0.00	66.25	0.00	608.98	49.41	31.62	623.82	90.23	28.70	243.21	261.68
2031	356.48	0.00	0.00	0.00	88.77	0.00	445.24	51.64	44.95	748.82	94.34	33.18	156.69	464.61
2032	131.29	0.00	0.00	0.00	104.61	0.00	235.91	52.82	43.93	1000.15	101.80	32.65	145.53	720.17
2033	41.43	0.00	0.00	0.00	0.00	0.00	41.43	53.03	42.59	1064.74	102.25	31.98	159.96	770.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	41.65	1031.94	100.41	31.35	163.91	736.26
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	39.90	959.49	98.75	31.38	137.27	692.09
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	39.21	922.77	97.05	32.11	137.82	655.79
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	53.03	38.42	890.43	95.38	32.04	141.65	621.35
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.03	37.46	855.85	93.71	31.96	146.47	583.72
2039	0.00	0.00	102.29	0.00	0.00	0.00	102.29	53.43	39.92	824.69	92.07	32.03	159.44	541.15
2040	0.00	0.00	131.55	0.00	9.48	0.00	141.03	54.02	36.52	822.89	90.74	30.50	175.90	525.75
2041	0.00	0.00	16.58	0.00	0.00	0.00	16.58	54.10	42.83	796.41	88.69	55.27	179.20	473.25
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	54.51	39.35	780.10	87.10	61.53	192.02	439.45
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	55.11	38.85	768.18	85.69	64.71	207.49	410.30
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	55.61	44.21	765.22	84.44	74.75	222.13	383.90
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	56.54	43.73	733.73	82.55	96.76	228.06	326.36
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	56.62	47.36	716.54	81.06	117.38	237.26	280.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	45.35	700.28	79.76	122.80	252.75	244.97
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	44.04	716.85	81.12	112.31	239.36	284.06
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	56.62	46.58	716.85	81.12	112.31	239.36	284.06
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	56.62	43.22	716.85	81.12	112.31	239.36	284.06
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	56.62	45.80	716.85	81.12	112.31	239.36	284.06
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	56.62	42.47	716.85	81.12	112.31	239.36	284.06
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	56.62	42.11	716.85	81.12	112.31	239.36	284.06
2054	0.00	0.00	0.00	0.00	17.12	18.89	36.02	56.62	41.76	716.85	81.12	112.31	239.36	284.06
2055	0.00	0.00	0.00	0.00	0.00	19.59	19.59	56.62	41.42	716.85	81.12	112.31	239.36	284.06
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	58.69	716.85	81.12	112.31	239.36	284.06
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	42.55	716.85	81.12	112.31	239.36	284.06
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	58.07	716.85	81.12	112.31	239.36	284.06
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	44.90	716.85	81.12	112.31	239.36	284.06
2060	0.00	0.00	0.00	0.00	0.89	0.00	0.89	56.62	54.15	716.85	81.12	112.31	239.36	284.06
2061	0.00	0.00	0.00	0.00	0.89	0.00	0.89	56.62	39.50	716.85	81.12	112.31	239.36	284.06
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2063	0.00	0.00	0.00	0.00	5.35	0.00	5.35	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2064	0.00	0.00	0.00	0.00	19.55	2.13	21.69	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2065	0.00	0.00	0.00	0.00	23.98	4.27	28.25	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2066	0.00	0.00	0.00	0.00	22.45	12.80	35.25	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2067	0.00	0.00	0.00	0.00	35.05	19.20	54.25	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2068	0.00	0.00	0.00	0.00	19.70	57.59	77.29	56.62	68.20	716.85	81.12	112.31	239.36	284.06
2069	0.00	0.00	80.00	0.00	31.08	57.59	168.68	56.62	39.50	716.85	81.12	112.31	239.36	284.06
2070	0.00	0.00	109.27	0.00	0.01	59.73	169.00	56.62	54.15	716.85	81.12	112.31	239.36	284.06
2071	0.00	0.00	16.58	0.00	0.00	0.00	16.58	56.62	41.28	716.85	81.12	112.31	239.36	284.06
2072	0.00	0.00	81.21	0.00	0.00	0.00	81.21	56.62	54.15	716.85	81.12	112.31	239.36	284.06
2073	0.00	0.00	110.91	0.00	0.00	0.00	110.91	56.62	37.43	716.85	81.12	112.31	239.36	284.06
2074	0.00	0.00	98.85	0.00	0.00	0.00	98.85	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2075	0.00	0.00	112.03	0.00	12.20	0.00	124.22	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2076	0.00	0.00	16.99	0.00	2.72	0.00	19.71	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2077	0.00	0.00	0.00	0.00	33.14	0.00	33.14	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2078	0.00	0.00	0.00	0.00	26.87	0.00	26.87	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2079	0.00	0.00	0.00	0.00	29.35	0.00	29.35	56.62	39.50	716.85	81.12	112.31	239.36	284.06
2080	0.00	0.00	0.00	0.00	107.10	0.00	107.10	56.62	52.37	716.85	81.12	112.31	239.36	284.06
2081	0.00	0.00	0.00	0.00	67.38	0.00	67.38	56.62	39.50	716.85	81.12	112.31	239.36	284.06
2082	0.00	0.00	0.00	0.00	78.77	0.00	78.77	56.62	54.15	716.85	81.12	112.31	239.36	284.06
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.62	38.32	716.85	81.12	112.31	239.36	284.06
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	56.62	54.15	716.85	81.12	112.31	239.36	284.06
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	56.62	38.32	716.85	81.12	112.31	239.36	284.06
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	56.62	54.15	716.85	81.12	112.31	239.36	284.06
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2088	0.00	0.00	0.00	0.00	20.99	18.89	39.88	56.62	36.54	716.85	81.12	112.31	239.36	284.06
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	56.62	39.50	716.85	81.12	112.31	239.36	284.06
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	56.62	39.50	716.85	81.12	112.31	239.36	284.06
Salvage Value	6.45	0.00	2.40	0.00	4.26	1.76	14.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2694.54	2810.14	128.68	0.00	330.78	448.31	6412.45	514.15	479.28	11098.77	1567.48	728.12	2755.94	6047.23

Net Present Value -1359

K19/Gas31/750MW

TABLE 365
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	5.40	253.08	1.27	0.00	378.60	105.26	29.90	115.53	127.90
2015	0.00	496.39	0.00	0.00	19.33	8.74	524.46	3.89	0.00	431.52	103.31	34.17	121.47	172.56
2016	0.00	657.29	0.00	0.00	26.45	18.32	702.06	7.40	0.00	447.06	101.43	36.48	124.68	184.48
2017	0.00	796.58	0.00	0.00	38.71	25.50	860.79	11.70	0.00	483.11	99.39	39.13	131.84	212.75
2018	0.00	561.68	0.00	0.00	40.69	149.24	751.61	15.46	0.00	465.86	97.22	39.91	135.15	193.58
2019	0.00	401.73	0.00	0.00	48.21	102.80	552.73	18.22	13.29	501.73	97.16	37.43	135.86	231.29
2020	0.00	164.04	0.00	0.00	0.01	284.21	448.27	20.46	49.02	798.76	104.57	29.32	154.10	510.77
2021	0.00	56.92	0.00	0.00	0.00	0.00	56.92	20.75	47.22	865.59	105.22	32.04	170.50	557.83
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	45.88	868.65	104.06	31.91	175.51	557.16
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	43.85	824.10	101.04	34.05	181.55	507.46
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	42.12	800.77	98.84	37.62	191.41	472.89
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	40.31	759.10	98.77	27.08	174.53	458.72
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.75	38.38	742.00	96.81	28.02	194.77	422.40
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	20.75	36.95	688.61	94.86	26.41	187.65	379.69
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	20.75	35.58	665.89	93.23	27.35	206.13	339.18
2029	0.00	0.00	174.50	0.00	0.00	0.00	174.50	21.51	36.97	641.12	91.65	27.78	224.70	296.99
2030	0.00	0.00	306.68	0.00	18.96	0.00	325.64	23.03	31.62	642.78	91.05	24.57	236.56	290.60
2031	0.00	0.00	138.13	0.00	74.66	0.00	212.80	24.08	38.48	630.67	88.81	57.91	200.73	283.22
2032	0.00	0.00	93.11	0.00	0.00	0.00	93.11	24.55	41.32	616.99	87.19	73.81	209.60	246.38
2033	0.00	0.00	105.52	0.00	0.00	0.00	105.52	25.07	40.12	598.93	85.71	80.92	220.55	211.75
2034	0.00	0.00	16.01	0.00	0.00	0.00	16.01	25.15	43.03	601.04	84.90	88.31	230.66	197.18
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.15	41.46	519.87	82.74	106.64	200.80	129.69
2036	0.00	0.00	162.47	0.00	0.00	0.00	162.47	25.97	40.82	490.70	81.26	116.51	204.91	88.02
2037	0.00	0.00	234.72	0.00	0.00	0.00	234.72	27.14	40.22	471.81	79.90	127.71	213.91	50.29
2038	0.00	0.00	105.13	0.00	62.81	0.00	167.94	27.98	39.63	483.36	79.81	120.42	226.63	56.50
2039	0.00	0.00	7.73	0.00	0.00	0.00	7.73	28.02	49.10	551.01	77.48	247.73	210.13	15.66
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.02	45.59	521.91	75.54	266.61	224.37	-44.60
2041	0.00	0.00	80.81	0.00	0.00	0.00	80.81	28.42	45.05	498.90	74.04	284.23	235.90	-95.27
2042	0.00	0.00	277.77	0.00	0.00	0.00	277.77	29.81	44.53	477.35	72.65	304.09	246.38	-145.77
2043	0.00	0.00	258.60	0.00	0.00	0.00	258.60	31.10	48.10	471.17	71.77	322.54	255.57	-178.71
2044	0.00	0.00	108.32	0.00	62.81	0.00	171.13	31.96	49.39	474.61	71.45	312.82	272.41	-182.08
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	32.00	56.01	551.55	69.42	462.87	241.93	-222.67
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	55.55	529.90	68.18	479.35	254.23	-271.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	54.22	506.41	66.90	504.51	263.14	-328.13
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	52.90	529.29	68.17	482.24	253.10	-274.22
2049	0.00	0.00	0.00	0.00	10.82	0.70	11.52	32.00	55.45	529.29	68.17	482.24	253.10	-274.22
2050	0.00	0.00	0.00	0.00	10.50	1.40	11.90	32.00	52.10	529.29	68.17	482.24	253.10	-274.22
2051	0.00	0.00	0.00	0.00	25.39	4.20	29.59	32.00	51.71	529.29	68.17	482.24	253.10	-274.22
2052	0.00	0.00	0.00	0.00	29.50	6.30	35.79	32.00	51.34	529.29	68.17	482.24	253.10	-274.22
2053	0.00	0.00	0.00	0.00	20.99	18.89	39.88	32.00	50.98	529.29	68.17	482.24	253.10	-274.22
2054	0.00	0.00	0.00	0.00	17.12	18.89	36.02	32.00	50.63	529.29	68.17	482.24	253.10	-274.22
2055	0.00	0.00	0.00	0.00	0.00	19.59	19.59	32.00	50.28	529.29	68.17	482.24	253.10	-274.22
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	65.79	529.29	68.17	482.24	253.10	-274.22
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	49.64	529.29	68.17	482.24	253.10	-274.22
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	65.16	529.29	68.17	482.24	253.10	-274.22
2059	0.00	0.00	152.22	0.00	0.00	0.00	152.22	32.00	51.99	529.29	68.17	482.24	253.10	-274.22
2060	0.00	0.00	284.40	0.00	0.00	0.00	284.40	32.00	61.24	529.29	68.17	482.24	253.10	-274.22
2061	0.00	0.00	136.01	0.00	0.00	0.00	136.01	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2062	0.00	0.00	93.11	0.00	0.00	0.00	93.11	32.00	61.24	529.29	68.17	482.24	253.10	-274.22
2063	0.00	0.00	105.52	0.00	0.00	0.00	105.52	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2064	0.00	0.00	16.01	0.00	10.64	2.13	28.78	32.00	61.24	529.29	68.17	482.24	253.10	-274.22
2065	0.00	0.00	0.00	0.00	27.80	4.27	32.06	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2066	0.00	0.00	162.47	0.00	57.06	12.80	232.33	32.00	61.24	529.29	68.17	482.24	253.10	-274.22
2067	0.00	0.00	234.72	0.00	9.21	19.20	263.13	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2068	0.00	0.00	105.13	0.00	19.70	57.59	182.42	32.00	61.24	529.29	68.17	482.24	253.10	-274.22
2069	0.00	0.00	7.73	0.00	31.08	57.59	96.41	32.00	48.37	529.29	68.17	482.24	253.10	-274.22
2070	0.00	0.00	0.00	0.00	0.01	59.73	59.73	32.00	47.18	529.29	68.17	482.24	253.10	-274.22
2071	0.00	0.00	80.81	0.00	0.00	0.00	80.81	32.00	47.18	529.29	68.17	482.24	253.10	-274.22
2072	0.00	0.00	277.77	0.00	0.00	0.00	277.77	32.00	47.18	529.29	68.17	482.24	253.10	-274.22
2073	0.00	0.00	258.60	0.00	47.11	0.00	305.71	32.00	46.30	529.29	68.17	482.24	253.10	-274.22
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2075	0.00	0.00	7.97	0.00	0.00	0.00	7.97	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	32.00	48.37	529.29	68.17	482.24	253.10	-274.22
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2081	0.00	0.00	0.00	0.00	18.67	0.00	18.67	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2084	0.00	0.00	0.00	0.00	10.82	0.70	11.52	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2085	0.00	0.00	0.00	0.00	10.50	1.40	11.90	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2086	0.00	0.00	0.00	0.00	25.39	4.20	29.59	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2087	0.00	0.00	0.00	0.00	29.50	6.30	35.79	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2088	0.00	0.00	0.00	0.00	36.69	18.89	55.59	32.00	45.41	529.29	68.17	482.24	253.10	-274.22
2089	0.00	0.00	0.00	0.00	17.12	18.89	36.02	32.00	48.37	529.29	68.17	482.24	253.10	-274.22
2090	0.00	0.00	0.00	0.00	0.00	19.59	19.59	32.00	48.37	529.29	68.17	482.24	253.10	-274.22
Salvage Value	0.00	0.00	4.63	0.00	2.27	1.76	8.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	609.60	0.00	235.24	448.31	4103.30	322.16	500.27	9566.20	1493.05	1926.82	2984.14	3162.19

Net Present Value -1764

K19/C25/250MW

TABLE 366
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.40	226.22	0.00	0.00	21.46	4.06	284.13	1.43	0.00	378.60	105.26	29.90	115.53	127.90
2015	89.38	496.39	0.00	0.00	19.33	2.78	607.88	4.47	0.00	431.52	103.31	34.17	121.47	172.56
2016	186.20	657.29	0.00	0.00	26.45	4.05	873.99	8.84	0.00	447.06	101.43	36.47	124.70	184.46
2017	216.63	796.58	0.00	0.00	38.71	6.07	1057.99	14.13	0.00	482.54	99.40	39.13	131.87	212.14
2018	260.39	561.68	0.00	0.00	40.69	18.21	880.97	18.54	0.00	460.92	96.62	42.74	137.43	184.13
2019	266.64	401.73	0.00	0.00	51.81	18.21	738.39	22.23	13.29	491.35	96.26	42.47	138.01	214.60
2020	734.99	164.04	0.00	0.00	3.62	18.88	921.52	26.84	13.51	742.42	104.93	30.26	131.28	475.95
2021	1179.93	56.92	0.00	0.00	43.84	0.00	1280.69	33.24	13.26	787.40	105.65	30.82	138.64	512.28
2022	1059.39	0.00	0.00	0.00	22.74	0.00	1082.13	38.65	13.48	773.20	103.70	31.98	144.69	492.83
2023	756.52	0.00	0.00	0.00	38.26	0.00	794.78	42.63	13.31	754.38	101.44	31.75	158.66	462.53
2024	523.93	0.00	0.00	0.00	66.25	0.00	590.19	45.58	13.26	741.45	99.07	34.99	176.85	430.54
2025	344.13	0.00	0.00	0.00	88.77	0.00	432.90	47.74	27.65	823.59	103.86	31.13	120.14	568.46
2026	126.75	0.00	0.00	0.00	104.61	0.00	231.36	48.90	27.45	1055.68	111.74	30.27	115.47	798.20
2027	40.00	0.00	0.00	0.00	0.00	0.00	40.00	49.10	27.33	1066.91	111.05	28.66	119.64	807.56
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.62	1049.44	109.28	29.89	123.04	787.23
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	30.20	1022.41	107.45	30.16	125.60	759.20
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	26.13	1006.09	106.15	29.84	124.68	745.42
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.96	991.92	104.51	30.48	127.51	729.41
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.58	961.40	102.87	30.74	127.98	699.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.65	923.04	101.19	30.94	124.71	666.20
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	25.77	891.88	99.51	31.21	126.83	634.33
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	27.88	864.38	97.87	31.48	122.96	612.08
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	49.10	24.92	830.69	96.26	31.95	124.31	578.17
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.10	24.92	795.48	94.66	31.90	126.29	542.63
2038	0.00	0.00	101.89	0.00	0.00	0.00	101.89	49.50	24.92	758.69	93.08	31.93	129.03	504.65
2039	0.00	0.00	131.00	0.00	9.48	0.00	140.49	50.09	27.88	747.10	91.86	30.22	143.33	481.69
2040	0.00	0.00	16.49	0.00	0.00	0.00	16.49	50.17	28.99	725.23	89.79	53.97	149.88	431.59
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	28.32	707.75	88.24	60.49	159.75	399.26
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	50.58	28.32	693.85	86.87	64.15	170.02	372.80
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	51.18	28.32	680.30	85.45	64.14	187.51	343.20
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	51.67	34.16	663.47	83.84	97.10	187.56	294.97
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	52.61	37.12	644.06	82.40	106.85	198.78	256.03
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	52.69	38.25	630.82	81.00	121.44	211.97	216.41
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	37.36	611.36	79.56	123.17	232.16	176.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.47	628.74	80.99	117.16	214.30	216.30
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	52.69	39.43	628.74	80.99	117.16	214.30	216.30
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	52.69	38.25	628.74	80.99	117.16	214.30	216.30
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	52.69	38.26	628.74	80.99	117.16	214.30	216.30
2052	0.00	0.00	0.00	0.00	29.50	1.50	30.99	52.69	38.27	628.74	80.99	117.16	214.30	216.30
2053	0.00	0.00	0.00	0.00	20.99	4.50	25.49	52.69	38.27	628.74	80.99	117.16	214.30	216.30
2054	0.00	0.00	0.00	0.00	18.01	4.50	22.51	52.69	38.27	628.74	80.99	117.16	214.30	216.30
2055	0.00	0.00	0.00	0.00	0.89	4.66	5.56	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2056	0.00	0.00	0.00	0.00	10.69	0.00	10.69	52.69	52.33	628.74	80.99	117.16	214.30	216.30
2057	0.00	0.00	0.00	0.00	5.35	0.00	5.35	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2058	0.00	0.00	0.00	0.00	8.91	0.00	8.91	52.69	52.33	628.74	80.99	117.16	214.30	216.30
2059	0.00	0.00	0.00	0.00	15.15	0.00	15.15	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2060	0.00	0.00	0.00	0.00	21.39	0.00	21.39	52.69	52.33	628.74	80.99	117.16	214.30	216.30
2061	0.00	0.00	0.00	0.00	25.84	0.00	25.84	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	68.16	628.74	80.99	117.16	214.30	216.30
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2064	0.00	0.00	0.00	0.00	10.64	3.89	14.53	52.69	68.16	628.74	80.99	117.16	214.30	216.30
2065	0.00	0.00	0.00	0.00	8.83	2.45	11.28	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2066	0.00	0.00	0.00	0.00	1.06	3.05	4.11	52.69	68.16	628.74	80.99	117.16	214.30	216.30
2067	0.00	0.00	0.00	0.00	9.21	4.57	13.78	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2068	0.00	0.00	79.61	0.00	19.70	13.71	113.01	52.69	68.16	628.74	80.99	117.16	214.30	216.30
2069	0.00	0.00	108.72	0.00	33.80	13.71	156.23	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2070	0.00	0.00	16.49	0.00	2.73	14.22	33.44	52.69	54.10	628.74	80.99	117.16	214.30	216.30
2071	0.00	0.00	0.00	0.00	33.14	0.00	33.14	52.69	38.27	628.74	80.99	117.16	214.30	216.30
2072	0.00	0.00	81.21	0.00	17.39	0.00	98.60	52.69	54.10	628.74	80.99	117.16	214.30	216.30
2073	0.00	0.00	110.91	0.00	29.35	0.00	140.27	52.69	37.38	628.74	80.99	117.16	214.30	216.30
2074	0.00	0.00	98.85	0.00	60.58	0.00	159.43	52.69	52.33	628.74	80.99	117.16	214.30	216.30
2075	0.00	0.00	112.03	0.00	67.38	0.00	179.41	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2076	0.00	0.00	16.99	0.00	78.77	0.00	95.77	52.69	54.10	628.74	80.99	117.16	214.30	216.30
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	38.27	628.74	80.99	117.16	214.30	216.30
2078	0.00	0.00	0.00	0.00	9.48	0.00	9.48	52.69	54.10	628.74	80.99	117.16	214.30	216.30
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	41.23	628.74	80.99	117.16	214.30	216.30
2080	0.00	0.00	0.00	0.00	56.00	0.00	56.00	52.69	54.10	628.74	80.99	117.16	214.30	216.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2084	0.00	0.00	0.00	0.00	10.82	0.17	10.99	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2087	0.00	0.00	0.00	0.00	29.50	1.50	30.99	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2088	0.00	0.00	0.00	0.00	20.99	4.50	25.49	52.69	36.50	628.74	80.99	117.16	214.30	216.30
2089	0.00	0.00	0.00	0.00	17.12	4.50	21.62	52.69	39.46	628.74	80.99	117.16	214.30	216.30
2090	0.00	0.00	0.00	0.00	0.00	4.66	4.66	52.69	39.46	628.74	80.99	117.16	214.30	216.30
Salvage Value	0.87	0.00	2.34	0.00	3.80	0.47	7.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3716.73	2810.14	132.14	0.00	397.23	61.74	7117.98	572.28	303.25	11287.66	1604.09	755.32	2346.47	6581.77

Net Present Value -1412

K19/Gas24/250MW

TABLE 367
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	226.22	0.00	0.00	21.46	4.06	251.74	1.27	0.00	378.60	105.26	29.90	115.53	127.90
2015	0.00	496.39	0.00	0.00	19.33	2.78	518.50	3.87	0.00	431.52	103.31	34.17	121.47	172.56
2016	0.00	657.29	0.00	0.00	26.45	4.05	687.79	7.30	0.00	447.06	101.43	36.48	124.69	184.46
2017	0.00	796.58	0.00	0.00	38.71	6.07	841.36	11.51	0.00	483.11	99.39	39.13	131.84	212.75
2018	0.00	561.68	0.00	0.00	40.69	18.21	620.58	14.61	0.00	461.70	96.62	42.68	137.34	185.06
2019	0.00	401.73	0.00	0.00	48.21	18.21	468.14	16.95	13.29	492.64	96.25	42.46	137.94	215.99
2020	0.00	164.04	0.37	0.00	0.01	18.88	183.30	17.87	13.51	744.57	104.92	30.28	131.29	478.07
2021	0.00	56.92	0.00	0.00	0.00	0.00	56.92	18.15	13.26	790.78	105.63	30.82	138.50	515.82
2022	0.00	0.00	95.78	0.00	0.00	0.00	95.78	18.52	13.48	783.44	104.17	30.19	143.23	505.85
2023	0.00	0.00	122.67	0.00	9.48	0.00	132.15	19.07	13.31	778.35	103.07	25.34	148.79	501.15
2024	0.00	0.00	15.23	0.00	0.00	0.00	15.23	19.15	17.33	771.93	101.16	41.28	153.87	475.62
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	19.15	17.11	679.89	98.84	31.52	139.36	410.16
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.15	16.68	652.50	96.50	35.69	148.19	372.12
2027	0.00	0.00	75.36	0.00	0.00	0.00	75.36	19.52	16.71	617.79	94.40	38.73	150.86	333.80
2028	0.00	0.00	105.04	0.00	74.66	0.00	179.71	20.41	16.77	597.17	92.51	44.88	158.91	300.88
2029	0.00	0.00	172.51	0.00	0.00	0.00	172.51	21.27	23.61	582.95	90.73	61.94	165.82	264.46
2030	0.00	0.00	226.67	0.00	0.00	0.00	226.67	22.41	19.59	579.69	89.80	66.81	169.64	253.43
2031	0.00	0.00	101.52	0.00	9.48	0.00	111.00	22.96	19.59	607.00	90.40	58.00	171.31	287.29
2032	0.00	0.00	7.47	0.00	0.00	0.00	7.47	23.00	26.66	641.80	87.81	158.09	147.99	247.91
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.00	26.66	628.79	86.26	168.54	158.43	215.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.00	26.67	614.34	84.74	181.26	167.48	180.86
2035	0.00	0.00	161.67	0.00	0.00	0.00	161.67	23.81	26.00	543.00	82.68	181.87	158.11	120.34
2036	0.00	0.00	233.56	0.00	0.00	0.00	233.56	24.98	26.01	515.93	81.18	192.60	162.77	79.38
2037	0.00	0.00	104.61	0.00	0.00	0.00	104.61	25.50	26.01	533.87	81.63	185.25	161.65	105.34
2038	0.00	0.00	171.80	0.00	0.00	0.00	171.80	26.36	33.08	575.52	79.16	302.02	142.70	51.63
2039	0.00	0.00	237.08	0.00	0.00	0.00	237.08	27.54	36.03	559.75	77.74	316.26	160.19	5.56
2040	0.00	0.00	106.18	0.00	62.81	0.00	168.99	28.39	33.08	559.26	77.11	320.79	168.80	-7.45
2041	0.00	0.00	7.81	0.00	0.00	0.00	7.81	28.43	40.15	609.40	75.21	438.41	145.62	-49.85
2042	0.00	0.00	167.41	0.00	0.00	0.00	167.41	29.26	40.15	587.68	73.37	466.39	156.27	-108.36
2043	0.00	0.00	241.85	0.00	0.00	0.00	241.85	30.47	40.15	571.91	72.01	488.55	164.30	-152.94
2044	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.02	41.93	563.97	71.51	489.28	172.38	-169.20
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	31.06	49.00	609.39	69.16	628.13	154.15	-242.05
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	49.01	618.08	69.35	622.14	154.81	-228.21
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	48.12	589.51	67.33	665.46	167.76	-311.04
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	31.06	50.20	605.66	68.61	638.58	158.91	-260.43
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2052	0.00	0.00	73.50	0.00	29.50	1.50	104.50	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2053	0.00	0.00	100.38	0.00	20.99	4.50	125.87	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2054	0.00	0.00	15.23	0.00	17.12	4.50	36.85	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2055	0.00	0.00	0.00	0.00	0.00	4.66	4.66	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2057	0.00	0.00	75.36	0.00	0.00	0.00	75.36	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2058	0.00	0.00	102.92	0.00	9.48	0.00	112.40	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2059	0.00	0.00	172.51	0.00	0.00	0.00	172.51	31.06	50.20	605.66	68.61	638.58	158.91	-260.43
2060	0.00	0.00	226.67	0.00	0.00	0.00	226.67	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2061	0.00	0.00	101.52	0.00	0.00	0.00	101.52	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2062	0.00	0.00	7.47	0.00	0.00	0.00	7.47	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2063	0.00	0.00	0.00	0.00	56.00	2.86	58.86	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2064	0.00	0.00	0.00	0.00	10.64	3.89	14.53	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2065	0.00	0.00	161.67	0.00	8.83	2.45	172.95	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2066	0.00	0.00	233.56	0.00	10.54	3.05	247.15	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2067	0.00	0.00	104.61	0.00	9.21	4.57	118.39	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2068	0.00	0.00	171.80	0.00	19.70	13.71	205.20	31.06	63.07	605.66	68.61	638.58	158.91	-260.43
2069	0.00	0.00	237.08	0.00	31.08	13.71	281.87	31.06	50.20	605.66	68.61	638.58	158.91	-260.43
2070	0.00	0.00	106.18	0.00	0.01	14.22	120.41	31.06	49.02	605.66	68.61	638.58	158.91	-260.43
2071	0.00	0.00	7.81	0.00	0.00	0.00	7.81	31.06	49.02	605.66	68.61	638.58	158.91	-260.43
2072	0.00	0.00	167.41	0.00	0.00	0.00	167.41	31.06	49.02	605.66	68.61	638.58	158.91	-260.43
2073	0.00	0.00	241.85	0.00	0.00	0.00	241.85	31.06	48.13	605.66	68.61	638.58	158.91	-260.43
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2075	0.00	0.00	7.97	0.00	47.11	0.00	55.07	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2078	0.00	0.00	0.00	0.00	18.67	0.00	18.67	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	50.20	605.66	68.61	638.58	158.91	-260.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2082	0.00	0.00	73.50	0.00	0.00	0.00	73.50	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2083	0.00	0.00	100.38	0.00	0.00	0.00	100.38	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2084	0.00	0.00	15.23	0.00	10.82	0.17	26.22	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2087	0.00	0.00	75.36	0.00	29.50	1.50	106.35	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2088	0.00	0.00	102.92	0.00	20.99	4.50	128.41	31.06	47.24	605.66	68.61	638.58	158.91	-260.43
2089	0.00	0.00	15.61	0.00	17.12	4.50	37.23	31.06	50.20	605.66	68.61	638.58	158.91	-260.43
2090	0.00	0.00	0.00	0.00	15.70	4.66	20.37	31.06	50.20	605.66	68.61	638.58	158.91	-260.43
Salvage Value	0.00	0.00	8.21	0.00	1.97	0.47	10.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2810.14	820.85	0.00	231.19	61.74	3923.92	305.28	309.00	9496.82	1496.27	2626.11	2361.31	3013.13

Net Present Value -1525

K19/C31/250MW

TABLE 368
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	226.22	0.00	0.00	21.46	4.06	283.49	1.43	0.00	378.60	105.26	29.90	115.53	127.90
2015	40.08	496.39	0.00	0.00	19.33	2.78	558.57	4.22	0.00	431.52	103.31	34.17	121.47	172.56
2016	10.89	657.29	0.00	0.00	26.45	4.05	698.68	7.72	0.00	447.06	101.43	36.48	124.69	184.46
2017	10.95	796.58	0.00	0.00	38.71	6.07	852.31	11.98	0.00	483.11	99.39	39.13	131.84	212.75
2018	13.02	561.68	0.00	0.00	40.69	18.21	633.60	15.15	0.00	461.70	96.62	42.68	137.34	185.06
2019	13.09	401.73	0.00	0.00	48.21	18.21	481.24	17.55	13.29	492.64	96.25	42.46	137.94	215.99
2020	13.17	164.04	0.37	0.00	0.01	18.88	196.47	18.53	13.51	744.57	104.92	30.28	131.29	478.07
2021	16.66	56.92	0.00	0.00	0.00	0.00	73.58	18.90	13.26	790.78	105.63	30.82	138.50	515.82
2022	168.48	0.00	95.78	0.00	0.00	0.00	264.26	20.11	13.48	783.26	104.15	30.23	143.29	505.60
2023	257.00	0.00	122.67	0.00	9.48	0.00	389.14	21.95	13.31	777.50	103.03	25.52	149.07	499.88
2024	279.20	0.00	15.23	0.00	0.00	0.00	294.43	23.42	17.33	771.11	101.13	41.55	154.40	474.03
2025	284.55	0.00	0.00	0.00	3.61	0.00	288.16	24.86	17.11	678.51	98.80	31.70	140.17	407.84
2026	769.74	0.00	0.00	0.00	3.61	0.00	773.35	28.73	16.68	650.79	96.49	35.95	148.79	369.57
2027	1222.24	0.00	75.36	0.00	43.84	0.00	1341.44	35.43	16.71	615.23	94.39	39.16	151.50	330.18
2028	1097.38	0.00	102.92	0.00	32.22	0.00	1232.52	41.60	16.77	593.36	92.43	46.06	159.71	295.16
2029	783.65	0.00	15.61	0.00	38.26	0.00	837.53	45.78	23.60	578.72	90.69	63.20	167.20	257.62
2030	542.72	0.00	0.00	0.00	66.25	0.00	608.98	48.83	19.58	607.92	91.79	55.25	161.15	299.73
2031	356.48	0.00	0.00	0.00	88.77	0.00	445.24	51.05	34.19	696.39	94.97	46.25	125.01	430.16
2032	131.29	0.00	0.00	0.00	104.61	0.00	235.91	52.23	34.42	928.24	102.25	44.65	117.44	663.91
2033	41.43	0.00	0.00	0.00	0.00	0.00	41.43	52.44	34.27	960.29	102.16	46.30	124.72	687.10
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	34.50	924.19	100.35	47.44	127.11	649.30
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.65	893.96	98.63	48.12	123.42	623.80
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.60	862.58	96.96	49.32	124.86	591.44
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.42	821.29	95.07	51.14	128.14	546.94
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.05	773.87	93.05	53.28	131.47	496.07
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	36.08	741.15	91.11	58.91	144.32	446.82
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.24	720.76	89.37	66.65	151.91	412.82
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	36.02	699.21	87.68	75.53	161.13	374.86
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	52.44	33.06	697.19	86.81	76.51	167.65	366.22
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	33.06	684.88	85.44	76.22	184.17	339.05
2044	0.00	0.00	82.02	0.00	0.00	0.00	82.02	52.85	34.84	663.74	83.85	97.05	187.55	295.29
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	53.78	34.84	644.17	82.40	106.82	198.72	256.23
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	53.87	38.92	630.94	81.00	121.43	211.96	216.56
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	37.36	611.37	79.56	123.17	232.16	176.48
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	36.47	628.83	80.99	117.14	214.28	216.42
2049	0.00	0.00	0.00	0.00	10.82	0.17	10.99	53.87	39.43	628.83	80.99	117.14	214.28	216.42
2050	0.00	0.00	0.00	0.00	10.50	0.33	10.83	53.87	36.48	628.83	80.99	117.14	214.28	216.42
2051	0.00	0.00	0.00	0.00	25.39	1.00	26.39	53.87	39.44	628.83	80.99	117.14	214.28	216.42
2052	0.00	0.00	73.50	0.00	29.50	1.50	104.50	53.87	36.49	628.83	80.99	117.14	214.28	216.42
2053	0.00	0.00	100.38	0.00	20.99	4.50	125.87	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2054	0.00	0.00	15.23	0.00	17.12	4.50	36.85	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2055	0.00	0.00	0.00	0.00	0.00	4.66	4.66	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2057	0.00	0.00	75.36	0.00	0.00	0.00	75.36	53.87	38.27	628.83	80.99	117.14	214.28	216.42
2058	0.00	0.00	102.92	0.00	9.48	0.00	112.40	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2059	0.00	0.00	15.61	0.00	0.00	0.00	15.61	53.87	41.23	628.83	80.99	117.14	214.28	216.42
2060	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2061	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.87	39.46	628.83	80.99	117.14	214.28	216.42
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2063	0.00	0.00	0.00	0.00	14.83	2.86	17.69	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2064	0.00	0.00	0.00	0.00	19.55	3.89	23.45	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2065	0.00	0.00	0.00	0.00	23.98	2.45	26.43	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2066	0.00	0.00	0.00	0.00	22.45	3.05	25.50	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2067	0.00	0.00	0.00	0.00	35.05	4.57	39.62	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2068	0.00	0.00	0.00	0.00	19.70	13.71	33.41	53.87	68.16	628.83	80.99	117.14	214.28	216.42
2069	0.00	0.00	0.00	0.00	31.08	13.71	44.79	53.87	39.46	628.83	80.99	117.14	214.28	216.42
2070	0.00	0.00	0.00	0.00	0.01	14.22	14.23	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	41.23	628.83	80.99	117.14	214.28	216.42
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.87	37.38	628.83	80.99	117.14	214.28	216.42
2074	0.00	0.00	82.02	0.00	0.00	0.00	82.02	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2075	0.00	0.00	112.03	0.00	2.72	0.00	114.74	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2076	0.00	0.00	16.99	0.00	2.72	0.00	19.71	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2077	0.00	0.00	0.00	0.00	33.14	0.00	33.14	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2078	0.00	0.00	0.00	0.00	17.39	0.00	17.39	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2079	0.00	0.00	0.00	0.00	29.35	0.00	29.35	53.87	39.46	628.83	80.99	117.14	214.28	216.42
2080	0.00	0.00	0.00	0.00	107.10	0.00	107.10	53.87	52.33	628.83	80.99	117.14	214.28	216.42
2081	0.00	0.00	0.00	0.00	67.38	0.00	67.38	53.87	39.46	628.83	80.99	117.14	214.28	216.42
2082	0.00	0.00	73.50	0.00	78.77	0.00	152.27	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2083	0.00	0.00	100.38	0.00	0.00	0.00	100.38	53.87	38.27	628.83	80.99	117.14	214.28	216.42
2084	0.00	0.00	15.23	0.00	10.82	0.17	26.22	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2085	0.00	0.00	0.00	0.00	10.50	0.33	10.83	53.87	38.27	628.83	80.99	117.14	214.28	216.42
2086	0.00	0.00	0.00	0.00	25.39	1.00	26.39	53.87	54.10	628.83	80.99	117.14	214.28	216.42
2087	0.00	0.00	75.36	0.00	29.50	1.50	106.35	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2088	0.00	0.00	102.92	0.00	20.99	4.50	128.41	53.87	36.50	628.83	80.99	117.14	214.28	216.42
2089	0.00	0.00	15.61	0.00	17.12	4.50	37.23	53.87	39.46	628.83	80.99	117.14	214.28	216.42
2090	0.00	0.00	0.00	0.00	0.00	4.66	4.66	53.87	39.46	628.83	80.99	117.14	214.28	216.42
Salvage Value	6.45	0.00	3.91	0.00	4.19	0.47	15.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2694.54	2810.14	282.66	0.00	337.44	61.74	6186.51	493.54	302.94	10291.24	1567.71	842.93	2409.30	5471.29

Net Present Value -1512

All Gas

TABLE 369
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	433.97	103.30	34.19	121.38	175.11
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	449.67	101.42	36.46	124.60	187.19
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	490.81	99.77	37.68	130.27	223.10
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	468.40	96.90	41.06	136.08	194.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	451.83	94.93	36.39	138.99	181.52
2020	0.00	0.00	95.05	0.00	0.00	0.00	95.05	0.89	0.00	483.24	94.99	28.74	145.25	214.26
2021	0.00	0.00	121.71	0.00	9.48	0.00	131.20	1.43	0.00	474.33	93.20	26.90	158.17	196.06
2022	0.00	0.00	15.08	0.00	0.00	0.00	15.08	1.51	4.07	461.85	90.88	49.97	163.68	157.31
2023	0.00	0.00	73.87	0.00	0.00	0.00	73.87	1.88	4.07	443.46	88.65	61.52	174.48	118.82
2024	0.00	0.00	103.01	0.00	74.66	0.00	177.67	2.75	4.07	435.04	87.14	70.23	183.66	94.01
2025	0.00	0.00	15.30	0.00	0.00	0.00	15.30	2.83	8.16	381.25	86.65	58.83	160.55	75.21
2026	0.00	0.00	74.98	0.00	0.00	0.00	74.98	3.21	8.16	361.91	85.31	60.87	165.57	50.15
2027	0.00	0.00	102.41	0.00	0.00	0.00	102.41	3.72	8.16	339.71	83.42	61.19	184.15	10.96
2028	0.00	0.00	171.65	0.00	0.00	0.00	171.65	4.58	12.23	316.07	81.43	95.42	182.77	-43.54
2029	0.00	0.00	225.54	0.00	0.00	0.00	225.54	5.70	12.23	294.51	79.94	108.49	190.66	-84.57
2030	0.00	0.00	101.02	0.00	9.48	0.00	110.50	6.26	12.24	313.35	80.90	100.96	184.88	-53.39
2031	0.00	0.00	7.43	0.00	0.00	0.00	7.43	6.29	19.31	338.88	78.44	188.34	164.78	-92.68
2032	0.00	0.00	77.26	0.00	0.00	0.00	77.26	6.68	19.32	308.10	76.49	206.03	175.11	-149.53
2033	0.00	0.00	105.52	0.00	62.81	0.00	168.33	7.52	19.32	280.58	74.70	223.74	185.97	-203.84
2034	0.00	0.00	176.87	0.00	0.00	0.00	176.87	8.41	23.40	262.43	73.26	250.98	192.41	-254.23
2035	0.00	0.00	232.39	0.00	0.00	0.00	232.39	9.57	23.40	246.29	72.35	263.70	198.53	-288.29
2036	0.00	0.00	104.08	0.00	0.00	0.00	104.08	10.09	23.40	245.22	72.31	256.49	208.73	-292.30
2037	0.00	0.00	170.94	0.00	0.00	0.00	170.94	10.94	30.46	256.01	70.27	350.54	177.26	-342.07
2038	0.00	0.00	235.90	0.00	0.00	0.00	235.90	12.12	30.47	233.84	69.03	369.21	187.14	-391.53
2039	0.00	0.00	105.65	0.00	0.00	0.00	105.65	12.65	30.48	229.77	68.98	374.99	195.36	-409.56
2040	0.00	0.00	7.77	0.00	0.00	0.00	7.77	12.69	37.55	249.01	67.00	467.59	173.84	-459.43
2041	0.00	0.00	166.58	0.00	0.00	0.00	166.58	13.52	37.55	232.67	65.19	505.84	190.19	-528.56
2042	0.00	0.00	240.65	0.00	0.00	0.00	240.65	14.73	37.55	222.78	64.12	532.27	202.40	-576.00
2043	0.00	0.00	107.78	0.00	62.81	0.00	170.60	15.58	37.55	226.01	64.12	537.66	206.95	-582.71
2044	0.00	0.00	7.93	0.00	0.00	0.00	7.93	15.62	44.63	247.64	62.50	634.18	180.93	-629.98
2045	0.00	0.00	36.26	0.00	0.00	0.00	36.26	15.80	44.63	234.46	60.94	675.60	196.79	-698.88
2046	0.00	0.00	49.52	0.00	0.00	0.00	49.52	16.05	44.63	224.51	59.82	709.87	208.92	-754.10
2047	0.00	0.00	7.51	0.00	0.00	0.00	7.51	16.08	46.11	220.54	58.94	748.13	215.11	-801.64
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.11	226.50	59.90	711.20	206.94	-751.54
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	16.08	46.12	226.50	59.90	711.20	206.94	-751.54
2050	0.00	0.00	72.77	0.00	10.08	0.00	82.85	16.08	46.12	226.50	59.90	711.20	206.94	-751.54
2051	0.00	0.00	99.39	0.00	10.08	0.00	109.47	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2052	0.00	0.00	15.08	0.00	10.08	0.00	25.16	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2053	0.00	0.00	73.87	0.00	0.00	0.00	73.87	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2054	0.00	0.00	100.89	0.00	0.00	0.00	100.89	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2055	0.00	0.00	15.30	0.00	0.00	0.00	15.30	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2056	0.00	0.00	74.98	0.00	9.48	0.00	84.46	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2057	0.00	0.00	102.41	0.00	0.00	0.00	102.41	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2058	0.00	0.00	171.65	0.00	0.00	0.00	171.65	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2059	0.00	0.00	225.54	0.00	56.00	0.00	281.54	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2060	0.00	0.00	101.02	0.00	0.00	0.00	101.02	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2061	0.00	0.00	7.43	0.00	0.00	0.00	7.43	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2062	0.00	0.00	77.26	0.00	0.00	0.00	77.26	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2063	0.00	0.00	105.52	0.00	0.00	0.00	105.52	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2064	0.00	0.00	176.87	0.00	0.00	0.00	176.87	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2065	0.00	0.00	232.39	0.00	9.48	0.00	241.88	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2066	0.00	0.00	104.08	0.00	0.00	0.00	104.08	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2067	0.00	0.00	170.94	0.00	0.00	0.00	170.94	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2068	0.00	0.00	235.90	0.00	47.11	0.00	283.01	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2069	0.00	0.00	105.65	0.00	0.00	0.00	105.65	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2070	0.00	0.00	7.77	0.00	0.00	0.00	7.77	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2071	0.00	0.00	166.58	0.00	0.00	0.00	166.58	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2072	0.00	0.00	240.65	0.00	0.00	0.00	240.65	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2073	0.00	0.00	107.78	0.00	0.00	0.00	107.78	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2074	0.00	0.00	7.93	0.00	18.67	0.00	26.59	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2075	0.00	0.00	36.26	0.00	0.00	0.00	36.26	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2076	0.00	0.00	49.52	0.00	0.00	0.00	49.52	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2077	0.00	0.00	7.51	0.00	0.00	0.00	7.51	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2078	0.00	0.00	0.00	0.00	47.11	0.00	47.11	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2080	0.00	0.00	72.77	0.00	0.00	0.00	72.77	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2081	0.00	0.00	99.39	0.00	0.00	0.00	99.39	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2082	0.00	0.00	15.08	0.00	0.00	0.00	15.08	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2083	0.00	0.00	73.87	0.00	15.70	0.00	89.57	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2084	0.00	0.00	100.89	0.00	10.08	0.00	110.97	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2085	0.00	0.00	15.30	0.00	10.08	0.00	25.38	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2086	0.00	0.00	74.98	0.00	10.08	0.00	85.06	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2087	0.00	0.00	102.41	0.00	10.08	0.00	112.49	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2088	0.00	0.00	15.54	0.00	0.00	0.00	15.54	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.08	46.13	226.50	59.90	711.20	206.94	-751.54
Salvage Value	0.00	0.00	25.89	0.00	0.99	0.00	26.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1069.44	0.00	126.11	0.00	1259.87	87.87	224.68	5914.61	1375.74	3191.85	2678.75	-1331.74

Net Present Value: -2904

Wind/Gas

TABLE 370
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	433.97	103.30	34.19	121.40	175.09
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	449.67	101.42	36.46	124.62	187.17
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	490.86	99.77	37.68	130.29	223.13
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	468.40	96.90	41.06	136.08	194.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	451.83	94.93	36.39	138.99	181.52
2020	0.00	0.00	0.00	9.79	13.83	0.00	23.61	0.64	0.00	477.57	94.51	30.99	146.66	205.40
2021	0.00	0.00	0.37	298.83	23.04	0.00	322.24	2.25	0.00	468.59	92.73	29.77	159.11	186.98
2022	0.00	0.00	0.00	304.42	27.82	0.00	332.24	3.91	6.34	478.85	91.07	29.87	160.82	197.10
2023	0.00	0.00	170.02	294.63	14.49	0.00	479.14	6.20	12.69	475.73	88.53	34.15	166.62	186.43
2024	0.00	0.00	224.10	5.59	25.56	0.00	255.25	7.36	19.03	482.55	86.73	34.43	171.13	190.27
2025	0.00	0.00	30.61	4.89	3.97	0.00	39.48	7.56	27.18	443.37	86.81	40.23	141.74	174.59
2026	0.00	0.00	74.98	149.41	9.99	0.00	234.39	8.73	27.18	432.40	85.79	38.46	145.84	162.30
2027	0.00	0.00	104.53	152.21	90.53	0.00	347.27	10.46	30.35	414.21	83.37	47.25	153.93	129.66
2028	0.00	0.00	15.54	152.21	22.00	0.00	189.74	11.40	37.60	407.80	81.59	61.26	159.35	105.60
2029	0.00	0.00	76.11	152.21	22.08	0.00	250.40	12.66	40.78	396.42	79.98	66.51	165.05	84.88
2030	0.00	0.00	103.95	152.21	22.08	0.00	278.24	14.05	43.95	399.04	79.04	69.72	166.35	83.92
2031	0.00	0.00	92.64	152.21	22.08	0.00	266.93	15.38	51.19	404.10	77.80	82.67	170.18	73.44
2032	0.00	0.00	104.99	152.21	84.89	0.00	342.09	17.09	54.37	399.88	76.68	83.44	175.97	63.80
2033	0.00	0.00	15.93	152.21	22.08	0.00	190.22	18.04	61.63	408.80	76.02	88.89	179.54	64.35
2034	0.00	0.00	78.03	152.21	22.08	0.00	252.32	19.31	64.81	391.90	74.17	104.62	184.10	29.00
2035	0.00	0.00	106.58	152.21	22.08	0.00	280.87	20.71	67.99	374.91	72.48	112.88	193.03	-3.47
2036	0.00	0.00	94.98	152.21	22.08	0.00	269.27	22.06	75.23	368.05	71.10	129.73	197.84	-30.62
2037	0.00	0.00	107.64	152.21	22.08	0.00	281.93	23.47	78.41	356.60	69.79	137.45	205.02	-55.66
2038	0.00	0.00	95.94	152.21	22.08	0.00	270.22	24.82	85.66	356.13	68.75	151.46	210.72	-74.80
2039	0.00	0.00	108.72	152.21	84.89	0.00	345.82	26.55	88.84	349.43	67.59	151.91	231.51	-101.58
2040	0.00	0.00	16.49	162.00	22.08	0.00	200.57	27.55	96.10	356.18	66.78	160.86	240.86	-112.32
2041	0.00	0.00	80.81	451.04	22.08	0.00	553.92	30.32	99.28	338.29	65.24	193.12	238.07	-158.14
2042	0.00	0.00	110.36	456.63	22.08	0.00	589.07	33.26	102.45	323.72	63.85	206.62	248.72	-195.47
2043	0.00	0.00	98.36	446.84	21.91	0.00	567.11	36.10	109.69	317.37	62.66	228.50	255.52	-229.31
2044	0.00	0.00	111.47	157.80	21.42	0.00	290.69	37.55	112.87	311.59	61.73	237.54	263.74	-251.41
2045	0.00	0.00	53.17	157.10	20.09	0.00	230.37	38.70	120.12	307.67	60.63	251.49	277.25	-281.69
2046	0.00	0.00	49.52	296.73	18.10	0.00	364.36	40.53	123.30	301.08	59.57	253.06	297.31	-308.87
2047	0.00	0.00	7.51	155.01	12.09	0.00	174.61	41.40	127.95	292.71	58.51	261.68	301.84	-329.33
2048	0.00	0.00	0.00	152.21	6.21	0.00	158.42	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2049	0.00	0.00	0.00	152.21	10.16	0.00	162.37	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2050	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2051	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2052	0.00	0.00	0.00	152.21	10.08	0.00	162.29	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2053	0.00	0.00	147.74	152.21	0.00	0.00	299.95	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2054	0.00	0.00	201.77	152.21	0.00	0.00	353.98	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2055	0.00	0.00	30.61	152.21	3.46	0.00	186.28	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2056	0.00	0.00	74.98	152.21	5.76	0.00	232.95	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2057	0.00	0.00	102.41	152.21	7.00	0.00	261.61	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2058	0.00	0.00	15.54	152.21	3.87	0.00	171.62	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2059	0.00	0.00	76.11	152.21	20.86	0.00	249.18	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2060	0.00	0.00	103.95	162.00	1.74	0.00	267.69	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2061	0.00	0.00	92.64	451.04	2.79	0.00	546.47	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2062	0.00	0.00	104.99	456.63	60.03	0.00	621.65	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2063	0.00	0.00	15.93	446.84	5.52	0.00	468.29	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2064	0.00	0.00	78.03	157.80	5.52	0.00	241.36	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2065	0.00	0.00	106.58	157.10	5.52	0.00	269.20	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2066	0.00	0.00	94.98	296.73	5.52	0.00	397.23	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2067	0.00	0.00	107.64	155.01	52.63	0.00	315.28	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2068	0.00	0.00	95.94	152.21	5.52	0.00	253.67	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2069	0.00	0.00	108.72	152.21	5.52	0.00	266.45	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2070	0.00	0.00	16.49	152.21	15.89	0.00	184.59	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2071	0.00	0.00	80.81	152.21	22.80	0.00	255.82	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2072	0.00	0.00	110.36	152.21	26.34	0.00	288.92	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2073	0.00	0.00	98.36	152.21	16.14	0.00	266.71	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2074	0.00	0.00	111.47	152.21	57.33	0.00	321.01	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2075	0.00	0.00	53.17	152.21	7.76	0.00	213.14	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2076	0.00	0.00	49.52	152.21	12.72	0.00	214.46	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2077	0.00	0.00	7.51	152.21	36.03	0.00	195.75	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2078	0.00	0.00	0.00	152.21	21.91	0.00	174.12	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2079	0.00	0.00	0.00	152.21	21.66	0.00	173.87	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2080	0.00	0.00	0.00	162.00	21.33	0.00	183.33	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2081	0.00	0.00	0.00	451.04	20.34	0.00	471.38	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2082	0.00	0.00	0.00	456.63	34.99	0.00	491.62	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2083	0.00	0.00	147.74	446.84	18.05	0.00	612.63	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2084	0.00	0.00	201.77	157.80	26.56	0.00	386.13	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2085	0.00	0.00	30.61	157.10	26.39	0.00	214.10	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2086	0.00	0.00	74.98	296.73	25.40	0.00	397.11	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2087	0.00	0.00	102.41	155.01	24.40	0.00	281.82	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2088	0.00	0.00	15.54	152.21	9.36	0.00	177.10	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2089	0.00	0.00	0.00	147.32	20.42	0.00	167.74	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
2090	0.00	0.00	0.00	2.80	0.08	0.00	2.88	41.40	127.95	300.48	59.57	255.41	292.13	-306.63
Salvage Value	0.00	0.00	7.84	19.15	3.53	0.00	30.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	783.56	1927.44	302.91	0.00	3078.23	209.16	641.69	6679.11	1373.24	1423.00	2859.17	1023.70

Net Present Value -2905

K22/Gas

TABLE 371
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	107.18	0.00	0.00	10.08	0.00	117.26	0.59	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	32.53	0.00	0.00	11.02	0.00	43.55	0.80	0.00	433.97	103.30	34.19	121.38	175.11
2016	0.00	28.86	0.00	0.00	11.10	0.00	39.96	1.00	0.00	449.12	101.42	36.47	124.60	186.63
2017	0.00	215.40	0.00	0.00	27.74	0.00	243.14	2.22	0.00	489.42	99.78	37.70	130.34	221.60
2018	0.00	420.08	0.00	0.00	9.06	0.00	429.13	4.37	0.00	465.38	96.91	41.08	136.23	191.16
2019	0.00	685.17	0.00	0.00	15.77	0.00	700.94	7.87	0.00	448.74	94.94	36.40	139.14	178.26
2020	0.00	763.03	0.00	0.00	28.69	0.00	791.72	11.83	0.00	470.62	94.33	31.96	147.72	196.60
2021	0.00	623.77	0.00	0.00	40.71	0.00	664.48	15.15	0.00	465.49	92.68	30.39	161.40	181.03
2022	0.00	362.26	0.00	0.00	48.21	0.00	410.47	17.20	13.29	474.23	92.65	34.56	149.08	197.95
2023	0.00	168.41	0.00	0.00	0.01	0.00	168.42	18.05	13.51	627.65	98.45	33.99	132.37	362.84
2024	0.00	58.23	0.00	0.00	0.00	0.00	58.23	18.34	13.21	653.04	98.30	38.40	141.60	374.74
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	18.34	13.43	622.49	98.29	26.77	123.78	373.65
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.34	13.26	601.30	96.39	27.11	129.76	348.04
2027	0.00	0.00	97.64	0.00	0.00	0.00	97.64	18.71	13.21	555.27	94.51	25.93	126.32	308.51
2028	0.00	0.00	125.25	0.00	9.48	0.00	134.73	19.28	12.96	529.24	92.93	27.03	130.95	278.32
2029	0.00	0.00	15.61	0.00	0.00	0.00	15.61	19.35	16.59	522.30	92.08	34.09	132.57	263.55
2030	0.00	0.00	76.49	0.00	0.00	0.00	76.49	19.74	16.59	505.81	90.28	42.26	139.51	233.76
2031	0.00	0.00	265.07	0.00	74.66	0.00	339.73	21.42	16.64	493.01	88.58	49.55	148.27	206.61
2032	0.00	0.00	244.79	0.00	0.00	0.00	244.79	22.65	23.48	478.54	86.94	66.73	155.56	169.31
2033	0.00	0.00	102.54	0.00	9.48	0.00	112.02	23.21	19.46	493.25	87.13	58.75	159.17	188.20
2034	0.00	0.00	7.54	0.00	0.00	0.00	7.54	23.25	26.52	528.98	84.66	159.16	136.26	148.90
2035	0.00	0.00	161.67	0.00	0.00	0.00	161.67	24.05	26.52	501.26	82.56	174.56	146.70	97.44
2036	0.00	0.00	233.56	0.00	0.00	0.00	233.56	25.22	26.53	484.35	81.01	189.13	154.83	59.37
2037	0.00	0.00	104.61	0.00	0.00	0.00	104.61	25.74	26.53	500.97	81.46	179.33	154.99	85.19
2038	0.00	0.00	171.80	0.00	0.00	0.00	171.80	26.60	32.93	536.79	79.04	289.54	135.99	32.22
2039	0.00	0.00	237.08	0.00	0.00	0.00	237.08	27.79	32.94	521.79	77.65	304.59	153.12	-13.58
2040	0.00	0.00	106.18	0.00	62.81	0.00	168.99	28.63	32.94	524.75	77.16	307.52	161.00	-20.92
2041	0.00	0.00	7.81	0.00	0.00	0.00	7.81	28.67	40.02	567.29	75.14	422.16	138.09	-68.09
2042	0.00	0.00	167.41	0.00	0.00	0.00	167.41	29.51	42.97	545.64	73.29	451.17	148.93	-127.75
2043	0.00	0.00	241.85	0.00	0.00	0.00	241.85	30.72	40.02	530.40	71.92	473.53	157.46	-172.52
2044	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.26	40.02	527.47	71.56	473.62	164.57	-182.28
2045	0.00	0.00	7.97	0.00	0.00	0.00	7.97	31.30	47.09	578.79	69.93	594.30	141.86	-227.29
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.09	561.53	68.66	616.01	151.93	-275.07
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	48.87	545.50	67.27	646.33	161.98	-330.08
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	48.88	561.94	68.62	618.88	151.92	-277.48
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	48.88	561.94	68.62	618.88	151.92	-277.48
2050	0.00	0.00	0.00	0.00	10.49	0.00	10.49	31.30	47.99	561.94	68.62	618.88	151.92	-277.48
2051	0.00	0.00	0.00	0.00	10.55	0.00	10.55	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2052	0.00	0.00	0.00	0.00	10.56	0.00	10.56	31.30	50.06	561.94	68.62	618.88	151.92	-277.48
2053	0.00	0.00	0.00	0.00	0.45	0.00	0.45	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2054	0.00	0.00	0.00	0.00	14.64	0.00	14.64	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2055	0.00	0.00	0.00	0.00	19.42	0.00	19.42	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2056	0.00	0.00	0.00	0.00	20.99	0.00	20.99	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2057	0.00	0.00	75.36	0.00	17.12	0.00	92.48	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2058	0.00	0.00	102.92	0.00	0.00	0.00	102.92	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2059	0.00	0.00	15.61	0.00	0.00	0.00	15.61	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2060	0.00	0.00	76.49	0.00	0.00	0.00	76.49	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2061	0.00	0.00	262.94	0.00	0.00	0.00	262.94	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2062	0.00	0.00	244.79	0.00	0.00	0.00	244.79	31.30	50.06	561.94	68.62	618.88	151.92	-277.48
2063	0.00	0.00	102.54	0.00	9.48	0.00	112.02	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2064	0.00	0.00	7.54	0.00	0.00	0.00	7.54	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2065	0.00	0.00	161.67	0.00	0.52	0.00	162.19	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2066	0.00	0.00	233.56	0.00	56.55	0.00	290.11	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2067	0.00	0.00	104.61	0.00	17.18	0.00	121.79	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2068	0.00	0.00	171.80	0.00	18.09	0.00	189.89	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2069	0.00	0.00	237.08	0.00	1.13	0.00	238.21	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2070	0.00	0.00	106.18	0.00	9.28	0.00	115.46	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2071	0.00	0.00	7.81	0.00	19.72	0.00	27.52	31.30	62.94	561.94	68.62	618.88	151.92	-277.48
2072	0.00	0.00	167.41	0.00	31.08	0.00	198.49	31.30	50.06	561.94	68.62	618.88	151.92	-277.48
2073	0.00	0.00	241.85	0.00	0.01	0.00	241.86	31.30	48.88	561.94	68.62	618.88	151.92	-277.48
2074	0.00	0.00	108.32	0.00	0.00	0.00	108.32	31.30	48.88	561.94	68.62	618.88	151.92	-277.48
2075	0.00	0.00	7.97	0.00	47.12	0.00	55.08	31.30	48.88	561.94	68.62	618.88	151.92	-277.48
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.99	561.94	68.62	618.88	151.92	-277.48
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2081	0.00	0.00	0.00	0.00	18.67	0.00	18.67	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	50.06	561.94	68.62	618.88	151.92	-277.48
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2087	0.00	0.00	75.36	0.00	10.08	0.00	85.44	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2088	0.00	0.00	102.92	0.00	0.00	0.00	102.92	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2089	0.00	0.00	15.61	0.00	0.00	0.00	15.61	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
2090	0.00	0.00	0.00	0.00	15.70	0.00	15.70	31.30	47.10	561.94	68.62	618.88	151.92	-277.48
Salvage Value	0.00	0.00	7.27	0.00	1.51	0.00	8.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2437.90	742.42	0.00	206.65	0.00	3386.98	263.17	263.16	8256.44	1468.90	2449.38	2265.28	2072.88

Net Present Value: -1840

K22/C29

TABLE 372
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	107.18	0.00	0.00	10.08	0.00	149.01	0.75	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.61	32.53	0.00	0.00	11.02	0.00	84.16	1.17	0.00	433.97	103.30	34.19	121.38	175.11
2016	11.43	28.86	0.00	0.00	11.10	0.00	51.39	1.42	0.00	449.12	101.42	36.47	124.60	186.63
2017	12.17	215.40	0.00	0.00	27.74	0.00	255.31	2.70	0.00	489.42	99.78	37.70	130.34	221.60
2018	12.25	420.08	0.00	0.00	9.06	0.00	441.38	4.91	0.00	465.38	96.91	41.08	136.23	191.16
2019	14.64	685.17	0.00	0.00	15.77	0.00	715.58	8.48	0.00	448.74	94.94	36.40	139.14	178.26
2020	169.77	763.03	0.00	0.00	28.69	0.00	961.49	13.29	0.00	470.63	94.33	31.96	147.73	196.60
2021	257.27	623.77	0.00	0.00	40.71	0.00	921.75	17.90	0.00	465.18	92.68	30.40	161.67	180.43
2022	275.94	362.26	0.00	0.00	48.21	0.00	686.41	21.33	13.29	473.85	92.66	34.51	149.36	197.32
2023	281.23	168.41	0.00	0.00	3.62	0.00	453.26	23.60	13.51	626.29	98.44	34.08	132.49	361.28
2024	760.76	58.23	0.00	0.00	3.61	0.00	822.60	27.71	13.21	650.28	98.29	38.41	141.70	371.89
2025	1207.98	0.00	0.00	0.00	43.84	0.00	1251.81	33.97	13.43	619.05	98.31	26.81	123.94	369.99
2026	1084.57	0.00	0.00	0.00	22.74	0.00	1107.31	39.51	13.26	597.04	96.39	27.18	130.07	343.40
2027	774.50	0.00	0.00	0.00	38.26	0.00	812.77	43.57	13.21	553.07	94.76	24.90	126.32	307.08
2028	536.39	0.00	0.00	0.00	66.25	0.00	602.64	46.58	12.96	519.57	92.83	27.36	132.19	267.19
2029	352.31	0.00	0.00	0.00	88.77	0.00	441.08	48.79	27.13	681.72	96.67	31.37	117.52	436.17
2030	129.76	0.00	0.00	0.00	104.61	0.00	234.38	49.96	27.36	905.49	103.98	30.51	107.94	663.06
2031	40.95	0.00	0.00	0.00	0.00	0.00	40.95	50.17	27.26	937.52	103.67	31.20	113.36	689.29
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	30.24	905.44	101.98	30.84	114.38	658.24
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	26.04	869.78	100.34	30.83	112.00	626.61
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.99	842.34	98.72	31.49	114.00	598.13
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.82	810.73	97.14	31.70	114.73	567.16
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	50.17	25.44	776.93	95.57	31.65	115.81	533.89
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.17	25.52	742.78	94.01	31.82	117.69	499.26
2038	0.00	0.00	101.89	0.00	0.00	0.00	101.89	50.56	24.96	709.71	92.48	31.87	121.21	464.15
2039	0.00	0.00	131.00	0.00	9.48	0.00	140.49	51.16	27.74	698.26	91.10	31.21	138.58	437.37
2040	0.00	0.00	16.49	0.00	0.00	0.00	16.49	51.24	28.85	682.34	89.34	55.58	141.07	396.36
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.24	28.85	665.13	87.85	62.02	149.66	365.60
2042	0.00	0.00	81.26	0.00	0.00	0.00	81.26	51.64	31.81	651.59	86.42	63.95	163.64	337.59
2043	0.00	0.00	110.91	0.00	9.48	0.00	120.40	52.25	28.85	635.13	84.91	65.18	180.83	304.22
2044	0.00	0.00	98.85	0.00	0.00	0.00	98.85	52.74	32.92	619.81	83.43	100.52	177.19	258.68
2045	0.00	0.00	114.15	0.00	74.66	0.00	188.81	53.67	32.25	605.95	82.14	107.71	188.15	227.94
2046	0.00	0.00	16.99	0.00	0.00	0.00	16.99	53.76	36.33	623.97	81.78	106.65	198.30	237.24
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.11	579.38	79.53	142.76	205.21	151.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.11	603.10	81.15	119.04	197.22	205.69
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	41.07	603.10	81.15	119.04	197.22	205.69
2050	0.00	0.00	0.00	0.00	10.49	0.00	10.49	53.76	37.23	603.10	81.15	119.04	197.22	205.69
2051	0.00	0.00	0.00	0.00	10.55	0.00	10.55	53.76	36.35	603.10	81.15	119.04	197.22	205.69
2052	0.00	0.00	0.00	0.00	10.56	0.00	10.56	53.76	39.31	603.10	81.15	119.04	197.22	205.69
2053	0.00	0.00	0.00	0.00	0.45	0.00	0.45	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2054	0.00	0.00	0.00	0.00	14.64	0.00	14.64	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2055	0.00	0.00	0.00	0.00	19.42	0.00	19.42	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2056	0.00	0.00	0.00	0.00	20.99	0.00	20.99	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2057	0.00	0.00	0.00	0.00	17.12	0.00	17.12	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2058	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2059	0.00	0.00	0.00	0.00	0.89	0.00	0.89	53.76	55.15	603.10	81.15	119.04	197.22	205.69
2060	0.00	0.00	0.00	0.00	10.69	0.00	10.69	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2061	0.00	0.00	0.00	0.00	5.35	0.00	5.35	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2062	0.00	0.00	0.00	0.00	8.91	0.00	8.91	53.76	39.32	603.10	81.15	119.04	197.22	205.69
2063	0.00	0.00	0.00	0.00	15.15	0.00	15.15	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2064	0.00	0.00	0.00	0.00	21.39	0.00	21.39	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2065	0.00	0.00	0.00	0.00	26.37	0.00	26.37	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2066	0.00	0.00	0.00	0.00	0.55	0.00	0.55	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2067	0.00	0.00	0.00	0.00	17.18	0.00	17.18	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2068	0.00	0.00	79.61	0.00	8.61	0.00	88.22	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2069	0.00	0.00	108.72	0.00	1.13	0.00	109.86	53.76	55.15	603.10	81.15	119.04	197.22	205.69
2070	0.00	0.00	16.49	0.00	9.28	0.00	25.77	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2071	0.00	0.00	0.00	0.00	19.72	0.00	19.72	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2072	0.00	0.00	81.21	0.00	31.08	0.00	112.29	53.76	55.15	603.10	81.15	119.04	197.22	205.69
2073	0.00	0.00	110.91	0.00	2.73	0.00	113.64	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2074	0.00	0.00	98.85	0.00	12.20	0.00	111.05	53.76	53.96	603.10	81.15	119.04	197.22	205.69
2075	0.00	0.00	112.03	0.00	33.14	0.00	145.17	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2076	0.00	0.00	16.99	0.00	17.39	0.00	34.39	53.76	53.08	603.10	81.15	119.04	197.22	205.69
2077	0.00	0.00	0.00	0.00	29.35	0.00	29.35	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2078	0.00	0.00	0.00	0.00	60.58	0.00	60.58	53.76	52.19	603.10	81.15	119.04	197.22	205.69
2079	0.00	0.00	0.00	0.00	67.38	0.00	67.38	53.76	39.32	603.10	81.15	119.04	197.22	205.69
2080	0.00	0.00	0.00	0.00	134.77	0.00	134.77	53.76	53.96	603.10	81.15	119.04	197.22	205.69
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	56.92	603.10	81.15	119.04	197.22	205.69
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	38.13	603.10	81.15	119.04	197.22	205.69
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	53.96	603.10	81.15	119.04	197.22	205.69
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	36.36	603.10	81.15	119.04	197.22	205.69
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	39.32	603.10	81.15	119.04	197.22	205.69
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.76	36.36	603.10	81.15	119.04	197.22	205.69
Salvage Value	4.51	0.00	2.34	0.00	3.58	0.00	10.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2994.94	2437.90	132.14	0.00	333.71	0.00	5898.70	473.16	248.53	9420.60	1548.35	754.09	2275.97	4842.19

Net Present Value: -1778

SCGT/C26

TABLE 373
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	433.97	103.30	34.19	121.39	175.10
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	449.67	101.42	36.46	124.60	187.19
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	490.85	99.77	37.68	130.30	223.11
2018	217.91	0.00	0.37	0.00	0.00	0.00	218.28	3.36	0.00	467.79	96.90	41.08	136.13	193.68
2019	261.93	0.00	0.00	0.00	0.00	0.00	261.93	4.67	0.00	450.87	94.93	36.40	139.03	180.51
2020	268.21	0.00	95.05	0.00	0.00	0.00	363.27	6.37	0.00	481.47	94.96	28.90	145.36	212.25
2021	739.32	0.00	121.67	0.00	9.48	0.00	870.47	10.62	0.00	472.60	93.17	27.23	158.75	193.46
2022	1186.89	0.00	15.08	0.00	0.55	0.00	1202.51	16.63	4.07	460.12	90.91	50.61	164.38	154.23
2023	1065.64	0.00	0.00	0.00	1.09	0.00	1066.73	21.96	4.07	439.65	88.50	63.95	175.70	111.50
2024	760.98	0.00	0.00	0.00	2.19	0.00	763.17	25.78	4.07	434.52	87.32	69.62	183.57	94.00
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	28.44	4.07	388.53	87.84	43.19	164.60	92.89
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	30.18	18.69	495.66	91.86	32.86	130.98	239.96
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	30.82	18.91	709.91	99.82	30.41	118.56	461.13
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	31.02	18.61	746.21	99.83	33.29	130.12	482.97
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.83	712.99	98.08	34.31	132.41	448.19
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.65	684.39	96.87	33.84	127.67	426.01
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.60	656.01	94.85	36.86	133.39	390.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	18.36	611.12	92.92	39.25	133.76	345.20
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.92	581.45	90.96	46.10	139.32	305.07
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.92	566.98	89.37	53.21	148.34	276.06
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.02	17.96	553.17	88.04	59.19	154.25	251.69
2036	0.00	0.00	78.82	0.00	0.00	0.00	78.82	31.41	20.74	546.12	86.95	59.78	163.69	235.70
2037	0.00	0.00	107.69	0.00	9.48	0.00	117.17	32.00	17.78	530.66	85.42	60.85	181.11	203.28
2038	0.00	0.00	16.33	0.00	0.00	0.00	16.33	32.08	21.85	516.82	83.89	93.92	179.29	159.72
2039	0.00	0.00	80.00	0.00	0.00	0.00	80.00	32.48	21.85	503.85	82.61	102.00	195.79	123.45
2040	0.00	0.00	111.39	0.00	74.66	0.00	186.05	33.40	21.85	493.89	81.25	101.39	217.75	93.51
2041	0.00	0.00	97.38	0.00	0.00	0.00	97.38	33.89	25.94	475.75	79.56	143.14	217.29	35.76
2042	0.00	0.00	110.36	0.00	0.00	0.00	110.36	34.44	25.27	457.40	78.21	161.09	225.29	-7.19
2043	0.00	0.00	98.36	0.00	0.00	0.00	98.36	34.93	29.34	447.96	76.87	180.53	239.85	-49.28
2044	0.00	0.00	111.47	0.00	62.81	0.00	174.28	35.80	29.34	433.41	75.54	182.94	265.20	-90.27
2045	0.00	0.00	16.91	0.00	0.00	0.00	16.91	35.89	33.43	422.06	74.18	251.02	249.26	-152.40
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	36.39	408.61	73.00	276.98	256.96	-198.33
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.44	394.70	71.65	282.12	286.73	-245.80
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.45	408.46	72.94	270.04	264.32	-198.84
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.45	408.46	72.94	270.04	264.32	-198.84
2050	0.00	0.00	72.77	0.00	10.08	0.00	82.85	35.89	33.46	408.46	72.94	270.04	264.32	-198.84
2051	0.00	0.00	99.39	0.00	10.08	0.00	109.47	35.89	35.24	408.46	72.94	270.04	264.32	-198.84
2052	0.00	0.00	15.08	0.00	10.08	0.00	25.16	35.89	35.25	408.46	72.94	270.04	264.32	-198.84
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	408.46	72.94	270.04	264.32	-198.84
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	408.46	72.94	270.04	264.32	-198.84
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	408.46	72.94	270.04	264.32	-198.84
2056	0.00	0.00	0.00	0.00	9.48	0.00	9.48	35.89	36.43	408.46	72.94	270.04	264.32	-198.84
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2066	0.00	0.00	78.82	0.00	0.00	0.00	78.82	35.89	36.43	408.46	72.94	270.04	264.32	-198.84
2067	0.00	0.00	107.64	0.00	0.00	0.00	107.64	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2068	0.00	0.00	16.33	0.00	0.00	0.00	16.33	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2069	0.00	0.00	80.00	0.00	0.00	0.00	80.00	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2070	0.00	0.00	109.27	0.00	0.00	0.00	109.27	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2071	0.00	0.00	97.38	0.00	0.00	0.00	97.38	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2072	0.00	0.00	110.36	0.00	10.03	0.00	120.39	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2073	0.00	0.00	98.36	0.00	1.09	0.00	99.45	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2074	0.00	0.00	111.47	0.00	2.19	0.00	113.66	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2075	0.00	0.00	16.91	0.00	60.92	0.00	77.83	35.89	49.30	408.46	72.94	270.04	264.32	-198.84
2076	0.00	0.00	0.00	0.00	2.19	0.00	2.19	35.89	36.43	408.46	72.94	270.04	264.32	-198.84
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	51.08	408.46	72.94	270.04	264.32	-198.84
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	35.25	408.46	72.94	270.04	264.32	-198.84
2079	0.00	0.00	0.00	0.00	47.12	0.00	47.12	35.89	51.08	408.46	72.94	270.04	264.32	-198.84
2080	0.00	0.00	72.77	0.00	0.00	0.00	72.77	35.89	35.25	408.46	72.94	270.04	264.32	-198.84
2081	0.00	0.00	99.39	0.00	0.00	0.00	99.39	35.89	51.08	408.46	72.94	270.04	264.32	-198.84
2082	0.00	0.00	15.08	0.00	0.00	0.00	15.08	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	36.43	408.46	72.94	270.04	264.32	-198.84
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
2090	0.00	0.00	0.00	0.00	18.67	0.00	18.67	35.89	33.47	408.46	72.94	270.04	264.32	-198.84
Salvage Value	1.77	0.00	3.88	0.00	1.11	0.00	6.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	352.93	0.00	81.43	0.00	4047.37	320.68	196.32	7934.15	1485.54	1279.56	2658.78	2510.26

Net Present Value: -2054

CCGT/C26

TABLE 374
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	433.97	103.30	34.19	121.39	175.10
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	449.67	101.42	36.46	124.60	187.19
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	490.85	99.77	37.68	130.30	223.11
2018	217.91	0.00	0.37	0.00	0.00	0.00	218.28	3.36	0.00	467.79	96.90	41.08	136.13	193.68
2019	261.93	0.00	149.27	0.00	0.00	0.00	411.20	5.42	0.00	450.87	94.93	36.40	139.03	180.51
2020	268.21	0.00	237.92	0.00	0.00	0.00	506.14	7.84	0.00	481.47	94.96	28.90	145.36	212.25
2021	739.32	0.00	118.86	0.00	9.48	0.00	867.67	12.06	0.00	483.05	93.95	24.02	155.87	209.21
2022	1186.89	0.00	7.10	0.00	0.55	0.00	1194.54	18.03	7.06	506.34	91.44	98.81	131.89	184.20
2023	1065.64	0.00	0.00	0.00	1.09	0.00	1066.73	23.37	7.06	497.79	89.35	113.83	140.45	154.15
2024	760.98	0.00	0.00	0.00	2.19	0.00	763.17	27.18	7.06	498.24	88.35	121.16	145.34	143.40
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	29.84	7.06	451.14	88.03	102.34	136.31	124.45
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	31.59	21.68	545.80	91.79	87.76	113.07	253.19
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	32.22	21.90	754.22	99.80	77.00	103.81	473.62
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	32.42	21.60	792.48	99.98	79.05	113.25	500.20
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.82	763.20	98.22	86.66	112.56	465.76
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.65	722.67	96.05	94.30	112.36	419.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.60	734.37	96.02	89.87	108.64	439.85
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	21.35	677.71	93.09	101.47	112.89	370.26
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.91	649.87	91.42	107.65	113.44	337.37
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.91	625.38	89.37	118.61	120.61	296.79
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	20.95	611.51	87.88	127.48	125.92	270.23
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.42	23.74	594.13	86.22	139.83	133.08	235.00
2037	0.00	0.00	79.21	0.00	0.00	0.00	79.21	32.82	20.78	591.95	85.47	144.19	136.32	225.97
2038	0.00	0.00	108.23	0.00	9.48	0.00	117.71	33.41	20.78	583.87	84.26	146.88	148.78	203.93
2039	0.00	0.00	16.41	0.00	0.00	0.00	16.41	33.49	24.85	567.54	82.46	176.31	160.95	147.82
2040	0.00	0.00	80.40	0.00	0.00	0.00	80.40	33.89	24.85	553.06	81.01	188.56	171.05	112.43
2041	0.00	0.00	111.94	0.00	74.66	0.00	186.60	34.82	24.85	538.74	79.67	196.76	183.80	78.51
2042	0.00	0.00	97.87	0.00	0.00	0.00	97.87	35.30	28.26	528.90	78.31	213.90	197.61	39.08
2043	0.00	0.00	110.91	0.00	0.00	0.00	110.91	35.86	28.26	509.33	76.88	242.19	198.36	-8.11
2044	0.00	0.00	16.83	0.00	0.00	0.00	16.83	35.94	32.33	495.41	75.54	267.30	206.98	-54.41
2045	0.00	0.00	82.43	0.00	0.00	0.00	82.43	36.36	32.33	479.85	74.20	275.46	226.38	-96.19
2046	0.00	0.00	112.59	0.00	62.81	0.00	175.40	37.23	35.30	471.72	73.28	274.59	244.47	-120.62
2047	0.00	0.00	17.08	0.00	0.00	0.00	17.08	37.32	36.43	446.46	71.67	329.51	238.54	-193.27
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.43	466.01	73.05	293.19	236.47	-136.70
2049	0.00	0.00	149.27	0.00	10.08	0.00	159.35	37.32	36.44	466.01	73.05	293.19	236.47	-136.70
2050	0.00	0.00	215.64	0.00	10.08	0.00	225.72	37.32	36.44	466.01	73.05	293.19	236.47	-136.70
2051	0.00	0.00	96.58	0.00	10.08	0.00	106.66	37.32	38.22	466.01	73.05	293.19	236.47	-136.70
2052	0.00	0.00	7.10	0.00	10.08	0.00	17.18	37.32	38.23	466.01	73.05	293.19	236.47	-136.70
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.23	466.01	73.05	293.19	236.47	-136.70
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	466.01	73.05	293.19	236.47	-136.70
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	466.01	73.05	293.19	236.47	-136.70
2056	0.00	0.00	0.00	0.00	9.48	0.00	9.48	37.32	39.42	466.01	73.05	293.19	236.47	-136.70
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	39.42	466.01	73.05	293.19	236.47	-136.70
2067	0.00	0.00	79.21	0.00	0.00	0.00	79.21	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2068	0.00	0.00	108.18	0.00	0.00	0.00	108.18	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2069	0.00	0.00	16.41	0.00	0.00	0.00	16.41	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2070	0.00	0.00	80.40	0.00	0.00	0.00	80.40	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2071	0.00	0.00	109.81	0.00	0.00	0.00	109.81	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2072	0.00	0.00	97.87	0.00	0.55	0.00	98.42	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2073	0.00	0.00	110.91	0.00	10.58	0.00	121.49	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2074	0.00	0.00	16.83	0.00	2.19	0.00	19.01	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2075	0.00	0.00	82.43	0.00	4.93	0.00	87.36	37.32	52.29	466.01	73.05	293.19	236.47	-136.70
2076	0.00	0.00	112.59	0.00	58.19	0.00	170.77	37.32	39.42	466.01	73.05	293.19	236.47	-136.70
2077	0.00	0.00	17.08	0.00	0.00	0.00	17.08	37.32	54.07	466.01	73.05	293.19	236.47	-136.70
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	38.24	466.01	73.05	293.19	236.47	-136.70
2079	0.00	0.00	149.27	0.00	0.00	0.00	149.27	37.32	54.07	466.01	73.05	293.19	236.47	-136.70
2080	0.00	0.00	215.64	0.00	0.00	0.00	215.64	37.32	38.24	466.01	73.05	293.19	236.47	-136.70
2081	0.00	0.00	96.58	0.00	47.11	0.00	143.69	37.32	54.07	466.01	73.05	293.19	236.47	-136.70
2082	0.00	0.00	7.10	0.00	0.00	0.00	7.10	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	39.42	466.01	73.05	293.19	236.47	-136.70
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.32	36.46	466.01	73.05	293.19	236.47	-136.70
Salvage Value	1.77	0.00	6.15	0.00	1.00	0.00	8.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	573.48	0.00	79.06	0.00	4265.54	335.86	222.15	8499.33	1487.92	1769.09	2380.58	2861.75

Net Present Value: -1962

Wind/C26

TABLE 375
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.75	64.32	0.00	0.00	10.08	0.00	106.15	0.53	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.61	0.00	0.00	0.00	10.08	0.00	50.69	0.78	0.00	433.97	103.30	34.19	121.40	175.09
2016	89.75	0.00	0.00	0.00	10.08	0.00	99.83	1.28	0.00	449.67	101.42	36.46	124.62	187.17
2017	187.30	0.00	0.00	0.00	10.08	0.00	197.38	2.27	0.00	490.86	99.77	37.68	130.29	223.13
2018	217.91	0.00	0.00	0.00	0.00	0.00	217.91	3.36	0.00	467.79	96.90	41.08	136.12	193.70
2019	261.93	0.00	0.00	0.00	0.00	0.00	261.93	4.67	0.00	450.87	94.93	36.40	139.04	180.50
2020	268.21	0.00	0.00	9.79	13.83	0.00	291.83	6.13	0.00	476.30	94.52	30.96	146.70	204.11
2021	739.32	0.00	0.00	298.83	23.04	0.00	1061.19	11.43	0.00	467.62	92.73	29.90	159.83	185.17
2022	1186.89	0.00	0.00	304.42	28.20	0.00	1519.51	19.03	6.34	477.26	91.07	29.82	162.19	194.17
2023	1065.64	0.00	0.00	294.63	14.92	0.00	1375.19	25.91	12.69	474.19	88.55	34.03	168.06	183.55
2024	760.98	0.00	0.00	5.59	6.80	0.00	773.37	29.77	19.03	478.61	86.62	34.78	174.70	182.50
2025	527.03	0.00	0.00	0.00	4.93	0.00	531.95	32.43	19.03	427.18	86.53	22.86	183.09	134.69
2026	346.16	0.00	0.00	0.00	2.19	0.00	348.35	34.18	33.65	572.96	90.60	27.16	130.08	325.12
2027	127.50	0.00	0.00	0.00	0.00	0.00	127.50	34.81	33.87	788.02	98.53	24.53	116.00	548.96
2028	40.23	0.00	0.00	0.00	0.00	0.00	40.23	35.02	33.57	816.47	98.33	26.74	126.36	565.03
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.79	785.18	96.65	27.14	128.88	532.51
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.62	763.72	95.57	26.50	125.98	515.66
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	33.57	747.29	94.11	27.45	128.75	496.98
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	35.02	33.32	712.80	92.69	27.37	127.53	465.20
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.02	32.88	670.89	91.16	27.25	124.22	428.26
2034	0.00	0.00	100.31	0.00	0.00	0.00	100.31	35.41	32.88	637.72	89.68	27.42	126.10	394.53
2035	0.00	0.00	128.86	0.00	9.48	0.00	138.34	35.99	32.92	626.12	88.65	25.37	131.96	380.14
2036	0.00	0.00	94.98	0.00	0.00	0.00	94.98	36.46	39.78	601.65	86.52	47.18	138.73	329.22
2037	0.00	0.00	107.69	0.00	9.48	0.00	117.17	37.05	36.82	584.48	85.03	53.26	148.36	297.83
2038	0.00	0.00	16.33	0.00	0.00	0.00	16.33	37.13	40.89	575.79	83.74	69.24	155.05	267.75
2039	0.00	0.00	80.00	0.00	0.00	0.00	80.00	37.53	40.89	566.86	82.55	68.24	176.72	239.35
2040	0.00	0.00	111.39	9.79	74.66	0.00	195.84	38.50	40.89	544.76	80.83	88.03	182.95	192.95
2041	0.00	0.00	97.38	298.83	0.00	0.00	396.21	40.48	44.97	531.85	79.40	107.77	192.50	152.18
2042	0.00	0.00	110.36	304.42	0.00	0.00	414.78	42.55	44.30	516.53	78.09	112.74	207.31	118.39
2043	0.00	0.00	98.36	294.63	0.00	0.00	392.99	44.52	48.37	506.52	76.76	125.99	224.66	79.11
2044	0.00	0.00	111.47	5.59	62.81	0.00	179.87	45.42	48.37	484.60	75.37	158.67	222.28	28.28
2045	0.00	0.00	16.91	0.00	0.00	0.00	16.91	45.50	52.46	471.85	74.08	185.20	231.21	-18.64
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	55.43	456.24	72.79	189.02	253.88	-59.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.47	442.07	71.52	191.91	281.29	-102.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.48	456.72	72.80	188.71	255.46	-60.25
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.49	456.72	72.80	188.71	255.46	-60.25
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.49	456.72	72.80	188.71	255.46	-60.25
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	54.27	456.72	72.80	188.71	255.46	-60.25
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	54.28	456.72	72.80	188.71	255.46	-60.25
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	456.72	72.80	188.71	255.46	-60.25
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	456.72	72.80	188.71	255.46	-60.25
2055	0.00	0.00	0.00	0.00	3.46	0.00	3.46	45.50	54.28	456.72	72.80	188.71	255.46	-60.25
2056	0.00	0.00	0.00	0.00	5.76	0.00	5.76	45.50	55.46	456.72	72.80	188.71	255.46	-60.25
2057	0.00	0.00	0.00	0.00	6.91	0.00	6.91	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2058	0.00	0.00	0.00	0.00	3.46	0.00	3.46	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2059	0.00	0.00	0.00	0.00	1.15	0.00	1.15	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2060	0.00	0.00	0.00	9.79	0.00	0.00	9.79	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2061	0.00	0.00	0.00	298.83	0.00	0.00	298.83	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2062	0.00	0.00	0.00	304.42	0.00	0.00	304.42	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2063	0.00	0.00	0.00	294.63	0.00	0.00	294.63	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2064	0.00	0.00	78.03	5.59	0.00	0.00	83.63	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2065	0.00	0.00	106.58	0.00	0.00	0.00	106.58	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2066	0.00	0.00	94.98	0.00	0.00	0.00	94.98	45.50	55.46	456.72	72.80	188.71	255.46	-60.25
2067	0.00	0.00	107.64	0.00	0.00	0.00	107.64	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2068	0.00	0.00	16.33	0.00	0.00	0.00	16.33	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2069	0.00	0.00	80.00	0.00	0.00	0.00	80.00	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2070	0.00	0.00	109.27	0.00	19.85	0.00	129.12	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2071	0.00	0.00	97.38	0.00	17.28	0.00	114.67	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2072	0.00	0.00	110.36	0.00	30.77	0.00	141.13	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2073	0.00	0.00	98.36	0.00	11.46	0.00	109.82	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2074	0.00	0.00	111.47	0.00	5.65	0.00	117.12	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2075	0.00	0.00	16.91	0.00	60.92	0.00	77.83	45.50	68.33	456.72	72.80	188.71	255.46	-60.25
2076	0.00	0.00	0.00	0.00	2.19	0.00	2.19	45.50	55.46	456.72	72.80	188.71	255.46	-60.25
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	70.11	456.72	72.80	188.71	255.46	-60.25
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	54.28	456.72	72.80	188.71	255.46	-60.25
2079	0.00	0.00	0.00	0.00	47.11	0.00	47.11	45.50	70.11	456.72	72.80	188.71	255.46	-60.25
2080	0.00	0.00	0.00	9.79	0.00	0.00	9.79	45.50	54.28	456.72	72.80	188.71	255.46	-60.25
2081	0.00	0.00	0.00	298.83	0.00	0.00	298.83	45.50	70.11	456.72	72.80	188.71	255.46	-60.25
2082	0.00	0.00	0.00	304.42	0.00	0.00	304.42	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2083	0.00	0.00	0.00	294.63	0.00	0.00	294.63	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2084	0.00	0.00	0.00	5.59	10.08	0.00	15.67	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	55.46	456.72	72.80	188.71	255.46	-60.25
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
2090	0.00	0.00	0.00	0.00	18.67	0.00	18.67	45.50	52.50	456.72	72.80	188.71	255.46	-60.25
Salvage Value	1.77	0.00	3.00	4.87	1.51	0.00	11.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3548.68	64.32	254.81	762.36	131.44	0.00	4761.62	375.93	347.44	8493.76	1480.50	956.20	2567.65	3489.40

Net Present Value -1996

K19/C25/750MW (WPS Sale &Inv)

TABLE 376
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	4.96	320.64	1.60	0.00	372.48	105.26	29.92	116.00	121.30
2015	90.00	558.63	0.00	0.00	22.21	8.93	679.78	5.00	0.00	422.64	103.32	34.19	121.56	163.57
2016	203.55	742.67	0.00	0.00	31.55	23.00	1000.77	10.01	0.00	438.30	101.44	36.51	124.90	175.45
2017	240.87	900.50	0.00	0.00	47.62	33.55	1222.53	16.12	0.00	472.25	99.40	39.11	132.09	201.64
2018	289.99	641.80	0.00	0.00	53.35	135.56	1120.71	21.72	0.00	454.72	97.24	40.04	135.38	182.06
2019	297.44	450.39	0.00	0.00	67.54	113.27	928.64	26.37	13.29	490.73	97.18	37.40	136.13	220.03
2020	821.32	186.45	0.00	0.00	4.34	202.72	1214.83	32.44	45.83	772.96	104.59	29.28	155.79	483.29
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	39.63	43.92	845.21	105.23	31.93	171.84	536.22
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	45.71	42.55	847.94	104.05	31.94	176.89	535.06
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	50.19	40.67	807.81	101.69	31.53	182.48	492.11
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	53.54	39.07	780.44	99.39	34.80	192.31	453.94
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	56.02	52.00	873.87	104.07	30.73	143.71	595.36
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	57.36	50.42	1142.16	112.42	30.62	144.77	854.35
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	57.59	48.96	1188.55	112.33	29.96	159.44	886.82
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	47.93	1172.41	110.64	30.95	163.21	867.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	49.25	1142.70	108.69	31.02	167.70	835.29
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	43.96	1121.55	107.33	30.44	165.72	818.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	42.61	1108.57	105.65	31.07	171.12	800.73
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	41.09	1072.04	103.96	31.19	170.18	766.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	40.06	1036.89	102.14	31.24	173.11	730.40
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	39.10	1004.51	100.39	31.52	177.39	695.21
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	40.40	970.46	98.68	31.28	169.24	671.26
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	36.88	908.95	97.04	31.88	143.22	636.80
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	57.59	36.35	868.34	95.39	32.05	143.17	597.72
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.59	35.83	833.30	93.71	32.03	148.54	559.02
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	58.16	38.28	801.36	92.06	31.99	161.73	515.58
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	59.01	34.83	820.22	90.75	30.50	178.54	520.43
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	59.13	37.76	798.55	88.69	55.27	181.70	472.90
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	59.71	37.30	781.59	87.10	61.53	194.06	438.91
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	60.57	36.85	769.46	85.69	64.71	209.31	409.75
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	61.29	42.27	766.10	84.44	74.75	223.68	383.23
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.59	44.81	734.74	82.55	96.76	229.50	325.93
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.71	45.53	717.57	81.06	117.38	238.69	280.44
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	44.25	701.64	79.76	122.80	254.47	244.61
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	42.98	717.98	81.12	112.31	240.89	283.66
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	62.71	45.58	717.98	81.12	112.31	240.89	283.66
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	62.71	44.04	717.98	81.12	112.31	240.89	283.66
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	62.71	43.70	717.98	81.12	112.31	240.89	283.66
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	62.71	43.38	717.98	81.12	112.31	240.89	283.66
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	62.71	43.06	717.98	81.12	112.31	240.89	283.66
2054	0.00	0.00	0.00	0.00	23.52	24.86	48.38	62.71	42.75	717.98	81.12	112.31	240.89	283.66
2055	0.00	0.00	0.00	0.00	1.07	25.78	26.85	62.71	43.63	717.98	81.12	112.31	240.89	283.66
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.71	56.21	717.98	81.12	112.31	240.89	283.66
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	62.71	40.10	717.98	81.12	112.31	240.89	283.66
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.71	55.66	717.98	81.12	112.31	240.89	283.66
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	62.71	42.53	717.98	81.12	112.31	240.89	283.66
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	62.71	52.37	717.98	81.12	112.31	240.89	283.66
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	68.20	717.98	81.12	112.31	240.89	283.66
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	62.71	68.20	717.98	81.12	112.31	240.89	283.66
2065	0.00	0.00	0.00	0.00	11.58	5.61	17.20	62.71	39.50	717.98	81.12	112.31	240.89	283.66
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	62.71	68.20	717.98	81.12	112.31	240.89	283.66
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	62.71	68.20	717.98	81.12	112.31	240.89	283.66
2069	0.00	0.00	114.57	0.00	44.02	75.78	234.37	62.71	39.50	717.98	81.12	112.31	240.89	283.66
2070	0.00	0.00	156.79	0.00	3.27	78.59	238.65	62.71	54.15	717.98	81.12	112.31	240.89	283.66
2071	0.00	0.00	23.83	0.00	39.94	0.00	63.77	62.71	38.32	717.98	81.12	112.31	240.89	283.66
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	62.71	54.15	717.98	81.12	112.31	240.89	283.66
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	62.71	37.43	717.98	81.12	112.31	240.89	283.66
2074	0.00	0.00	142.97	0.00	62.80	0.00	205.78	62.71	52.37	717.98	81.12	112.31	240.89	283.66
2075	0.00	0.00	162.36	0.00	93.85	0.00	256.21	62.71	39.50	717.98	81.12	112.31	240.89	283.66
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	62.71	54.15	717.98	81.12	112.31	240.89	283.66
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	38.32	717.98	81.12	112.31	240.89	283.66
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	62.71	54.15	717.98	81.12	112.31	240.89	283.66
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	41.28	717.98	81.12	112.31	240.89	283.66
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	62.71	54.15	717.98	81.12	112.31	240.89	283.66
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	62.71	39.50	717.98	81.12	112.31	240.89	283.66
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	62.71	36.54	717.98	81.12	112.31	240.89	283.66
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	62.71	39.50	717.98	81.12	112.31	240.89	283.66
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	62.71	39.50	717.98	81.12	112.31	240.89	283.66
Salvage Value	0.97	0.00	3.46	0.00	4.67	2.32	11.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	181.29	0.00	486.59	403.67	8397.11	673.97	494.22	12176.07	1610.50	731.81	2682.71	7151.05

Net Present Value -2414

K19/C25/750MW

TABLE 377
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	6.80	322.48	1.61	0.00	378.60	105.26	29.90	115.53	127.90
2015	90.00	558.63	0.00	0.00	22.21	11.15	681.99	5.02	0.00	431.52	103.31	34.17	121.47	172.56
2016	203.55	742.67	0.00	0.00	31.55	23.95	1001.73	10.03	0.00	447.06	101.43	36.47	124.70	184.46
2017	240.87	900.50	0.00	0.00	47.62	33.55	1222.53	16.14	0.00	482.54	99.40	39.13	131.87	212.14
2018	289.99	641.80	0.00	0.00	53.35	187.94	1173.09	22.01	0.00	465.16	97.23	39.93	135.22	192.78
2019	297.44	450.39	0.00	0.00	67.54	132.21	947.59	26.75	13.29	500.55	97.17	37.38	135.87	230.13
2020	821.32	186.45	0.00	0.00	4.34	350.24	1362.36	33.56	49.02	796.69	104.58	29.25	154.33	508.53
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	40.75	47.22	862.68	105.23	32.12	170.89	554.43
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	46.83	45.88	864.48	104.05	31.94	175.79	552.71
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	51.31	43.85	825.36	101.68	31.53	181.18	510.98
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	54.66	42.12	798.19	99.38	34.87	191.10	472.83
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	57.14	54.92	892.67	104.06	30.78	141.22	616.61
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	58.48	53.22	1154.32	112.43	30.77	138.69	872.43
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	58.71	51.65	1189.61	112.35	29.73	144.80	902.73
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	50.50	1175.01	110.65	30.92	147.73	885.71
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	51.71	1148.49	108.69	30.99	152.53	856.28
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	46.31	1131.11	107.33	30.44	151.39	841.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	44.86	1123.48	105.64	31.20	156.89	829.74
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	43.24	1091.22	103.96	31.26	156.62	799.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	42.11	1059.48	102.16	31.17	159.14	767.01
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	41.06	1031.79	100.41	31.36	163.98	736.03
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	42.27	960.69	98.76	31.59	137.42	692.93
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	38.67	922.75	97.05	31.93	137.66	656.11
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	58.71	38.06	889.80	95.37	31.97	141.57	620.90
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.71	37.47	855.76	93.71	31.97	146.49	583.59
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	59.28	39.86	824.59	92.06	32.05	159.43	541.04
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	60.13	36.34	822.88	90.74	30.51	175.90	525.72
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	60.25	39.20	796.42	88.69	55.27	179.24	473.22
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	60.83	38.68	780.10	87.10	61.53	192.07	439.40
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	61.69	38.18	768.18	85.69	64.71	207.54	410.24
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	62.41	43.53	765.22	84.44	74.75	222.12	383.91
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	63.71	46.02	733.73	82.55	96.76	228.07	326.35
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	63.83	46.69	716.54	81.06	117.38	237.24	280.87
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	45.35	700.28	79.76	122.80	252.78	244.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	44.04	716.85	81.12	112.31	239.36	284.05
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	63.83	46.58	716.85	81.12	112.31	239.36	284.05
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	63.83	45.00	716.85	81.12	112.31	239.36	284.05
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	63.83	44.62	716.85	81.12	112.31	239.36	284.05
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	63.83	44.24	716.85	81.12	112.31	239.36	284.05
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	63.83	43.89	716.85	81.12	112.31	239.36	284.05
2054	0.00	0.00	0.00	0.00	23.52	24.86	48.38	63.83	43.53	716.85	81.12	112.31	239.36	284.05
2055	0.00	0.00	0.00	0.00	1.07	25.78	26.85	63.83	44.38	716.85	81.12	112.31	239.36	284.05
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	63.83	56.92	716.85	81.12	112.31	239.36	284.05
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	63.83	40.77	716.85	81.12	112.31	239.36	284.05
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	63.83	56.29	716.85	81.12	112.31	239.36	284.05
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	63.83	43.13	716.85	81.12	112.31	239.36	284.05
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	63.83	52.37	716.85	81.12	112.31	239.36	284.05
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	68.20	716.85	81.12	112.31	239.36	284.05
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	63.83	68.20	716.85	81.12	112.31	239.36	284.05
2065	0.00	0.00	0.00	0.00	11.58	5.61	17.20	63.83	39.50	716.85	81.12	112.31	239.36	284.05
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	63.83	68.20	716.85	81.12	112.31	239.36	284.05
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	63.83	68.20	716.85	81.12	112.31	239.36	284.05
2069	0.00	0.00	114.57	0.00	44.02	75.78	234.37	63.83	39.50	716.85	81.12	112.31	239.36	284.05
2070	0.00	0.00	156.79	0.00	3.27	78.59	238.65	63.83	54.15	716.85	81.12	112.31	239.36	284.05
2071	0.00	0.00	23.83	0.00	39.94	0.00	63.77	63.83	38.32	716.85	81.12	112.31	239.36	284.05
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	63.83	54.15	716.85	81.12	112.31	239.36	284.05
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	63.83	37.43	716.85	81.12	112.31	239.36	284.05
2074	0.00	0.00	142.97	0.00	62.80	0.00	205.78	63.83	52.37	716.85	81.12	112.31	239.36	284.05
2075	0.00	0.00	162.36	0.00	93.85	0.00	256.21	63.83	39.50	716.85	81.12	112.31	239.36	284.05
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	63.83	54.15	716.85	81.12	112.31	239.36	284.05
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	38.32	716.85	81.12	112.31	239.36	284.05
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	63.83	54.15	716.85	81.12	112.31	239.36	284.05
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	41.28	716.85	81.12	112.31	239.36	284.05
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	63.83	54.15	716.85	81.12	112.31	239.36	284.05
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	63.83	39.50	716.85	81.12	112.31	239.36	284.05
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	63.83	36.54	716.85	81.12	112.31	239.36	284.05
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	63.83	39.50	716.85	81.12	112.31	239.36	284.05
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	63.83	39.50	716.85	81.12	112.31	239.36	284.05
Salvage Value	0.97	0.00	3.46	0.00	4.67	2.32	11.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	181.29	0.00	486.59	564.08	8557.52	686.96	518.00	12339.92	1610.49	731.84	2616.12	7381.47

Net Present Value -2381

K19/Gas25/750MW (WPS Sale & INV)

TABLE 378
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	4.96	288.02	1.44	0.00	372.48	105.26	29.92	116.00	121.30
2015	0.00	558.63	0.00	0.00	22.21	8.93	589.77	4.39	0.00	422.65	103.33	34.17	121.54	163.61
2016	0.00	742.67	0.00	0.00	31.55	23.00	797.22	8.38	0.00	438.22	101.44	36.49	124.81	175.49
2017	0.00	900.50	0.00	0.00	47.62	33.55	981.66	13.28	0.00	472.66	99.40	39.09	132.03	202.14
2018	0.00	641.80	0.00	0.00	53.35	135.56	830.72	17.44	0.00	455.44	97.24	39.96	135.31	182.94
2019	0.00	450.39	0.00	0.00	63.21	113.27	626.87	20.57	13.29	491.94	97.18	37.38	136.04	221.35
2020	0.00	186.45	0.00	0.00	0.01	202.72	389.18	22.52	45.83	774.88	104.58	29.25	155.60	485.45
2021	0.00	64.80	0.37	0.00	0.00	0.00	65.17	22.84	43.92	848.69	105.23	31.91	171.63	539.92
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	22.84	42.55	851.70	104.05	31.86	176.57	539.22
2023	0.00	0.00	124.75	0.00	0.00	0.00	124.75	23.35	40.67	808.10	101.14	33.63	182.23	491.09
2024	0.00	0.00	265.70	0.00	12.34	0.00	278.04	24.63	39.07	785.31	99.03	36.73	190.87	458.67
2025	0.00	0.00	164.65	0.00	97.19	0.00	261.84	25.93	41.46	741.25	98.76	35.72	166.34	440.43
2026	0.00	0.00	126.10	0.00	0.00	0.00	126.10	26.56	43.74	747.53	97.41	42.83	179.34	427.94
2027	0.00	0.00	143.20	0.00	0.00	0.00	143.20	27.28	42.42	723.61	95.38	42.08	194.12	392.03
2028	0.00	0.00	21.77	0.00	0.00	0.00	21.77	27.39	45.24	700.13	92.99	64.01	202.00	341.13
2029	0.00	0.00	106.85	0.00	0.00	0.00	106.85	27.92	46.73	678.50	91.14	71.11	213.23	303.02
2030	0.00	0.00	146.23	0.00	81.76	0.00	227.99	29.06	41.50	673.65	90.03	78.05	220.45	285.12
2031	0.00	0.00	130.58	0.00	0.00	0.00	130.58	29.71	44.41	687.72	89.66	85.75	225.49	286.81
2032	0.00	0.00	148.28	0.00	0.00	0.00	148.28	30.45	43.28	656.60	87.20	103.75	238.92	226.72
2033	0.00	0.00	22.54	0.00	0.00	0.00	22.54	30.57	46.25	643.52	85.63	124.36	248.87	184.66
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	45.18	638.67	84.88	132.38	255.03	166.37
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	43.70	562.50	82.69	125.64	245.95	108.21
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	43.15	490.59	81.21	126.55	212.34	70.50
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	42.62	461.33	79.76	138.56	215.76	27.26
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.57	42.10	457.77	79.00	137.36	230.51	10.90
2039	0.00	0.00	240.03	0.00	0.00	0.00	240.03	31.77	44.56	424.12	77.01	168.34	240.89	-62.11
2040	0.00	0.00	347.45	0.00	0.00	0.00	347.45	33.50	41.11	417.94	75.64	187.09	250.81	-95.60
2041	0.00	0.00	155.93	0.00	12.34	0.00	168.27	34.35	40.64	438.62	75.94	186.76	249.60	-73.68
2042	0.00	0.00	11.49	0.00	0.00	0.00	11.49	34.40	47.24	505.45	73.60	299.93	242.31	-110.40
2043	0.00	0.00	117.81	0.00	0.00	0.00	117.81	34.99	46.80	474.29	71.82	323.28	256.00	-176.80
2044	0.00	0.00	161.23	0.00	81.76	0.00	242.99	36.21	48.14	444.28	70.15	348.22	268.38	-242.47
2045	0.00	0.00	77.06	0.00	0.00	0.00	77.06	36.59	51.81	428.55	68.82	381.50	278.30	-300.07
2046	0.00	0.00	71.92	0.00	0.00	0.00	71.92	36.95	51.40	410.21	67.57	408.57	288.93	-354.86
2047	0.00	0.00	10.93	0.00	0.00	0.00	10.93	37.01	51.60	401.88	66.77	425.25	301.41	-391.54
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	50.33	413.55	67.72	405.11	289.55	-348.82
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	37.01	52.93	413.55	67.72	405.11	289.55	-348.82
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	37.01	49.62	413.55	67.72	405.11	289.55	-348.82
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	37.01	49.28	413.55	67.72	405.11	289.55	-348.82
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	37.01	48.95	413.55	67.72	405.11	289.55	-348.82
2053	0.00	0.00	102.47	0.00	27.52	24.86	154.86	37.01	48.63	413.55	67.72	405.11	289.55	-348.82
2054	0.00	0.00	243.42	0.00	22.45	24.86	290.74	37.01	48.32	413.55	67.72	405.11	289.55	-348.82
2055	0.00	0.00	162.53	0.00	0.00	25.78	188.31	37.01	48.02	413.55	67.72	405.11	289.55	-348.82
2056	0.00	0.00	126.10	0.00	0.00	0.00	126.10	37.01	63.56	413.55	67.72	405.11	289.55	-348.82
2057	0.00	0.00	143.20	0.00	0.00	0.00	143.20	37.01	47.45	413.55	67.72	405.11	289.55	-348.82
2058	0.00	0.00	21.77	0.00	0.00	0.00	21.77	37.01	63.01	413.55	67.72	405.11	289.55	-348.82
2059	0.00	0.00	106.85	0.00	12.34	0.00	119.19	37.01	49.87	413.55	67.72	405.11	289.55	-348.82
2060	0.00	0.00	146.23	0.00	72.89	0.00	219.12	37.01	59.72	413.55	67.72	405.11	289.55	-348.82
2061	0.00	0.00	130.58	0.00	0.00	0.00	130.58	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2062	0.00	0.00	148.28	0.00	0.00	0.00	148.28	37.01	59.72	413.55	67.72	405.11	289.55	-348.82
2063	0.00	0.00	22.54	0.00	0.00	0.00	22.54	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2064	0.00	0.00	0.00	0.00	13.95	2.81	16.76	37.01	59.72	413.55	67.72	405.11	289.55	-348.82
2065	0.00	0.00	0.00	0.00	72.90	5.61	78.52	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2066	0.00	0.00	0.00	0.00	1.39	16.84	18.23	37.01	59.72	413.55	67.72	405.11	289.55	-348.82
2067	0.00	0.00	0.00	0.00	12.08	25.26	37.34	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	37.01	59.72	413.55	67.72	405.11	289.55	-348.82
2069	0.00	0.00	240.03	0.00	40.76	75.78	356.56	37.01	46.85	413.55	67.72	405.11	289.55	-348.82
2070	0.00	0.00	347.45	0.00	0.01	78.59	426.05	37.01	45.66	413.55	67.72	405.11	289.55	-348.82
2071	0.00	0.00	155.93	0.00	0.00	0.00	155.93	37.01	45.66	413.55	67.72	405.11	289.55	-348.82
2072	0.00	0.00	11.49	0.00	0.00	0.00	11.49	37.01	45.66	413.55	67.72	405.11	289.55	-348.82
2073	0.00	0.00	117.81	0.00	0.00	0.00	117.81	37.01	44.77	413.55	67.72	405.11	289.55	-348.82
2074	0.00	0.00	161.23	0.00	0.00	0.00	161.23	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2075	0.00	0.00	77.06	0.00	24.30	0.00	101.36	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2076	0.00	0.00	71.92	0.00	12.34	0.00	84.26	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2077	0.00	0.00	10.93	0.00	0.00	0.00	10.93	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	37.01	46.85	413.55	67.72	405.11	289.55	-348.82
2080	0.00	0.00	0.00	0.00	20.44	0.00	20.44	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2083	0.00	0.00	102.47	0.00	0.00	0.00	102.47	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2084	0.00	0.00	243.42	0.00	11.05	0.92	255.40	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2085	0.00	0.00	162.53	0.00	10.63	1.84	175.00	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2086	0.00	0.00	126.10	0.00	30.15	5.52	161.78	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2087	0.00	0.00	143.20	0.00	35.54	8.29	187.02	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2088	0.00	0.00	21.77	0.00	27.52	24.86	74.15	37.01	43.89	413.55	67.72	405.11	289.55	-348.82
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	37.01	46.85	413.55	67.72	405.11	289.55	-348.82
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	37.01	46.85	413.55	67.72	405.11	289.55	-348.82
Salvage Value	0.00	0.00	10.87	0.00	2.61	2.32	15.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	953.97	0.00	324.85	403.67	4862.43	378.36	507.22	9262.77	1492.42	1839.87	3108.58	2821.89

Net Present Value -2926

K19/C31/750MW

TABLE 379
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	258.05	0.00	0.00	25.01	6.80	321.81	1.61	0.00	378.60	105.26	29.90	115.53	127.90
2015	40.34	558.63	0.00	0.00	22.21	11.15	632.33	4.77	0.00	431.52	103.31	34.17	121.47	172.56
2016	10.98	742.67	0.00	0.00	31.55	23.95	809.16	8.82	0.00	447.06	101.43	36.48	124.68	184.48
2017	11.07	900.50	0.00	0.00	47.62	33.55	992.73	13.78	0.00	483.11	99.39	39.13	131.84	212.75
2018	13.18	641.80	0.00	0.00	53.35	187.94	896.27	18.26	0.00	465.86	97.22	39.91	135.15	193.58
2019	13.28	450.39	0.00	0.00	63.21	132.21	659.09	21.56	13.29	501.73	97.16	37.43	135.86	231.29
2020	13.38	186.45	0.00	0.00	0.01	350.24	550.09	24.31	49.02	798.76	104.57	29.32	154.10	510.77
2021	16.96	64.80	0.00	0.00	0.00	0.00	81.76	24.72	47.22	865.59	105.22	32.04	170.50	557.83
2022	188.48	0.00	0.00	0.00	0.00	0.00	188.48	25.66	45.88	868.74	104.06	31.88	175.51	557.29
2023	285.89	0.00	0.00	0.00	0.00	0.00	285.89	27.09	43.85	823.39	101.04	34.05	181.52	506.79
2024	313.80	0.00	0.00	0.00	0.00	0.00	313.80	28.66	42.12	799.40	98.83	37.60	191.43	471.54
2025	320.45	0.00	0.00	0.00	4.33	0.00	324.78	30.28	40.31	755.75	98.78	27.06	173.70	456.22
2026	869.95	0.00	0.00	0.00	4.33	0.00	874.28	34.65	38.38	735.33	96.82	27.83	192.68	418.01
2027	1385.33	0.00	0.00	0.00	52.77	0.00	1438.09	41.84	36.95	680.19	94.88	26.33	185.77	373.21
2028	1246.13	0.00	0.00	0.00	27.62	0.00	1273.74	48.21	35.58	653.51	93.25	27.33	202.13	330.80
2029	891.53	0.00	0.00	0.00	46.57	0.00	938.11	52.90	36.97	631.35	91.60	28.15	224.18	287.42
2030	618.59	0.00	0.00	0.00	80.98	0.00	699.57	56.40	31.62	623.82	90.23	28.70	243.21	261.68
2031	407.07	0.00	0.00	0.00	107.18	0.00	514.25	58.97	44.95	748.82	94.34	33.18	156.69	464.61
2032	150.21	0.00	0.00	0.00	125.54	0.00	275.74	60.35	43.93	1000.15	101.80	32.65	145.53	720.17
2033	47.49	0.00	0.00	0.00	0.00	0.00	47.49	60.59	42.59	1064.74	102.25	31.98	159.96	770.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	41.65	1031.94	100.41	31.35	163.91	736.26
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	39.90	959.49	98.75	31.38	137.27	692.09
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	39.21	922.77	97.05	32.11	137.82	655.79
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	60.59	38.42	890.43	95.38	32.04	141.65	621.35
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.59	37.46	855.85	93.71	31.96	146.47	583.72
2039	0.00	0.00	136.85	0.00	0.00	0.00	136.85	61.16	39.92	824.69	92.07	32.03	159.44	541.15
2040	0.00	0.00	179.07	0.00	12.34	0.00	191.41	62.01	36.52	822.89	90.74	30.50	175.90	525.75
2041	0.00	0.00	23.83	0.00	0.00	0.00	23.83	62.12	42.83	796.41	88.69	55.27	179.20	473.25
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	62.71	39.35	780.10	87.10	61.53	192.02	439.45
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	63.57	38.85	768.18	85.69	64.71	207.49	410.30
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	64.29	44.21	765.22	84.44	74.75	222.13	383.90
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	65.58	43.73	733.73	82.55	96.76	228.06	326.36
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	65.71	47.36	716.54	81.06	117.38	237.26	280.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	45.35	700.28	79.76	122.80	252.75	244.97
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	44.04	716.85	81.12	112.31	239.36	284.06
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	65.71	46.58	716.85	81.12	112.31	239.36	284.06
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	65.71	43.22	716.85	81.12	112.31	239.36	284.06
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	65.71	45.80	716.85	81.12	112.31	239.36	284.06
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	65.71	42.47	716.85	81.12	112.31	239.36	284.06
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	65.71	42.11	716.85	81.12	112.31	239.36	284.06
2054	0.00	0.00	0.00	0.00	22.45	24.86	47.31	65.71	41.76	716.85	81.12	112.31	239.36	284.06
2055	0.00	0.00	0.00	0.00	0.00	25.78	25.78	65.71	41.42	716.85	81.12	112.31	239.36	284.06
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	58.69	716.85	81.12	112.31	239.36	284.06
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	42.55	716.85	81.12	112.31	239.36	284.06
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	58.07	716.85	81.12	112.31	239.36	284.06
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	44.90	716.85	81.12	112.31	239.36	284.06
2060	0.00	0.00	0.00	0.00	1.07	0.00	1.07	65.71	54.15	716.85	81.12	112.31	239.36	284.06
2061	0.00	0.00	0.00	0.00	1.07	0.00	1.07	65.71	39.50	716.85	81.12	112.31	239.36	284.06
2062	0.00	0.00	0.00	0.00	12.83	0.00	12.83	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2063	0.00	0.00	0.00	0.00	6.42	0.00	6.42	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2064	0.00	0.00	0.00	0.00	24.65	2.81	27.45	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2065	0.00	0.00	0.00	0.00	29.76	5.61	35.37	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2066	0.00	0.00	0.00	0.00	27.06	16.84	43.90	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2067	0.00	0.00	0.00	0.00	43.09	25.26	68.35	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2068	0.00	0.00	0.00	0.00	25.83	75.78	101.61	65.71	68.20	716.85	81.12	112.31	239.36	284.06
2069	0.00	0.00	114.57	0.00	40.76	75.78	231.11	65.71	39.50	716.85	81.12	112.31	239.36	284.06
2070	0.00	0.00	156.79	0.00	0.01	78.59	235.39	65.71	54.15	716.85	81.12	112.31	239.36	284.06
2071	0.00	0.00	23.83	0.00	0.00	0.00	23.83	65.71	41.28	716.85	81.12	112.31	239.36	284.06
2072	0.00	0.00	116.99	0.00	0.00	0.00	116.99	65.71	54.15	716.85	81.12	112.31	239.36	284.06
2073	0.00	0.00	160.11	0.00	0.00	0.00	160.11	65.71	37.43	716.85	81.12	112.31	239.36	284.06
2074	0.00	0.00	142.97	0.00	0.00	0.00	142.97	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2075	0.00	0.00	162.36	0.00	15.60	0.00	177.96	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2076	0.00	0.00	24.68	0.00	3.26	0.00	27.94	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2077	0.00	0.00	0.00	0.00	39.94	0.00	39.94	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2078	0.00	0.00	0.00	0.00	33.54	0.00	33.54	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2079	0.00	0.00	0.00	0.00	35.88	0.00	35.88	65.71	39.50	716.85	81.12	112.31	239.36	284.06
2080	0.00	0.00	0.00	0.00	135.69	0.00	135.69	65.71	52.37	716.85	81.12	112.31	239.36	284.06
2081	0.00	0.00	0.00	0.00	81.51	0.00	81.51	65.71	39.50	716.85	81.12	112.31	239.36	284.06
2082	0.00	0.00	0.00	0.00	94.53	0.00	94.53	65.71	54.15	716.85	81.12	112.31	239.36	284.06
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.71	38.32	716.85	81.12	112.31	239.36	284.06
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	65.71	54.15	716.85	81.12	112.31	239.36	284.06
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	65.71	38.32	716.85	81.12	112.31	239.36	284.06
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	65.71	54.15	716.85	81.12	112.31	239.36	284.06
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2088	0.00	0.00	0.00	0.00	27.52	24.86	52.38	65.71	36.54	716.85	81.12	112.31	239.36	284.06
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	65.71	39.50	716.85	81.12	112.31	239.36	284.06
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	65.71	39.50	716.85	81.12	112.31	239.36	284.06
Salvage Value	7.27	0.00	3.46	0.00	5.23	2.32	18.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3035.28	3179.95	181.29	0.00	406.42	564.08	7367.03	590.12	479.28	11098.77	1567.48	728.12	2755.94	6047.23

Net Present Value -2389

K19/Gas31/750MW

TABLE 380
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	6.80	289.87	1.45	0.00	378.60	105.26	29.90	115.53	127.90
2015	0.00	558.63	0.00	0.00	22.21	11.15	591.99	4.41	0.00	431.52	103.31	34.17	121.47	172.56
2016	0.00	742.67	0.00	0.00	31.55	23.95	798.17	8.40	0.00	447.06	101.43	36.48	124.68	184.48
2017	0.00	900.50	0.00	0.00	47.62	33.55	981.66	13.31	0.00	483.11	99.39	39.13	131.84	212.75
2018	0.00	641.80	0.00	0.00	53.35	187.94	883.10	17.72	0.00	465.86	97.22	39.91	135.15	193.58
2019	0.00	450.39	0.00	0.00	63.21	132.21	645.81	20.95	13.29	501.73	97.16	37.43	135.86	231.29
2020	0.00	186.45	0.00	0.00	0.01	350.24	536.70	23.64	49.02	798.76	104.57	29.32	154.10	510.77
2021	0.00	64.80	0.00	0.00	0.00	0.00	64.80	23.96	47.22	865.59	105.22	32.04	170.50	557.83
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	45.88	868.65	104.06	31.91	175.51	557.16
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	43.85	824.10	101.04	34.05	181.55	507.46
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	42.12	800.77	98.84	37.62	191.41	472.89
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	40.31	759.10	98.77	27.08	174.53	458.72
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.96	38.38	742.00	96.81	28.02	194.77	422.40
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	23.96	36.95	688.61	94.86	26.41	187.65	379.69
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	23.96	35.58	665.89	93.23	27.35	206.13	339.18
2029	0.00	0.00	235.99	0.00	0.00	0.00	235.99	25.03	36.97	641.12	91.65	27.78	224.70	296.99
2030	0.00	0.00	422.33	0.00	24.68	0.00	447.02	27.15	31.62	642.78	91.05	24.57	236.56	290.60
2031	0.00	0.00	193.82	0.00	97.19	0.00	291.01	28.60	38.48	630.67	88.81	57.91	200.73	283.22
2032	0.00	0.00	131.49	0.00	0.00	0.00	131.49	29.25	41.32	616.99	87.19	73.81	209.60	246.38
2033	0.00	0.00	149.32	0.00	0.00	0.00	149.32	30.00	40.12	598.93	85.71	80.92	220.55	211.75
2034	0.00	0.00	22.70	0.00	0.00	0.00	22.70	30.11	43.03	601.04	84.90	88.31	230.66	197.18
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.11	41.46	519.87	82.74	106.64	200.80	129.69
2036	0.00	0.00	235.06	0.00	0.00	0.00	235.06	31.29	40.82	490.70	81.26	116.51	204.91	88.02
2037	0.00	0.00	340.26	0.00	0.00	0.00	340.26	32.99	40.22	471.81	79.90	127.71	213.91	50.29
2038	0.00	0.00	152.70	0.00	81.76	0.00	234.46	34.16	39.63	483.36	79.81	120.42	226.63	56.50
2039	0.00	0.00	11.25	0.00	0.00	0.00	11.25	34.22	49.10	551.01	77.48	247.73	210.13	15.66
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.22	45.59	521.91	75.54	266.61	224.37	-44.60
2041	0.00	0.00	116.18	0.00	0.00	0.00	116.18	34.80	45.05	498.90	74.04	284.23	235.90	-95.27
2042	0.00	0.00	404.09	0.00	0.00	0.00	404.09	36.82	44.53	477.35	72.65	304.09	246.38	-145.77
2043	0.00	0.00	378.97	0.00	0.00	0.00	378.97	38.72	48.10	471.17	71.77	322.54	255.57	-178.71
2044	0.00	0.00	159.22	0.00	81.76	0.00	240.99	39.92	49.39	474.61	71.45	312.82	272.41	-182.08
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.98	56.01	551.55	69.42	462.87	241.93	-222.67
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	55.55	529.90	68.18	479.35	254.23	-271.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	54.22	506.41	66.90	504.51	263.14	-328.13
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	52.90	529.29	68.17	482.24	253.10	-274.22
2049	0.00	0.00	0.00	0.00	11.05	0.92	11.97	39.98	55.45	529.29	68.17	482.24	253.10	-274.22
2050	0.00	0.00	0.00	0.00	10.63	1.84	12.47	39.98	52.10	529.29	68.17	482.24	253.10	-274.22
2051	0.00	0.00	0.00	0.00	30.15	5.52	35.68	39.98	51.71	529.29	68.17	482.24	253.10	-274.22
2052	0.00	0.00	0.00	0.00	35.54	8.29	43.83	39.98	51.34	529.29	68.17	482.24	253.10	-274.22
2053	0.00	0.00	0.00	0.00	27.52	24.86	52.38	39.98	50.98	529.29	68.17	482.24	253.10	-274.22
2054	0.00	0.00	0.00	0.00	22.45	24.86	47.31	39.98	50.63	529.29	68.17	482.24	253.10	-274.22
2055	0.00	0.00	0.00	0.00	0.00	25.78	25.78	39.98	50.28	529.29	68.17	482.24	253.10	-274.22
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	65.79	529.29	68.17	482.24	253.10	-274.22
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	49.64	529.29	68.17	482.24	253.10	-274.22
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	65.16	529.29	68.17	482.24	253.10	-274.22
2059	0.00	0.00	213.70	0.00	0.00	0.00	213.70	39.98	51.99	529.29	68.17	482.24	253.10	-274.22
2060	0.00	0.00	400.05	0.00	0.00	0.00	400.05	39.98	61.24	529.29	68.17	482.24	253.10	-274.22
2061	0.00	0.00	191.70	0.00	0.00	0.00	191.70	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2062	0.00	0.00	131.49	0.00	0.00	0.00	131.49	39.98	61.24	529.29	68.17	482.24	253.10	-274.22
2063	0.00	0.00	149.32	0.00	0.00	0.00	149.32	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2064	0.00	0.00	22.70	0.00	13.95	2.81	39.46	39.98	61.24	529.29	68.17	482.24	253.10	-274.22
2065	0.00	0.00	0.00	0.00	36.27	5.61	41.88	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2066	0.00	0.00	235.06	0.00	74.29	16.84	326.18	39.98	61.24	529.29	68.17	482.24	253.10	-274.22
2067	0.00	0.00	340.26	0.00	12.08	25.26	377.59	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2068	0.00	0.00	152.70	0.00	25.83	75.78	254.31	39.98	61.24	529.29	68.17	482.24	253.10	-274.22
2069	0.00	0.00	11.25	0.00	40.76	75.78	127.79	39.98	48.37	529.29	68.17	482.24	253.10	-274.22
2070	0.00	0.00	0.00	0.00	0.01	78.59	78.60	39.98	47.18	529.29	68.17	482.24	253.10	-274.22
2071	0.00	0.00	116.18	0.00	0.00	0.00	116.18	39.98	47.18	529.29	68.17	482.24	253.10	-274.22
2072	0.00	0.00	404.09	0.00	0.00	0.00	404.09	39.98	47.18	529.29	68.17	482.24	253.10	-274.22
2073	0.00	0.00	378.97	0.00	61.32	0.00	440.29	39.98	46.30	529.29	68.17	482.24	253.10	-274.22
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2075	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	39.98	48.37	529.29	68.17	482.24	253.10	-274.22
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2081	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2084	0.00	0.00	0.00	0.00	11.05	0.92	11.97	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2085	0.00	0.00	0.00	0.00	10.63	1.84	12.47	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2086	0.00	0.00	0.00	0.00	30.15	5.52	35.68	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2087	0.00	0.00	0.00	0.00	35.54	8.29	43.83	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2088	0.00	0.00	0.00	0.00	47.96	24.86	72.82	39.98	45.41	529.29	68.17	482.24	253.10	-274.22
2089	0.00	0.00	0.00	0.00	22.45	24.86	47.31	39.98	48.37	529.29	68.17	482.24	253.10	-274.22
2090	0.00	0.00	0.00	0.00	0.00	25.78	25.78	39.98	48.37	529.29	68.17	482.24	253.10	-274.22
Salvage Value	0.00	0.00	6.73	0.00	2.86	2.32	11.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	863.78	0.00	295.15	564.08	4902.96	383.43	500.27	9566.20	1493.05	1926.82	2984.14	3162.19

Net Present Value -2624

K19/C25/250MW

TABLE 381
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	32.62	258.05	0.00	0.00	25.01	4.27	319.95	1.61	0.00	378.60	105.26	29.90	115.53	127.90
2015	90.00	558.63	0.00	0.00	22.21	3.20	674.05	4.98	0.00	431.52	103.31	34.17	121.47	172.56
2016	203.55	742.67	0.00	0.00	31.55	5.31	983.08	9.90	0.00	447.06	101.43	36.47	124.70	184.46
2017	240.87	900.50	0.00	0.00	47.62	7.97	1196.94	15.88	0.00	482.54	99.40	39.13	131.87	212.14
2018	289.99	641.80	0.00	0.00	53.35	23.90	1009.05	20.93	0.00	460.92	96.62	42.74	137.43	184.13
2019	297.44	450.39	0.00	0.00	67.54	23.90	839.27	25.13	13.29	491.35	96.26	42.47	138.01	214.60
2020	821.32	186.45	0.00	0.00	4.34	24.78	1036.89	30.31	13.51	742.42	104.93	30.26	131.28	475.95
2021	1320.82	64.80	0.00	0.00	52.77	0.00	1438.39	37.50	13.26	787.40	105.65	30.82	138.64	512.28
2022	1187.95	0.00	0.00	0.00	27.62	0.00	1215.57	43.58	13.48	773.20	103.70	31.98	144.69	492.83
2023	849.81	0.00	0.00	0.00	46.57	0.00	896.38	48.06	13.31	754.38	101.44	31.75	158.66	462.53
2024	589.57	0.00	0.00	0.00	80.98	0.00	670.55	51.41	13.26	741.45	99.07	34.99	176.85	430.54
2025	387.92	0.00	0.00	0.00	107.18	0.00	495.10	53.89	27.65	823.59	103.86	31.13	120.14	568.46
2026	143.12	0.00	0.00	0.00	125.54	0.00	268.66	55.23	27.45	1055.68	111.74	30.27	115.47	798.20
2027	45.24	0.00	0.00	0.00	0.00	0.00	45.24	55.46	27.33	1066.91	111.05	28.66	119.64	807.56
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	27.62	1049.44	109.28	29.89	123.04	787.23
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	30.20	1022.41	107.45	30.16	125.60	759.20
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	26.13	1006.09	106.15	29.84	124.68	745.42
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.96	991.92	104.51	30.48	127.51	729.41
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.58	961.40	102.87	30.74	127.98	699.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.65	923.04	101.19	30.94	124.71	666.20
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	25.77	891.88	99.51	31.21	126.83	634.33
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	27.88	864.38	97.87	31.48	122.96	612.08
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	55.46	24.92	830.69	96.26	31.95	124.31	578.17
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.46	24.92	795.48	94.66	31.90	126.29	542.63
2038	0.00	0.00	136.06	0.00	0.00	0.00	136.06	56.03	24.92	758.69	93.08	31.93	129.03	504.65
2039	0.00	0.00	177.98	0.00	12.34	0.00	190.32	56.87	27.88	747.10	91.86	30.22	143.33	481.69
2040	0.00	0.00	23.67	0.00	0.00	0.00	23.67	56.99	28.99	725.23	89.79	53.97	149.88	431.59
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.99	28.32	707.75	88.24	60.49	159.75	399.26
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	57.57	28.32	693.85	86.87	64.15	170.02	372.80
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	58.43	28.32	680.30	85.45	64.14	187.51	343.20
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	59.15	34.16	663.47	83.84	97.10	187.56	294.97
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	60.45	37.12	644.06	82.40	106.85	198.78	256.03
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	60.57	38.25	630.82	81.00	121.44	211.97	216.41
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	37.36	611.36	79.56	123.17	232.16	176.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.47	628.74	80.99	117.16	214.30	216.30
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	60.57	39.43	628.74	80.99	117.16	214.30	216.30
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	60.57	38.25	628.74	80.99	117.16	214.30	216.30
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	60.57	38.26	628.74	80.99	117.16	214.30	216.30
2052	0.00	0.00	0.00	0.00	35.54	1.97	37.51	60.57	38.27	628.74	80.99	117.16	214.30	216.30
2053	0.00	0.00	0.00	0.00	27.52	5.90	33.43	60.57	38.27	628.74	80.99	117.16	214.30	216.30
2054	0.00	0.00	0.00	0.00	23.52	5.90	29.42	60.57	38.27	628.74	80.99	117.16	214.30	216.30
2055	0.00	0.00	0.00	0.00	1.07	6.12	7.19	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2056	0.00	0.00	0.00	0.00	12.83	0.00	12.83	60.57	52.33	628.74	80.99	117.16	214.30	216.30
2057	0.00	0.00	0.00	0.00	6.42	0.00	6.42	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2058	0.00	0.00	0.00	0.00	10.69	0.00	10.69	60.57	52.33	628.74	80.99	117.16	214.30	216.30
2059	0.00	0.00	0.00	0.00	18.18	0.00	18.18	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2060	0.00	0.00	0.00	0.00	25.66	0.00	25.66	60.57	52.33	628.74	80.99	117.16	214.30	216.30
2061	0.00	0.00	0.00	0.00	31.01	0.00	31.01	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	68.16	628.74	80.99	117.16	214.30	216.30
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2064	0.00	0.00	0.00	0.00	13.95	4.05	18.00	60.57	68.16	628.74	80.99	117.16	214.30	216.30
2065	0.00	0.00	0.00	0.00	11.58	2.77	14.35	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2066	0.00	0.00	0.00	0.00	1.39	4.00	5.39	60.57	68.16	628.74	80.99	117.16	214.30	216.30
2067	0.00	0.00	0.00	0.00	12.08	6.00	18.07	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2068	0.00	0.00	113.78	0.00	25.83	17.99	157.60	60.57	68.16	628.74	80.99	117.16	214.30	216.30
2069	0.00	0.00	155.70	0.00	44.02	17.99	217.71	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2070	0.00	0.00	23.67	0.00	3.27	18.66	45.60	60.57	54.10	628.74	80.99	117.16	214.30	216.30
2071	0.00	0.00	0.00	0.00	39.94	0.00	39.94	60.57	38.27	628.74	80.99	117.16	214.30	216.30
2072	0.00	0.00	116.99	0.00	21.20	0.00	138.19	60.57	54.10	628.74	80.99	117.16	214.30	216.30
2073	0.00	0.00	160.11	0.00	35.88	0.00	195.98	60.57	37.38	628.74	80.99	117.16	214.30	216.30
2074	0.00	0.00	142.97	0.00	75.14	0.00	218.12	60.57	52.33	628.74	80.99	117.16	214.30	216.30
2075	0.00	0.00	162.36	0.00	81.51	0.00	243.87	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2076	0.00	0.00	24.68	0.00	94.53	0.00	119.20	60.57	54.10	628.74	80.99	117.16	214.30	216.30
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	38.27	628.74	80.99	117.16	214.30	216.30
2078	0.00	0.00	0.00	0.00	12.34	0.00	12.34	60.57	54.10	628.74	80.99	117.16	214.30	216.30
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	41.23	628.74	80.99	117.16	214.30	216.30
2080	0.00	0.00	0.00	0.00	72.89	0.00	72.89	60.57	54.10	628.74	80.99	117.16	214.30	216.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2084	0.00	0.00	0.00	0.00	11.05	0.22	11.27	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2087	0.00	0.00	0.00	0.00	35.54	1.97	37.51	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2088	0.00	0.00	0.00	0.00	27.52	5.90	33.43	60.57	36.50	628.74	80.99	117.16	214.30	216.30
2089	0.00	0.00	0.00	0.00	22.45	5.90	28.36	60.57	39.46	628.74	80.99	117.16	214.30	216.30
2090	0.00	0.00	0.00	0.00	0.00	6.12	6.12	60.57	39.46	628.74	80.99	117.16	214.30	216.30
Salvage Value	0.97	0.00	3.37	0.00	4.67	0.61	9.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	4145.61	3179.95	185.86	0.00	486.76	78.51	8076.70	648.82	303.25	11287.66	1604.09	755.32	2346.47	6581.77

Net Present Value -2447

K19/Gas24/250MW

TABLE 382
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	258.05	0.00	0.00	25.01	4.27	287.33	1.45	0.00	378.60	105.26	29.90	115.53	127.90
2015	0.00	558.63	0.00	0.00	22.21	3.20	584.04	4.37	0.00	431.52	103.31	34.17	121.47	172.56
2016	0.00	742.67	0.00	0.00	31.55	5.31	779.53	8.27	0.00	447.06	101.43	36.48	124.69	184.46
2017	0.00	900.50	0.00	0.00	47.62	7.97	956.08	13.05	0.00	483.11	99.39	39.13	131.84	212.75
2018	0.00	641.80	0.00	0.00	53.35	23.90	719.05	16.64	0.00	461.70	96.62	42.68	137.34	185.06
2019	0.00	450.39	0.00	0.00	63.21	23.90	537.50	19.33	13.29	492.64	96.25	42.46	137.94	215.99
2020	0.00	186.45	0.37	0.00	0.01	24.78	211.61	20.39	13.51	744.57	104.92	30.28	131.29	478.07
2021	0.00	64.80	0.00	0.00	0.00	0.00	64.80	20.71	13.26	790.78	105.63	30.82	138.50	515.82
2022	0.00	0.00	124.04	0.00	0.00	0.00	124.04	21.22	13.48	783.44	104.17	30.19	143.23	505.85
2023	0.00	0.00	161.54	0.00	12.34	0.00	173.88	21.98	13.31	778.35	103.07	25.34	148.79	501.15
2024	0.00	0.00	21.17	0.00	0.00	0.00	21.17	22.08	17.33	771.93	101.16	41.28	153.87	475.62
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	22.08	17.11	679.89	98.84	31.52	139.36	410.16
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.08	16.68	652.50	96.50	35.69	148.19	372.12
2027	0.00	0.00	105.37	0.00	0.00	0.00	105.37	22.61	16.71	617.79	94.40	38.73	150.86	333.80
2028	0.00	0.00	146.32	0.00	97.19	0.00	243.51	23.82	16.77	597.17	92.51	44.88	158.91	300.88
2029	0.00	0.00	245.77	0.00	0.00	0.00	245.77	25.05	23.61	582.95	90.73	61.94	165.82	264.46
2030	0.00	0.00	324.04	0.00	0.00	0.00	324.04	26.67	19.59	579.69	89.80	66.81	169.64	253.43
2031	0.00	0.00	145.42	0.00	12.34	0.00	157.76	27.46	19.59	607.00	90.40	58.00	171.31	287.29
2032	0.00	0.00	10.72	0.00	0.00	0.00	10.72	27.51	26.66	641.80	87.81	158.09	147.99	247.91
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51	26.66	628.79	86.26	168.54	158.43	215.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51	26.67	614.34	84.74	181.26	167.48	180.86
2035	0.00	0.00	233.42	0.00	0.00	0.00	233.42	28.68	26.00	543.00	82.68	181.87	158.11	120.34
2036	0.00	0.00	337.89	0.00	0.00	0.00	337.89	30.37	26.01	515.93	81.18	192.60	162.77	79.38
2037	0.00	0.00	151.64	0.00	0.00	0.00	151.64	31.12	26.01	533.87	81.63	185.25	161.65	105.34
2038	0.00	0.00	249.53	0.00	0.00	0.00	249.53	32.37	33.08	575.52	79.16	302.02	142.70	51.63
2039	0.00	0.00	345.04	0.00	0.00	0.00	345.04	34.10	36.03	559.75	77.74	316.26	160.19	5.56
2040	0.00	0.00	154.84	0.00	81.76	0.00	236.61	35.28	33.08	559.26	77.11	320.79	168.80	-7.45
2041	0.00	0.00	11.41	0.00	0.00	0.00	11.41	35.34	40.15	609.40	75.21	438.41	145.62	-49.85
2042	0.00	0.00	245.10	0.00	0.00	0.00	245.10	36.56	40.15	587.68	73.37	466.39	156.27	-108.36
2043	0.00	0.00	354.80	0.00	0.00	0.00	354.80	38.34	40.15	571.91	72.01	488.55	164.30	-152.94
2044	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.13	41.93	563.97	71.51	489.28	172.38	-169.20
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.19	49.00	609.39	69.16	628.13	154.15	-242.05
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	49.01	618.08	69.35	622.14	154.81	-228.21
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	48.12	589.51	67.33	665.46	167.76	-311.04
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	39.19	50.20	605.66	68.61	638.58	158.91	-260.43
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2052	0.00	0.00	101.76	0.00	35.54	1.97	139.27	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2053	0.00	0.00	139.26	0.00	27.52	5.90	172.68	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2054	0.00	0.00	21.17	0.00	22.45	5.90	49.52	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2055	0.00	0.00	0.00	0.00	0.00	6.12	6.12	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2057	0.00	0.00	105.37	0.00	0.00	0.00	105.37	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2058	0.00	0.00	144.20	0.00	12.34	0.00	156.54	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2059	0.00	0.00	245.77	0.00	0.00	0.00	245.77	39.19	50.20	605.66	68.61	638.58	158.91	-260.43
2060	0.00	0.00	324.04	0.00	0.00	0.00	324.04	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2061	0.00	0.00	145.42	0.00	0.00	0.00	145.42	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2062	0.00	0.00	10.72	0.00	0.00	0.00	10.72	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2063	0.00	0.00	0.00	0.00	72.89	2.86	75.76	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2064	0.00	0.00	0.00	0.00	13.95	4.05	18.00	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2065	0.00	0.00	233.42	0.00	11.58	2.77	247.77	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2066	0.00	0.00	337.89	0.00	13.73	4.00	355.62	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2067	0.00	0.00	151.64	0.00	12.08	6.00	169.71	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2068	0.00	0.00	249.53	0.00	25.83	17.99	293.35	39.19	63.07	605.66	68.61	638.58	158.91	-260.43
2069	0.00	0.00	345.04	0.00	40.76	17.99	403.79	39.19	50.20	605.66	68.61	638.58	158.91	-260.43
2070	0.00	0.00	154.84	0.00	0.01	18.66	173.51	39.19	49.02	605.66	68.61	638.58	158.91	-260.43
2071	0.00	0.00	11.41	0.00	0.00	0.00	11.41	39.19	49.02	605.66	68.61	638.58	158.91	-260.43
2072	0.00	0.00	245.10	0.00	0.00	0.00	245.10	39.19	49.02	605.66	68.61	638.58	158.91	-260.43
2073	0.00	0.00	354.80	0.00	0.00	0.00	354.80	39.19	48.13	605.66	68.61	638.58	158.91	-260.43
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2075	0.00	0.00	11.73	0.00	61.32	0.00	73.05	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2078	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	50.20	605.66	68.61	638.58	158.91	-260.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2082	0.00	0.00	101.76	0.00	0.00	0.00	101.76	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2083	0.00	0.00	139.26	0.00	0.00	0.00	139.26	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2084	0.00	0.00	21.17	0.00	11.05	0.22	32.44	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2087	0.00	0.00	105.37	0.00	35.54	1.97	142.88	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2088	0.00	0.00	144.20	0.00	27.52	5.90	177.63	39.19	47.24	605.66	68.61	638.58	158.91	-260.43
2089	0.00	0.00	21.92	0.00	22.45	5.90	50.27	39.19	50.20	605.66	68.61	638.58	158.91	-260.43
2090	0.00	0.00	0.00	0.00	20.44	6.12	26.56	39.19	50.20	605.66	68.61	638.58	158.91	-260.43
Salvage Value	0.00	0.00	11.78	0.00	2.47	0.61	14.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	3179.95	1162.52	0.00	289.86	78.51	4710.84	364.75	309.00	9496.82	1496.27	2626.11	2361.31	3013.13

Net Present Value -2371

K19/C31/250MW

TABLE 383
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	258.05	0.00	0.00	25.01	4.27	319.28	1.61	0.00	378.60	105.26	29.90	115.53	127.90
2015	40.34	558.63	0.00	0.00	22.21	3.20	624.38	4.73	0.00	431.52	103.31	34.17	121.47	172.56
2016	10.98	742.67	0.00	0.00	31.55	5.31	790.51	8.69	0.00	447.06	101.43	36.48	124.69	184.46
2017	11.07	900.50	0.00	0.00	47.62	7.97	967.14	13.52	0.00	483.11	99.39	39.13	131.84	212.75
2018	13.18	641.80	0.00	0.00	53.35	23.90	732.23	17.18	0.00	461.70	96.62	42.68	137.34	185.06
2019	13.28	450.39	0.00	0.00	63.21	23.90	550.78	19.94	13.29	492.64	96.25	42.46	137.94	215.99
2020	13.38	186.45	0.37	0.00	0.01	24.78	224.99	21.06	13.51	744.57	104.92	30.28	131.29	478.07
2021	16.96	64.80	0.00	0.00	0.00	0.00	81.76	21.47	13.26	790.78	105.63	30.82	138.50	515.82
2022	188.48	0.00	124.04	0.00	0.00	0.00	312.52	22.92	13.48	783.26	104.15	30.23	143.29	505.60
2023	285.89	0.00	161.54	0.00	12.34	0.00	459.77	25.11	13.31	777.50	103.03	25.52	149.07	499.88
2024	313.80	0.00	21.17	0.00	0.00	0.00	334.97	26.78	17.33	771.11	101.13	41.55	154.40	474.03
2025	320.45	0.00	0.00	0.00	4.33	0.00	324.78	28.41	17.11	678.51	98.80	31.70	140.17	407.84
2026	869.95	0.00	0.00	0.00	4.33	0.00	874.28	32.78	16.68	650.79	96.49	35.95	148.79	369.57
2027	1385.33	0.00	105.37	0.00	52.77	0.00	1543.46	40.49	16.71	615.23	94.39	39.16	151.50	330.18
2028	1246.13	0.00	144.20	0.00	39.96	0.00	1430.29	47.65	16.77	593.36	92.43	46.06	159.71	295.16
2029	891.53	0.00	21.92	0.00	46.57	0.00	960.02	52.45	23.60	578.72	90.69	63.20	167.20	257.62
2030	618.59	0.00	0.00	0.00	80.98	0.00	699.57	55.94	19.58	607.92	91.79	55.25	161.15	299.73
2031	407.07	0.00	0.00	0.00	107.18	0.00	514.25	58.51	34.19	696.39	94.97	46.25	125.01	430.16
2032	150.21	0.00	0.00	0.00	125.54	0.00	275.74	59.89	34.42	928.24	102.25	44.65	117.44	663.91
2033	47.49	0.00	0.00	0.00	0.00	0.00	47.49	60.13	34.27	960.29	102.16	46.30	124.72	687.10
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	34.50	924.19	100.35	47.44	127.11	649.30
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.65	893.96	98.63	48.12	123.42	623.80
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.60	862.58	96.96	49.32	124.86	591.44
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.42	821.29	95.07	51.14	128.14	546.94
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.05	773.87	93.05	53.28	131.47	496.07
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	36.08	741.15	91.11	58.91	144.32	446.82
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.24	720.76	89.37	66.65	151.91	412.82
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	36.02	699.21	87.68	75.53	161.13	374.86
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	60.13	33.06	697.19	86.81	76.51	167.65	366.22
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.13	33.06	684.88	85.44	76.22	184.17	339.05
2044	0.00	0.00	118.64	0.00	0.00	0.00	118.64	60.72	34.84	663.74	83.85	97.05	187.55	295.29
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.02	34.84	644.17	82.40	106.82	198.72	256.23
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.15	38.92	630.94	81.00	121.43	211.96	216.56
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	37.36	611.37	79.56	123.17	232.16	176.48
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	36.47	628.83	80.99	117.14	214.28	216.42
2049	0.00	0.00	0.00	0.00	11.05	0.22	11.27	62.15	39.43	628.83	80.99	117.14	214.28	216.42
2050	0.00	0.00	0.00	0.00	10.63	0.44	11.06	62.15	36.48	628.83	80.99	117.14	214.28	216.42
2051	0.00	0.00	0.00	0.00	30.15	1.31	31.47	62.15	39.44	628.83	80.99	117.14	214.28	216.42
2052	0.00	0.00	101.76	0.00	35.54	1.97	139.27	62.15	36.49	628.83	80.99	117.14	214.28	216.42
2053	0.00	0.00	139.26	0.00	27.52	5.90	172.68	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2054	0.00	0.00	21.17	0.00	22.45	5.90	49.52	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2055	0.00	0.00	0.00	0.00	0.00	6.12	6.12	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2057	0.00	0.00	105.37	0.00	0.00	0.00	105.37	62.15	38.27	628.83	80.99	117.14	214.28	216.42
2058	0.00	0.00	144.20	0.00	12.34	0.00	156.54	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2059	0.00	0.00	21.92	0.00	0.00	0.00	21.92	62.15	41.23	628.83	80.99	117.14	214.28	216.42
2060	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2061	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.15	39.46	628.83	80.99	117.14	214.28	216.42
2062	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2063	0.00	0.00	0.00	0.00	18.76	2.86	21.62	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2064	0.00	0.00	0.00	0.00	24.65	4.05	28.70	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2065	0.00	0.00	0.00	0.00	29.76	2.77	32.53	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2066	0.00	0.00	0.00	0.00	27.06	4.00	31.06	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2067	0.00	0.00	0.00	0.00	43.09	6.00	49.09	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2068	0.00	0.00	0.00	0.00	25.83	17.99	43.82	62.15	68.16	628.83	80.99	117.14	214.28	216.42
2069	0.00	0.00	0.00	0.00	40.76	17.99	58.75	62.15	39.46	628.83	80.99	117.14	214.28	216.42
2070	0.00	0.00	0.00	0.00	0.01	18.66	18.67	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	41.23	628.83	80.99	117.14	214.28	216.42
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.15	37.38	628.83	80.99	117.14	214.28	216.42
2074	0.00	0.00	118.64	0.00	0.00	0.00	118.64	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2075	0.00	0.00	162.36	0.00	3.26	0.00	165.61	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2076	0.00	0.00	24.68	0.00	3.26	0.00	27.94	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2077	0.00	0.00	0.00	0.00	39.94	0.00	39.94	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2078	0.00	0.00	0.00	0.00	21.20	0.00	21.20	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2079	0.00	0.00	0.00	0.00	35.88	0.00	35.88	62.15	39.46	628.83	80.99	117.14	214.28	216.42
2080	0.00	0.00	0.00	0.00	135.69	0.00	135.69	62.15	52.33	628.83	80.99	117.14	214.28	216.42
2081	0.00	0.00	0.00	0.00	81.51	0.00	81.51	62.15	39.46	628.83	80.99	117.14	214.28	216.42
2082	0.00	0.00	101.76	0.00	94.53	0.00	196.29	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2083	0.00	0.00	139.26	0.00	0.00	0.00	139.26	62.15	38.27	628.83	80.99	117.14	214.28	216.42
2084	0.00	0.00	21.17	0.00	11.05	0.22	32.44	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2085	0.00	0.00	0.00	0.00	10.63	0.44	11.06	62.15	38.27	628.83	80.99	117.14	214.28	216.42
2086	0.00	0.00	0.00	0.00	30.15	1.31	31.47	62.15	54.10	628.83	80.99	117.14	214.28	216.42
2087	0.00	0.00	105.37	0.00	35.54	1.97	142.88	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2088	0.00	0.00	144.20	0.00	27.52	5.90	177.63	62.15	36.50	628.83	80.99	117.14	214.28	216.42
2089	0.00	0.00	21.92	0.00	22.45	5.90	50.27	62.15	39.46	628.83	80.99	117.14	214.28	216.42
2090	0.00	0.00	0.00	0.00	0.00	6.12	6.12	62.15	39.46	628.83	80.99	117.14	214.28	216.42
Salvage Value	7.27	0.00	5.51	0.00	5.14	0.61	18.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3035.28	3179.95	384.98	0.00	415.09	78.51	7093.82	565.34	302.94	10291.24	1567.71	842.93	2409.30	5471.29

Net Present Value -2491

All Gas

TABLE 384
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	433.97	103.30	34.19	121.38	175.11
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	449.67	101.42	36.46	124.60	187.19
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	490.81	99.77	37.68	130.27	223.10
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	468.40	96.90	41.06	136.08	194.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	451.83	94.93	36.39	138.99	181.52
2020	0.00	0.00	122.63	0.00	0.00	0.00	122.63	1.02	0.00	483.24	94.99	28.74	145.25	214.26
2021	0.00	0.00	159.65	0.00	12.34	0.00	172.00	1.77	0.00	474.33	93.20	26.90	158.17	196.06
2022	0.00	0.00	20.87	0.00	0.00	0.00	20.87	1.88	4.07	461.85	90.88	49.97	163.68	157.31
2023	0.00	0.00	102.47	0.00	0.00	0.00	102.47	2.39	4.07	443.46	88.65	61.52	174.48	118.82
2024	0.00	0.00	142.35	0.00	97.19	0.00	239.54	3.58	4.07	435.04	87.14	70.23	183.66	94.01
2025	0.00	0.00	21.32	0.00	0.00	0.00	21.32	3.68	8.16	381.25	86.65	58.83	160.55	75.21
2026	0.00	0.00	104.64	0.00	0.00	0.00	104.64	4.21	8.16	361.91	85.31	60.87	165.57	50.15
2027	0.00	0.00	143.20	0.00	0.00	0.00	143.20	4.92	8.16	339.71	83.42	61.19	184.15	10.96
2028	0.00	0.00	244.06	0.00	0.00	0.00	244.06	6.14	12.23	316.07	81.43	95.42	182.77	-43.54
2029	0.00	0.00	321.79	0.00	0.00	0.00	321.79	7.75	12.23	294.51	79.94	108.49	190.66	-84.57
2030	0.00	0.00	144.41	0.00	12.34	0.00	156.75	8.54	12.24	313.35	80.90	100.96	184.88	-53.39
2031	0.00	0.00	10.64	0.00	0.00	0.00	10.64	8.59	19.31	338.88	78.44	188.34	164.78	-92.68
2032	0.00	0.00	109.11	0.00	0.00	0.00	109.11	9.13	19.32	308.10	76.49	206.03	175.11	-149.53
2033	0.00	0.00	149.32	0.00	81.76	0.00	231.08	10.29	19.32	280.58	74.70	223.74	185.97	-203.84
2034	0.00	0.00	254.50	0.00	0.00	0.00	254.50	11.56	23.40	262.43	73.26	250.98	192.41	-254.23
2035	0.00	0.00	335.54	0.00	0.00	0.00	335.54	13.24	23.40	246.29	72.35	263.70	198.53	-288.29
2036	0.00	0.00	150.58	0.00	0.00	0.00	150.58	13.99	23.40	245.22	72.31	256.49	208.73	-292.30
2037	0.00	0.00	247.80	0.00	0.00	0.00	247.80	15.23	30.46	256.01	70.27	350.54	177.26	-342.07
2038	0.00	0.00	342.64	0.00	0.00	0.00	342.64	16.95	30.47	233.84	69.03	369.21	187.14	-391.53
2039	0.00	0.00	153.77	0.00	0.00	0.00	153.77	17.71	30.48	229.77	68.98	374.99	195.36	-409.56
2040	0.00	0.00	11.33	0.00	0.00	0.00	11.33	17.77	37.55	249.01	67.00	467.59	173.84	-459.43
2041	0.00	0.00	243.40	0.00	0.00	0.00	243.40	18.99	37.55	232.67	65.19	505.84	190.19	-528.56
2042	0.00	0.00	352.33	0.00	0.00	0.00	352.33	20.75	37.55	222.78	64.12	532.27	202.40	-576.00
2043	0.00	0.00	158.12	0.00	81.76	0.00	239.88	21.95	37.55	226.01	64.12	537.66	206.95	-582.71
2044	0.00	0.00	11.65	0.00	0.00	0.00	11.65	22.01	44.63	247.64	62.50	634.18	180.93	-629.98
2045	0.00	0.00	52.55	0.00	0.00	0.00	52.55	22.27	44.63	234.46	60.94	675.60	196.79	-698.88
2046	0.00	0.00	71.92	0.00	0.00	0.00	71.92	22.63	44.63	224.51	59.82	709.87	208.92	-754.10
2047	0.00	0.00	10.93	0.00	0.00	0.00	10.93	22.68	46.11	220.54	58.94	748.13	215.11	-801.64
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.11	226.50	59.90	711.20	206.94	-751.54
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	22.68	46.12	226.50	59.90	711.20	206.94	-751.54
2050	0.00	0.00	100.35	0.00	10.08	0.00	110.43	22.68	46.12	226.50	59.90	711.20	206.94	-751.54
2051	0.00	0.00	137.33	0.00	10.08	0.00	147.41	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2052	0.00	0.00	20.87	0.00	10.08	0.00	30.95	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2053	0.00	0.00	102.47	0.00	0.00	0.00	102.47	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2054	0.00	0.00	140.23	0.00	0.00	0.00	140.23	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2055	0.00	0.00	21.32	0.00	0.00	0.00	21.32	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2056	0.00	0.00	104.64	0.00	12.34	0.00	116.98	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2057	0.00	0.00	143.20	0.00	0.00	0.00	143.20	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2058	0.00	0.00	244.06	0.00	0.00	0.00	244.06	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2059	0.00	0.00	321.79	0.00	72.89	0.00	394.68	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2060	0.00	0.00	144.41	0.00	0.00	0.00	144.41	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2061	0.00	0.00	10.64	0.00	0.00	0.00	10.64	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2062	0.00	0.00	109.11	0.00	0.00	0.00	109.11	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2063	0.00	0.00	149.32	0.00	0.00	0.00	149.32	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2064	0.00	0.00	254.50	0.00	0.00	0.00	254.50	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2065	0.00	0.00	335.54	0.00	12.34	0.00	347.88	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2066	0.00	0.00	150.58	0.00	0.00	0.00	150.58	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2067	0.00	0.00	247.80	0.00	0.00	0.00	247.80	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2068	0.00	0.00	342.64	0.00	61.32	0.00	403.96	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2069	0.00	0.00	153.77	0.00	0.00	0.00	153.77	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2070	0.00	0.00	11.33	0.00	0.00	0.00	11.33	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2071	0.00	0.00	243.40	0.00	0.00	0.00	243.40	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2072	0.00	0.00	352.33	0.00	0.00	0.00	352.33	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2073	0.00	0.00	158.12	0.00	0.00	0.00	158.12	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2074	0.00	0.00	11.65	0.00	24.30	0.00	35.95	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2075	0.00	0.00	52.55	0.00	0.00	0.00	52.55	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2076	0.00	0.00	71.92	0.00	0.00	0.00	71.92	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2077	0.00	0.00	10.93	0.00	0.00	0.00	10.93	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2078	0.00	0.00	0.00	0.00	61.32	0.00	61.32	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2080	0.00	0.00	100.35	0.00	0.00	0.00	100.35	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2081	0.00	0.00	137.33	0.00	0.00	0.00	137.33	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2082	0.00	0.00	20.87	0.00	0.00	0.00	20.87	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2083	0.00	0.00	102.47	0.00	20.44	0.00	122.91	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2084	0.00	0.00	140.23	0.00	10.08	0.00	150.31	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2085	0.00	0.00	21.32	0.00	10.08	0.00	31.39	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2086	0.00	0.00	104.64	0.00	10.08	0.00	114.72	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2087	0.00	0.00	143.20	0.00	10.08	0.00	153.28	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2088	0.00	0.00	21.77	0.00	0.00	0.00	21.77	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.68	46.13	226.50	59.90	711.20	206.94	-751.54
Salvage Value	0.00	0.00	29.88	0.00	1.19	0.00	31.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1514.62	0.00	151.81	0.00	1730.75	120.73	224.68	5914.61	1375.74	3191.85	2678.75	-1331.74

Net Present Value: -3408

Wind/Gas

TABLE 385
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	433.97	103.30	34.19	121.40	175.09
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	449.67	101.42	36.46	124.62	187.17
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	490.86	99.77	37.68	130.29	223.13
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	468.40	96.90	41.06	136.08	194.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	451.83	94.93	36.39	138.99	181.52
2020	0.00	0.00	0.00	13.09	21.21	0.00	34.30	0.69	0.00	477.57	94.51	30.99	146.66	205.40
2021	0.00	0.00	0.37	399.71	35.35	0.00	435.43	2.87	0.00	468.59	92.73	29.77	159.11	186.98
2022	0.00	0.00	0.00	407.19	42.70	0.00	449.89	5.12	6.34	478.85	91.07	29.87	160.82	197.10
2023	0.00	0.00	227.23	394.10	22.34	0.00	643.67	8.23	12.69	475.73	88.53	34.15	166.62	186.43
2024	0.00	0.00	302.79	7.48	35.16	0.00	345.43	9.84	19.03	482.55	86.73	34.43	171.13	190.27
2025	0.00	0.00	42.63	6.55	6.81	0.00	55.99	10.12	27.18	443.37	86.81	40.23	141.74	174.59
2026	0.00	0.00	104.64	199.85	17.12	0.00	321.61	11.73	27.18	432.40	85.79	38.46	145.84	162.30
2027	0.00	0.00	145.32	203.59	124.38	0.00	473.30	14.09	30.35	414.21	83.37	47.25	153.93	129.66
2028	0.00	0.00	21.77	203.59	37.69	0.00	263.05	15.40	37.60	407.80	81.59	61.26	159.35	105.60
2029	0.00	0.00	106.85	203.59	37.83	0.00	348.28	17.14	40.78	396.42	79.98	66.51	165.05	84.88
2030	0.00	0.00	146.23	203.59	37.83	0.00	387.65	19.08	43.95	399.04	79.04	69.72	166.35	83.92
2031	0.00	0.00	130.58	203.59	37.83	0.00	372.01	20.94	51.19	404.10	77.80	82.67	170.18	73.44
2032	0.00	0.00	148.28	203.59	119.59	0.00	471.47	23.30	54.37	399.88	76.68	83.44	175.97	63.80
2033	0.00	0.00	22.54	203.59	37.83	0.00	263.97	24.62	61.63	408.80	76.02	88.89	179.54	64.35
2034	0.00	0.00	110.64	203.59	37.83	0.00	352.07	26.38	64.81	391.90	74.17	104.62	184.10	29.00
2035	0.00	0.00	151.42	203.59	37.83	0.00	392.84	28.34	67.99	374.91	72.48	112.88	193.03	-3.47
2036	0.00	0.00	135.21	203.59	37.83	0.00	376.64	30.23	75.23	368.05	71.10	129.73	197.84	-30.62
2037	0.00	0.00	153.54	203.59	37.83	0.00	394.97	32.20	78.41	356.60	69.79	137.45	205.02	-55.66
2038	0.00	0.00	137.11	203.59	37.83	0.00	378.54	34.09	85.66	356.13	68.75	151.46	210.72	-74.80
2039	0.00	0.00	155.70	203.59	119.59	0.00	478.89	36.49	88.84	349.43	67.59	151.91	231.51	-101.58
2040	0.00	0.00	23.67	216.69	37.83	0.00	278.19	37.88	96.10	356.18	66.78	160.86	240.86	-112.32
2041	0.00	0.00	116.18	603.30	37.83	0.00	757.32	41.67	99.28	338.29	65.24	193.12	238.07	-158.14
2042	0.00	0.00	158.99	610.78	37.83	0.00	807.61	45.70	102.45	323.72	63.85	206.62	248.72	-195.47
2043	0.00	0.00	141.98	597.69	37.55	0.00	777.22	49.59	109.69	317.37	62.66	228.50	255.52	-229.31
2044	0.00	0.00	161.23	211.08	36.70	0.00	409.00	51.63	112.87	311.59	61.73	237.54	263.74	-251.41
2045	0.00	0.00	77.06	210.14	34.43	0.00	321.63	53.24	120.12	307.67	60.63	251.49	277.25	-281.69
2046	0.00	0.00	71.92	396.90	31.02	0.00	499.84	55.74	123.30	301.08	59.57	253.06	297.31	-308.87
2047	0.00	0.00	10.93	207.34	20.71	0.00	238.98	56.94	127.95	292.71	58.51	261.68	301.84	-329.33
2048	0.00	0.00	0.00	203.59	10.64	0.00	214.24	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2049	0.00	0.00	0.00	203.59	10.22	0.00	213.82	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2050	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2051	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2052	0.00	0.00	0.00	203.59	10.08	0.00	213.67	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2053	0.00	0.00	204.94	203.59	0.00	0.00	408.54	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2054	0.00	0.00	280.46	203.59	0.00	0.00	484.06	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2055	0.00	0.00	42.63	203.59	5.30	0.00	251.53	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2056	0.00	0.00	104.64	203.59	8.84	0.00	317.07	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2057	0.00	0.00	143.20	203.59	10.75	0.00	357.54	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2058	0.00	0.00	21.77	203.59	6.01	0.00	231.37	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2059	0.00	0.00	106.85	203.59	27.73	0.00	338.17	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2060	0.00	0.00	146.23	216.69	2.98	0.00	365.89	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2061	0.00	0.00	130.58	603.30	4.78	0.00	738.66	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2062	0.00	0.00	148.28	610.78	79.80	0.00	838.86	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2063	0.00	0.00	22.54	597.69	9.46	0.00	629.69	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2064	0.00	0.00	110.64	211.08	9.46	0.00	331.18	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2065	0.00	0.00	151.42	210.14	9.46	0.00	371.02	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2066	0.00	0.00	135.21	396.90	9.46	0.00	541.57	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2067	0.00	0.00	153.54	207.34	70.78	0.00	431.66	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2068	0.00	0.00	137.11	203.59	9.46	0.00	350.17	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2069	0.00	0.00	155.70	203.59	9.46	0.00	368.75	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2070	0.00	0.00	23.67	203.59	25.37	0.00	252.63	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2071	0.00	0.00	116.18	203.59	35.97	0.00	355.75	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2072	0.00	0.00	158.99	203.59	41.41	0.00	404.00	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2073	0.00	0.00	141.98	203.59	25.79	0.00	371.37	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2074	0.00	0.00	161.23	203.59	78.21	0.00	443.03	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2075	0.00	0.00	77.06	203.59	13.29	0.00	293.94	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2076	0.00	0.00	71.92	203.59	21.80	0.00	297.31	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2077	0.00	0.00	10.93	203.59	54.04	0.00	268.57	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2078	0.00	0.00	0.00	203.59	37.55	0.00	241.14	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2079	0.00	0.00	0.00	203.59	37.12	0.00	240.72	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2080	0.00	0.00	0.00	216.69	36.55	0.00	253.24	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2081	0.00	0.00	0.00	603.30	34.85	0.00	638.16	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2082	0.00	0.00	0.00	610.78	53.50	0.00	664.28	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2083	0.00	0.00	204.94	597.69	30.93	0.00	833.56	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2084	0.00	0.00	280.46	211.08	38.31	0.00	529.85	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2085	0.00	0.00	42.63	210.14	38.03	0.00	290.80	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2086	0.00	0.00	104.64	396.90	36.33	0.00	537.87	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2087	0.00	0.00	143.20	207.34	34.62	0.00	385.16	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2088	0.00	0.00	21.77	203.59	16.03	0.00	241.39	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2089	0.00	0.00	0.00	197.05	28.53	0.00	225.58	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
2090	0.00	0.00	0.00	3.74	0.14	0.00	3.88	56.94	127.95	300.48	59.57	255.41	292.13	-306.63
Salvage Value	0.00	0.00	11.06	25.62	5.43	0.00	42.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	1093.35	2578.12	446.03	0.00	4181.82	284.93	641.69	6679.11	1373.24	1423.00	2859.17	1023.70

Net Present Value -4085

K22/Gas

TABLE 386
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	107.68	0.00	0.00	10.08	0.00	117.76	0.59	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	35.49	0.00	0.00	11.31	0.00	46.80	0.82	0.00	433.97	103.30	34.19	121.38	175.11
2016	0.00	38.11	0.00	0.00	11.42	0.00	49.53	1.07	0.00	449.12	101.42	36.47	124.60	186.63
2017	0.00	248.88	0.00	0.00	33.24	0.00	282.12	2.48	0.00	489.42	99.78	37.70	130.34	221.60
2018	0.00	486.04	0.00	0.00	11.88	0.00	497.92	4.97	0.00	465.38	96.91	41.08	136.23	191.16
2019	0.00	777.34	0.00	0.00	20.68	0.00	798.02	8.96	0.00	448.74	94.94	36.40	139.14	178.26
2020	0.00	874.32	0.00	0.00	37.63	0.00	911.94	13.52	0.00	470.62	94.33	31.96	147.72	196.60
2021	0.00	711.17	0.00	0.00	53.38	0.00	764.54	17.34	0.00	465.49	92.68	30.39	161.40	181.03
2022	0.00	413.91	0.00	0.00	63.21	0.00	477.12	19.73	13.29	474.23	92.65	34.56	149.08	197.95
2023	0.00	192.68	0.00	0.00	0.01	0.00	192.69	20.69	13.51	627.65	98.45	33.99	132.37	362.84
2024	0.00	66.77	0.00	0.00	0.00	0.00	66.77	21.03	13.21	653.04	98.30	38.40	141.60	374.74
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	21.03	13.43	622.49	98.29	26.77	123.78	373.65
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.03	13.26	601.30	96.39	27.11	129.76	348.04
2027	0.00	0.00	127.65	0.00	0.00	0.00	127.65	21.55	13.21	555.27	94.51	25.93	126.32	308.51
2028	0.00	0.00	166.53	0.00	12.34	0.00	178.87	22.34	12.96	529.24	92.93	27.03	130.95	278.32
2029	0.00	0.00	21.92	0.00	0.00	0.00	21.92	22.45	16.59	522.30	92.08	34.09	132.57	263.55
2030	0.00	0.00	107.60	0.00	0.00	0.00	107.60	22.98	16.59	505.81	90.28	42.26	139.51	233.76
2031	0.00	0.00	376.37	0.00	97.19	0.00	473.56	25.34	16.64	493.01	88.58	49.55	148.27	206.61
2032	0.00	0.00	350.98	0.00	0.00	0.00	350.98	27.10	23.48	478.54	86.94	66.73	155.56	169.31
2033	0.00	0.00	147.46	0.00	12.34	0.00	159.81	27.89	19.46	493.25	87.13	58.75	159.17	188.20
2034	0.00	0.00	10.87	0.00	0.00	0.00	10.87	27.95	26.52	528.98	84.66	159.16	136.26	148.90
2035	0.00	0.00	233.42	0.00	0.00	0.00	233.42	29.12	26.52	501.26	82.56	174.56	146.70	97.44
2036	0.00	0.00	337.89	0.00	0.00	0.00	337.89	30.81	26.53	484.35	81.01	189.13	154.83	59.37
2037	0.00	0.00	151.64	0.00	0.00	0.00	151.64	31.56	26.53	500.97	81.46	179.33	154.99	85.19
2038	0.00	0.00	249.53	0.00	0.00	0.00	249.53	32.81	32.93	536.79	79.04	289.54	135.99	32.22
2039	0.00	0.00	345.04	0.00	0.00	0.00	345.04	34.54	32.94	521.79	77.65	304.59	153.12	-13.58
2040	0.00	0.00	154.84	0.00	81.76	0.00	236.61	35.72	32.94	524.75	77.16	307.52	161.00	-20.92
2041	0.00	0.00	11.41	0.00	0.00	0.00	11.41	35.78	40.02	567.29	75.14	422.16	138.09	-68.09
2042	0.00	0.00	245.10	0.00	0.00	0.00	245.10	37.00	42.97	545.64	73.29	451.17	148.93	-127.75
2043	0.00	0.00	354.80	0.00	0.00	0.00	354.80	38.78	40.02	530.40	71.92	473.53	157.46	-172.52
2044	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.57	40.02	527.47	71.56	473.62	164.57	-182.28
2045	0.00	0.00	11.73	0.00	0.00	0.00	11.73	39.63	47.09	578.79	69.93	594.30	141.86	-227.29
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.09	561.53	68.66	616.01	151.93	-275.07
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	48.87	545.50	67.27	646.33	161.98	-330.08
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	48.88	561.94	68.62	618.88	151.92	-277.48
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	48.88	561.94	68.62	618.88	151.92	-277.48
2050	0.00	0.00	0.00	0.00	10.62	0.00	10.62	39.63	47.99	561.94	68.62	618.88	151.92	-277.48
2051	0.00	0.00	0.00	0.00	10.69	0.00	10.69	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2052	0.00	0.00	0.00	0.00	10.71	0.00	10.71	39.63	50.06	561.94	68.62	618.88	151.92	-277.48
2053	0.00	0.00	0.00	0.00	0.58	0.00	0.58	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2054	0.00	0.00	0.00	0.00	19.19	0.00	19.19	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2055	0.00	0.00	0.00	0.00	25.46	0.00	25.46	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2056	0.00	0.00	0.00	0.00	27.52	0.00	27.52	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2057	0.00	0.00	105.37	0.00	22.45	0.00	127.82	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2058	0.00	0.00	144.20	0.00	0.00	0.00	144.20	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2059	0.00	0.00	21.92	0.00	0.00	0.00	21.92	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2060	0.00	0.00	107.60	0.00	0.00	0.00	107.60	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2061	0.00	0.00	374.25	0.00	0.00	0.00	374.25	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2062	0.00	0.00	350.98	0.00	0.00	0.00	350.98	39.63	50.06	561.94	68.62	618.88	151.92	-277.48
2063	0.00	0.00	147.46	0.00	12.34	0.00	159.81	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2064	0.00	0.00	10.87	0.00	0.00	0.00	10.87	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2065	0.00	0.00	233.42	0.00	0.69	0.00	234.11	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2066	0.00	0.00	337.89	0.00	73.62	0.00	411.51	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2067	0.00	0.00	151.64	0.00	22.53	0.00	174.16	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2068	0.00	0.00	249.53	0.00	23.63	0.00	273.16	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2069	0.00	0.00	345.04	0.00	1.48	0.00	346.52	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2070	0.00	0.00	154.84	0.00	12.17	0.00	167.01	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2071	0.00	0.00	11.41	0.00	25.85	0.00	37.26	39.63	62.94	561.94	68.62	618.88	151.92	-277.48
2072	0.00	0.00	245.10	0.00	40.76	0.00	285.86	39.63	50.06	561.94	68.62	618.88	151.92	-277.48
2073	0.00	0.00	354.80	0.00	0.01	0.00	354.81	39.63	48.88	561.94	68.62	618.88	151.92	-277.48
2074	0.00	0.00	159.22	0.00	0.00	0.00	159.22	39.63	48.88	561.94	68.62	618.88	151.92	-277.48
2075	0.00	0.00	11.73	0.00	61.32	0.00	73.05	39.63	48.88	561.94	68.62	618.88	151.92	-277.48
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.99	561.94	68.62	618.88	151.92	-277.48
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2081	0.00	0.00	0.00	0.00	24.30	0.00	24.30	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	50.06	561.94	68.62	618.88	151.92	-277.48
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2087	0.00	0.00	105.37	0.00	10.08	0.00	115.45	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2088	0.00	0.00	144.20	0.00	0.00	0.00	144.20	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2089	0.00	0.00	21.92	0.00	0.00	0.00	21.92	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
2090	0.00	0.00	0.00	0.00	20.44	0.00	20.44	39.63	47.10	561.94	68.62	618.88	151.92	-277.48
Salvage Value	0.00	0.00	10.50	0.00	1.87	0.00	12.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2777.64	1058.42	0.00	257.77	0.00	4093.83	316.50	263.16	8256.44	1468.90	2449.38	2265.28	2072.88

Net Present Value: -2601

K22/C29

TABLE 387
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	107.68	0.00	0.00	10.08	0.00	149.70	0.75	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.87	35.49	0.00	0.00	11.31	0.00	87.67	1.19	0.00	433.97	103.30	34.19	121.38	175.11
2016	11.52	38.11	0.00	0.00	11.42	0.00	61.05	1.49	0.00	449.12	101.42	36.47	124.60	186.63
2017	12.30	248.88	0.00	0.00	33.24	0.00	294.42	2.96	0.00	489.42	99.78	37.70	130.34	221.60
2018	12.39	486.04	0.00	0.00	11.88	0.00	510.31	5.52	0.00	465.38	96.91	41.08	136.23	191.16
2019	14.85	777.34	0.00	0.00	20.68	0.00	812.87	9.58	0.00	448.74	94.94	36.40	139.14	178.26
2020	188.90	874.32	0.00	0.00	37.63	0.00	1100.84	15.08	0.00	470.63	94.33	31.96	147.73	196.60
2021	284.83	711.17	0.00	0.00	53.38	0.00	1049.37	20.33	0.00	465.18	92.68	30.40	161.67	180.43
2022	308.98	413.91	0.00	0.00	63.21	0.00	786.10	24.26	13.29	473.85	92.66	34.51	149.36	197.32
2023	315.53	192.68	0.00	0.00	4.34	0.00	512.55	26.82	13.51	626.29	98.44	34.08	132.49	361.28
2024	856.59	66.77	0.00	0.00	4.33	0.00	927.69	31.46	13.21	650.28	98.29	38.41	141.70	371.89
2025	1364.05	0.00	0.00	0.00	52.77	0.00	1416.82	38.55	13.43	619.05	98.31	26.81	123.94	369.99
2026	1226.99	0.00	0.00	0.00	27.62	0.00	1254.61	44.82	13.26	597.04	96.39	27.18	130.07	343.40
2027	877.84	0.00	0.00	0.00	46.57	0.00	924.42	49.44	13.21	553.07	94.76	24.90	126.32	307.08
2028	609.09	0.00	0.00	0.00	80.98	0.00	690.07	52.89	12.96	519.57	92.83	27.36	132.19	267.19
2029	400.82	0.00	0.00	0.00	107.18	0.00	508.00	55.43	27.13	681.72	96.67	31.37	117.52	436.17
2030	147.90	0.00	0.00	0.00	125.54	0.00	273.44	56.80	27.36	905.49	103.98	30.51	107.94	663.06
2031	46.76	0.00	0.00	0.00	0.00	0.00	46.76	57.03	27.26	937.52	103.67	31.20	113.36	689.29
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	30.24	905.44	101.98	30.84	114.38	658.24
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	26.04	869.78	100.34	30.83	112.00	626.61
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.99	842.34	98.72	31.49	114.00	598.13
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.82	810.73	97.14	31.70	114.73	567.16
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	57.03	25.44	776.93	95.57	31.65	115.81	533.89
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.03	25.52	742.78	94.01	31.82	117.69	499.26
2038	0.00	0.00	136.06	0.00	0.00	0.00	136.06	57.60	24.96	709.71	92.48	31.87	121.21	464.15
2039	0.00	0.00	177.98	0.00	12.34	0.00	190.32	58.44	27.74	698.26	91.10	31.21	138.58	437.37
2040	0.00	0.00	23.67	0.00	0.00	0.00	23.67	58.56	28.85	682.34	89.34	55.58	141.07	396.36
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.56	28.85	665.13	87.85	62.02	149.66	365.60
2042	0.00	0.00	117.04	0.00	0.00	0.00	117.04	59.15	31.81	651.59	86.42	63.95	163.64	337.59
2043	0.00	0.00	160.11	0.00	12.34	0.00	172.45	60.01	28.85	635.13	84.91	65.18	180.83	304.22
2044	0.00	0.00	142.97	0.00	0.00	0.00	142.97	60.72	32.92	619.81	83.43	100.52	177.19	258.68
2045	0.00	0.00	164.48	0.00	97.19	0.00	261.67	62.02	32.25	605.95	82.14	107.71	188.15	227.94
2046	0.00	0.00	24.68	0.00	0.00	0.00	24.68	62.14	36.33	623.97	81.78	106.65	198.30	237.24
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.11	579.38	79.53	142.76	205.21	151.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.11	603.10	81.15	119.04	197.22	205.69
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	41.07	603.10	81.15	119.04	197.22	205.69
2050	0.00	0.00	0.00	0.00	10.62	0.00	10.62	62.14	37.23	603.10	81.15	119.04	197.22	205.69
2051	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.14	36.35	603.10	81.15	119.04	197.22	205.69
2052	0.00	0.00	0.00	0.00	10.71	0.00	10.71	62.14	39.31	603.10	81.15	119.04	197.22	205.69
2053	0.00	0.00	0.00	0.00	0.58	0.00	0.58	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2054	0.00	0.00	0.00	0.00	19.19	0.00	19.19	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2055	0.00	0.00	0.00	0.00	25.46	0.00	25.46	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2056	0.00	0.00	0.00	0.00	27.52	0.00	27.52	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2057	0.00	0.00	0.00	0.00	22.45	0.00	22.45	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2058	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2059	0.00	0.00	0.00	0.00	1.07	0.00	1.07	62.14	55.15	603.10	81.15	119.04	197.22	205.69
2060	0.00	0.00	0.00	0.00	12.83	0.00	12.83	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2061	0.00	0.00	0.00	0.00	6.42	0.00	6.42	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2062	0.00	0.00	0.00	0.00	10.69	0.00	10.69	62.14	39.32	603.10	81.15	119.04	197.22	205.69
2063	0.00	0.00	0.00	0.00	18.18	0.00	18.18	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2064	0.00	0.00	0.00	0.00	25.66	0.00	25.66	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2065	0.00	0.00	0.00	0.00	31.70	0.00	31.70	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2066	0.00	0.00	0.00	0.00	0.73	0.00	0.73	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2067	0.00	0.00	0.00	0.00	22.53	0.00	22.53	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2068	0.00	0.00	113.78	0.00	11.29	0.00	125.07	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2069	0.00	0.00	155.70	0.00	1.48	0.00	157.18	62.14	55.15	603.10	81.15	119.04	197.22	205.69
2070	0.00	0.00	23.67	0.00	12.17	0.00	35.83	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2071	0.00	0.00	0.00	0.00	25.85	0.00	25.85	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2072	0.00	0.00	116.99	0.00	40.76	0.00	157.75	62.14	55.15	603.10	81.15	119.04	197.22	205.69
2073	0.00	0.00	160.11	0.00	3.27	0.00	163.38	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2074	0.00	0.00	142.97	0.00	15.60	0.00	158.58	62.14	53.96	603.10	81.15	119.04	197.22	205.69
2075	0.00	0.00	162.36	0.00	39.94	0.00	202.29	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2076	0.00	0.00	24.68	0.00	21.20	0.00	45.88	62.14	53.08	603.10	81.15	119.04	197.22	205.69
2077	0.00	0.00	0.00	0.00	35.88	0.00	35.88	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2078	0.00	0.00	0.00	0.00	75.14	0.00	75.14	62.14	52.19	603.10	81.15	119.04	197.22	205.69
2079	0.00	0.00	0.00	0.00	81.51	0.00	81.51	62.14	39.32	603.10	81.15	119.04	197.22	205.69
2080	0.00	0.00	0.00	0.00	167.42	0.00	167.42	62.14	53.96	603.10	81.15	119.04	197.22	205.69
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	56.92	603.10	81.15	119.04	197.22	205.69
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	38.13	603.10	81.15	119.04	197.22	205.69
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	53.96	603.10	81.15	119.04	197.22	205.69
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	36.36	603.10	81.15	119.04	197.22	205.69
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	39.32	603.10	81.15	119.04	197.22	205.69
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.14	36.36	603.10	81.15	119.04	197.22	205.69
Salvage Value	5.07	0.00	3.37	0.00	4.36	0.00	12.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3364.72	2777.64	185.86	0.00	408.28	0.00	6736.50	539.94	248.53	9420.60	1548.35	754.09	2275.97	4842.19

Net Present Value: -2683

SCGT/C26

TABLE 388
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	433.97	103.30	34.19	121.39	175.10
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	449.67	101.42	36.46	124.60	187.19
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	490.85	99.77	37.68	130.30	223.11
2018	243.00	0.00	0.37	0.00	0.00	0.00	243.37	3.58	0.00	467.79	96.90	41.08	136.13	193.68
2019	292.57	0.00	0.00	0.00	0.00	0.00	292.57	5.04	0.00	450.87	94.93	36.40	139.03	180.51
2020	300.06	0.00	122.63	0.00	0.00	0.00	422.69	7.05	0.00	481.47	94.96	28.90	145.36	212.25
2021	828.64	0.00	159.61	0.00	12.34	0.00	1000.59	11.94	0.00	472.60	93.17	27.23	158.75	193.46
2022	1332.76	0.00	20.87	0.00	0.82	0.00	1354.45	18.71	4.07	460.12	90.91	50.61	164.38	154.23
2023	1198.84	0.00	0.00	0.00	1.64	0.00	1200.49	24.71	4.07	439.65	88.50	63.95	175.70	111.50
2024	857.70	0.00	0.00	0.00	3.28	0.00	860.99	29.02	4.07	434.52	87.32	69.62	183.57	94.00
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	32.03	4.07	388.53	87.84	43.19	164.60	92.89
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	34.00	18.69	495.66	91.86	32.86	130.98	239.96
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	34.73	18.91	709.91	99.82	30.41	118.56	461.13
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	34.96	18.61	746.21	99.83	33.29	130.12	482.97
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.83	712.99	98.08	34.31	132.41	448.19
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.65	684.39	96.87	33.84	127.67	426.01
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.60	656.01	94.85	36.86	133.39	390.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	18.36	611.12	92.92	39.25	133.76	345.20
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.92	581.45	90.96	46.10	139.32	305.07
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.92	566.98	89.37	53.21	148.34	276.06
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.96	17.96	553.17	88.04	59.19	154.25	251.69
2036	0.00	0.00	112.20	0.00	0.00	0.00	112.20	35.52	20.74	546.12	86.95	59.78	163.69	235.70
2037	0.00	0.00	153.59	0.00	12.34	0.00	165.93	36.35	17.78	530.66	85.42	60.85	181.11	203.28
2038	0.00	0.00	23.34	0.00	0.00	0.00	23.34	36.46	21.85	516.82	83.89	93.92	179.29	159.72
2039	0.00	0.00	114.57	0.00	0.00	0.00	114.57	37.04	21.85	503.85	82.61	102.00	195.79	123.45
2040	0.00	0.00	158.91	0.00	97.19	0.00	256.10	38.31	21.85	493.89	81.25	101.39	217.75	93.51
2041	0.00	0.00	140.01	0.00	0.00	0.00	140.01	39.01	25.94	475.75	79.56	143.14	217.29	35.76
2042	0.00	0.00	158.99	0.00	0.00	0.00	158.99	39.80	25.27	457.40	78.21	161.09	225.29	-7.19
2043	0.00	0.00	141.98	0.00	0.00	0.00	141.98	40.51	29.34	447.96	76.87	180.53	239.85	-49.28
2044	0.00	0.00	161.23	0.00	81.76	0.00	242.99	41.72	29.34	433.41	75.54	182.94	265.20	-90.27
2045	0.00	0.00	24.51	0.00	0.00	0.00	24.51	41.85	33.43	422.06	74.18	251.02	249.26	-152.40
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	36.39	408.61	73.00	276.98	256.96	-198.33
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.44	394.70	71.65	282.12	286.73	-245.80
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.45	408.46	72.94	270.04	264.32	-198.84
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.45	408.46	72.94	270.04	264.32	-198.84
2050	0.00	0.00	100.35	0.00	10.08	0.00	110.43	41.85	33.46	408.46	72.94	270.04	264.32	-198.84
2051	0.00	0.00	137.33	0.00	10.08	0.00	147.41	41.85	35.24	408.46	72.94	270.04	264.32	-198.84
2052	0.00	0.00	20.87	0.00	10.08	0.00	30.95	41.85	35.25	408.46	72.94	270.04	264.32	-198.84
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	408.46	72.94	270.04	264.32	-198.84
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	408.46	72.94	270.04	264.32	-198.84
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	408.46	72.94	270.04	264.32	-198.84
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	41.85	36.43	408.46	72.94	270.04	264.32	-198.84
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2066	0.00	0.00	112.20	0.00	0.00	0.00	112.20	41.85	36.43	408.46	72.94	270.04	264.32	-198.84
2067	0.00	0.00	153.54	0.00	0.00	0.00	153.54	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2068	0.00	0.00	23.34	0.00	0.00	0.00	23.34	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2069	0.00	0.00	114.57	0.00	0.00	0.00	114.57	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2070	0.00	0.00	156.79	0.00	0.00	0.00	156.79	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2071	0.00	0.00	140.01	0.00	0.00	0.00	140.01	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2072	0.00	0.00	158.99	0.00	13.16	0.00	172.16	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2073	0.00	0.00	141.98	0.00	1.64	0.00	143.62	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2074	0.00	0.00	161.23	0.00	3.28	0.00	164.51	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2075	0.00	0.00	24.51	0.00	80.28	0.00	104.79	41.85	49.30	408.46	72.94	270.04	264.32	-198.84
2076	0.00	0.00	0.00	0.00	3.28	0.00	3.28	41.85	36.43	408.46	72.94	270.04	264.32	-198.84
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	51.08	408.46	72.94	270.04	264.32	-198.84
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	35.25	408.46	72.94	270.04	264.32	-198.84
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	41.85	51.08	408.46	72.94	270.04	264.32	-198.84
2080	0.00	0.00	100.35	0.00	0.00	0.00	100.35	41.85	35.25	408.46	72.94	270.04	264.32	-198.84
2081	0.00	0.00	137.33	0.00	0.00	0.00	137.33	41.85	51.08	408.46	72.94	270.04	264.32	-198.84
2082	0.00	0.00	20.87	0.00	0.00	0.00	20.87	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	36.43	408.46	72.94	270.04	264.32	-198.84
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
2090	0.00	0.00	0.00	0.00	24.30	0.00	24.30	41.85	33.47	408.46	72.94	270.04	264.32	-198.84
Salvage Value	1.98	0.00	5.52	0.00	1.36	0.00	8.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	485.51	0.00	94.79	0.00	4610.65	364.63	196.32	7934.15	1485.54	1279.56	2658.78	2510.26

Net Present Value -2661

CCGT/C26

TABLE 389
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	High
Capital Cost	High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	433.97	103.30	34.19	121.39	175.10
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	449.67	101.42	36.46	124.60	187.19
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	490.85	99.77	37.68	130.30	223.11
2018	243.00	0.00	0.37	0.00	0.00	0.00	243.37	3.58	0.00	467.79	96.90	41.08	136.13	193.68
2019	292.57	0.00	208.77	0.00	0.00	0.00	501.34	6.09	0.00	450.87	94.93	36.40	139.03	180.51
2020	300.06	0.00	324.49	0.00	0.00	0.00	624.54	9.10	0.00	481.47	94.96	28.90	145.36	212.25
2021	828.64	0.00	157.90	0.00	12.34	0.00	998.88	13.98	0.00	483.05	93.95	24.02	155.87	209.21
2022	1332.76	0.00	9.99	0.00	0.82	0.00	1343.57	20.70	7.06	506.34	91.44	98.81	131.89	184.20
2023	1198.84	0.00	0.00	0.00	1.64	0.00	1200.49	26.70	7.06	497.79	89.35	113.83	140.45	154.15
2024	857.70	0.00	0.00	0.00	3.28	0.00	860.99	31.01	7.06	498.24	88.35	121.16	145.34	143.40
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	34.02	7.06	451.14	88.03	102.34	136.31	124.45
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	35.99	21.68	545.80	91.79	87.76	113.07	253.19
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	36.72	21.90	754.22	99.80	77.00	103.81	473.62
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	36.95	21.60	792.48	99.98	79.05	113.25	500.20
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.82	763.20	98.22	86.66	112.56	465.76
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.65	722.67	96.05	94.30	112.36	419.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.60	734.37	96.02	89.87	108.64	439.85
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	21.35	677.71	93.09	101.47	112.89	370.26
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.91	649.87	91.42	107.65	113.44	337.37
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.91	625.38	89.37	118.61	120.61	296.79
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	20.95	611.51	87.88	127.48	125.92	270.23
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.95	23.74	594.13	86.22	139.83	133.08	235.00
2037	0.00	0.00	112.98	0.00	0.00	0.00	112.98	37.51	20.78	591.95	85.47	144.19	136.32	225.97
2038	0.00	0.00	154.66	0.00	12.34	0.00	167.01	38.35	20.78	583.87	84.26	146.88	148.78	203.93
2039	0.00	0.00	23.50	0.00	0.00	0.00	23.50	38.46	24.85	567.54	82.46	176.31	160.95	147.82
2040	0.00	0.00	115.37	0.00	0.00	0.00	115.37	39.04	24.85	553.06	81.01	188.56	171.05	112.43
2041	0.00	0.00	160.01	0.00	97.19	0.00	257.20	40.31	24.85	538.74	79.67	196.76	183.80	78.51
2042	0.00	0.00	140.99	0.00	0.00	0.00	140.99	41.02	28.26	528.90	78.31	213.90	197.61	39.08
2043	0.00	0.00	160.11	0.00	0.00	0.00	160.11	41.82	28.26	509.33	76.88	242.19	198.36	-8.11
2044	0.00	0.00	24.34	0.00	0.00	0.00	24.34	41.94	32.33	495.41	75.54	267.30	206.98	-54.41
2045	0.00	0.00	119.47	0.00	0.00	0.00	119.47	42.54	32.33	479.85	74.20	275.46	226.38	-96.19
2046	0.00	0.00	163.49	0.00	81.76	0.00	245.25	43.77	35.30	471.72	73.28	274.59	244.47	-120.62
2047	0.00	0.00	24.85	0.00	0.00	0.00	24.85	43.89	36.43	446.46	71.67	329.51	238.54	-193.27
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.43	466.01	73.05	293.19	236.47	-136.70
2049	0.00	0.00	208.77	0.00	10.08	0.00	218.85	43.89	36.44	466.01	73.05	293.19	236.47	-136.70
2050	0.00	0.00	302.21	0.00	10.08	0.00	312.29	43.89	36.44	466.01	73.05	293.19	236.47	-136.70
2051	0.00	0.00	135.62	0.00	10.08	0.00	145.70	43.89	38.22	466.01	73.05	293.19	236.47	-136.70
2052	0.00	0.00	9.99	0.00	10.08	0.00	20.07	43.89	38.23	466.01	73.05	293.19	236.47	-136.70
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.23	466.01	73.05	293.19	236.47	-136.70
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	466.01	73.05	293.19	236.47	-136.70
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	466.01	73.05	293.19	236.47	-136.70
2056	0.00	0.00	0.00	0.00	12.34	0.00	12.34	43.89	39.42	466.01	73.05	293.19	236.47	-136.70
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	39.42	466.01	73.05	293.19	236.47	-136.70
2067	0.00	0.00	112.98	0.00	0.00	0.00	112.98	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2068	0.00	0.00	154.62	0.00	0.00	0.00	154.62	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2069	0.00	0.00	23.50	0.00	0.00	0.00	23.50	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2070	0.00	0.00	115.37	0.00	0.00	0.00	115.37	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2071	0.00	0.00	157.89	0.00	0.00	0.00	157.89	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2072	0.00	0.00	140.99	0.00	0.82	0.00	141.81	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2073	0.00	0.00	160.11	0.00	13.98	0.00	174.09	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2074	0.00	0.00	24.34	0.00	3.28	0.00	27.62	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2075	0.00	0.00	119.47	0.00	7.39	0.00	126.86	43.89	52.29	466.01	73.05	293.19	236.47	-136.70
2076	0.00	0.00	163.49	0.00	76.18	0.00	239.67	43.89	39.42	466.01	73.05	293.19	236.47	-136.70
2077	0.00	0.00	24.85	0.00	0.00	0.00	24.85	43.89	54.07	466.01	73.05	293.19	236.47	-136.70
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	38.24	466.01	73.05	293.19	236.47	-136.70
2079	0.00	0.00	208.77	0.00	0.00	0.00	208.77	43.89	54.07	466.01	73.05	293.19	236.47	-136.70
2080	0.00	0.00	302.21	0.00	0.00	0.00	302.21	43.89	38.24	466.01	73.05	293.19	236.47	-136.70
2081	0.00	0.00	135.62	0.00	61.32	0.00	196.94	43.89	54.07	466.01	73.05	293.19	236.47	-136.70
2082	0.00	0.00	9.99	0.00	0.00	0.00	9.99	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	39.42	466.01	73.05	293.19	236.47	-136.70
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.89	36.46	466.01	73.05	293.19	236.47	-136.70
Salvage Value	1.98	0.00	8.74	0.00	1.21	0.00	11.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	797.55	0.00	91.70	0.00	4919.61	386.12	222.15	8499.33	1487.92	1769.09	2380.58	2861.75

Net Present Value -2666

Wind/C26

TABLE 390
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost High

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.95	64.32	0.00	0.00	10.08	0.00	106.35	0.53	0.00	379.57	105.25	29.87	115.46	129.00
2015	40.87	0.00	0.00	0.00	10.08	0.00	50.95	0.79	0.00	433.97	103.30	34.19	121.40	175.09
2016	90.50	0.00	0.00	0.00	10.08	0.00	100.58	1.29	0.00	449.67	101.42	36.46	124.62	187.17
2017	205.27	0.00	0.00	0.00	10.08	0.00	215.34	2.37	0.00	490.86	99.77	37.68	130.29	223.13
2018	243.00	0.00	0.00	0.00	0.00	0.00	243.00	3.58	0.00	467.79	96.90	41.08	136.12	193.70
2019	292.57	0.00	0.00	0.00	0.00	0.00	292.57	5.04	0.00	450.87	94.93	36.40	139.04	180.50
2020	300.06	0.00	0.00	13.09	21.21	0.00	334.36	6.72	0.00	476.30	94.52	30.96	146.70	204.11
2021	828.64	0.00	0.00	399.71	35.35	0.00	1263.70	13.03	0.00	467.62	92.73	29.90	159.83	185.17
2022	1332.76	0.00	0.00	407.19	43.24	0.00	1783.19	21.95	6.34	477.26	91.07	29.82	162.19	194.17
2023	1198.84	0.00	0.00	394.10	22.85	0.00	1615.79	30.03	12.69	474.19	88.55	34.03	168.06	183.55
2024	857.70	0.00	0.00	7.48	10.35	0.00	875.54	34.41	19.03	478.61	86.62	34.78	174.70	182.50
2025	595.12	0.00	0.00	0.00	7.39	0.00	602.51	37.42	19.03	427.18	86.53	22.86	183.09	134.69
2026	391.62	0.00	0.00	0.00	3.28	0.00	394.91	39.39	33.65	572.96	90.60	27.16	130.08	325.12
2027	144.51	0.00	0.00	0.00	0.00	0.00	144.51	40.12	33.87	788.02	98.53	24.53	116.00	548.96
2028	45.69	0.00	0.00	0.00	0.00	0.00	45.69	40.34	33.57	816.47	98.33	26.74	126.36	565.03
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.79	785.18	96.65	27.14	128.88	532.51
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.62	763.72	95.57	26.50	125.98	515.66
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	33.57	747.29	94.11	27.45	128.75	496.98
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	40.34	33.32	712.80	92.69	27.37	127.53	465.20
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.34	32.88	670.89	91.16	27.25	124.22	428.26
2034	0.00	0.00	132.93	0.00	0.00	0.00	132.93	40.90	32.88	637.72	89.68	27.42	126.10	394.53
2035	0.00	0.00	173.70	0.00	12.34	0.00	186.04	41.72	32.92	626.12	88.65	25.37	131.96	380.14
2036	0.00	0.00	135.21	0.00	0.00	0.00	135.21	42.39	39.78	601.65	86.52	47.18	138.73	329.22
2037	0.00	0.00	153.59	0.00	12.34	0.00	165.93	43.22	36.82	584.48	85.03	53.26	148.36	297.83
2038	0.00	0.00	23.34	0.00	0.00	0.00	23.34	43.34	40.89	575.79	83.74	69.24	155.05	267.75
2039	0.00	0.00	114.57	0.00	0.00	0.00	114.57	43.91	40.89	566.86	82.55	68.24	176.72	239.35
2040	0.00	0.00	158.91	13.09	97.19	0.00	269.19	45.25	40.89	544.76	80.83	88.03	182.95	192.95
2041	0.00	0.00	140.01	399.71	0.00	0.00	539.72	47.95	44.97	531.85	79.40	107.77	192.50	152.18
2042	0.00	0.00	158.99	407.19	0.00	0.00	566.18	50.78	44.30	516.53	78.09	112.74	207.31	118.39
2043	0.00	0.00	141.98	394.10	0.00	0.00	536.08	53.46	48.37	506.52	76.76	125.99	224.66	79.11
2044	0.00	0.00	161.23	7.48	81.76	0.00	250.47	54.71	48.37	484.60	75.37	158.67	222.28	28.28
2045	0.00	0.00	24.51	0.00	0.00	0.00	24.51	54.83	52.46	471.85	74.08	185.20	231.21	-18.64
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	55.43	456.24	72.79	189.02	253.88	-59.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.47	442.07	71.52	191.91	281.29	-102.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.48	456.72	72.80	188.71	255.46	-60.25
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.49	456.72	72.80	188.71	255.46	-60.25
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.49	456.72	72.80	188.71	255.46	-60.25
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	54.27	456.72	72.80	188.71	255.46	-60.25
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	54.28	456.72	72.80	188.71	255.46	-60.25
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	456.72	72.80	188.71	255.46	-60.25
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	456.72	72.80	188.71	255.46	-60.25
2055	0.00	0.00	0.00	0.00	5.30	0.00	5.30	54.83	54.28	456.72	72.80	188.71	255.46	-60.25
2056	0.00	0.00	0.00	0.00	8.84	0.00	8.84	54.83	55.46	456.72	72.80	188.71	255.46	-60.25
2057	0.00	0.00	0.00	0.00	10.60	0.00	10.60	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2058	0.00	0.00	0.00	0.00	5.30	0.00	5.30	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2059	0.00	0.00	0.00	0.00	1.77	0.00	1.77	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2060	0.00	0.00	0.00	13.09	0.00	0.00	13.09	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2061	0.00	0.00	0.00	399.71	0.00	0.00	399.71	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2062	0.00	0.00	0.00	407.19	0.00	0.00	407.19	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2063	0.00	0.00	0.00	394.10	0.00	0.00	394.10	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2064	0.00	0.00	110.64	7.48	0.00	0.00	118.13	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2065	0.00	0.00	151.42	0.00	0.00	0.00	151.42	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2066	0.00	0.00	135.21	0.00	0.00	0.00	135.21	54.83	55.46	456.72	72.80	188.71	255.46	-60.25
2067	0.00	0.00	153.54	0.00	0.00	0.00	153.54	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2068	0.00	0.00	23.34	0.00	0.00	0.00	23.34	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2069	0.00	0.00	114.57	0.00	0.00	0.00	114.57	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2070	0.00	0.00	156.79	0.00	28.25	0.00	185.04	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2071	0.00	0.00	140.01	0.00	26.51	0.00	166.53	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2072	0.00	0.00	158.99	0.00	44.98	0.00	203.97	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2073	0.00	0.00	141.98	0.00	17.55	0.00	159.53	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2074	0.00	0.00	161.23	0.00	8.59	0.00	169.81	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2075	0.00	0.00	24.51	0.00	80.28	0.00	104.79	54.83	68.33	456.72	72.80	188.71	255.46	-60.25
2076	0.00	0.00	0.00	0.00	3.28	0.00	3.28	54.83	55.46	456.72	72.80	188.71	255.46	-60.25
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	70.11	456.72	72.80	188.71	255.46	-60.25
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	54.28	456.72	72.80	188.71	255.46	-60.25
2079	0.00	0.00	0.00	0.00	61.32	0.00	61.32	54.83	70.11	456.72	72.80	188.71	255.46	-60.25
2080	0.00	0.00	0.00	13.09	0.00	0.00	13.09	54.83	54.28	456.72	72.80	188.71	255.46	-60.25
2081	0.00	0.00	0.00	399.71	0.00	0.00	399.71	54.83	70.11	456.72	72.80	188.71	255.46	-60.25
2082	0.00	0.00	0.00	407.19	0.00	0.00	407.19	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2083	0.00	0.00	0.00	394.10	0.00	0.00	394.10	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2084	0.00	0.00	0.00	7.48	10.08	0.00	17.56	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	55.46	456.72	72.80	188.71	255.46	-60.25
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
2090	0.00	0.00	0.00	0.00	24.30	0.00	24.30	54.83	52.50	456.72	72.80	188.71	255.46	-60.25
Salvage Value	1.98	0.00	4.31	6.52	1.97	0.00	14.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3966.03	64.32	359.13	1019.73	172.43	0.00	5581.64	439.28	347.44	8493.76	1480.50	956.20	2567.65	3489.40

Net Present Value -2879

K19/C25/750MW (WPS Sale &Inv)

TABLE 391
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	3.09	259.35	1.30	0.00	372.48	105.26	29.92	116.00	121.30
2015	87.06	457.15	0.00	0.00	17.36	5.50	567.07	4.13	0.00	422.64	103.32	34.19	121.56	163.57
2016	173.05	602.85	0.00	0.00	22.96	13.86	812.72	8.20	0.00	438.30	101.44	36.51	124.90	175.45
2017	199.14	728.47	0.00	0.00	32.60	20.13	980.34	13.10	0.00	472.25	99.40	39.11	132.09	201.64
2018	237.78	512.16	0.00	0.00	32.01	84.64	866.59	17.43	0.00	454.72	97.24	40.04	135.38	182.06
2019	241.61	365.25	0.00	0.00	40.52	69.15	716.54	21.01	13.29	490.73	97.18	37.40	136.13	220.03
2020	664.05	148.71	0.00	0.00	2.60	130.92	946.29	25.74	45.83	772.96	104.59	29.28	155.79	483.29
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	31.47	43.92	845.21	105.23	31.93	171.84	536.22
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	36.32	42.55	847.94	104.05	31.94	176.89	535.06
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	39.84	40.67	807.81	101.69	31.53	182.48	492.11
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	42.43	39.07	780.44	99.39	34.80	192.31	453.94
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	44.28	52.00	873.87	104.07	30.73	143.71	595.36
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	45.22	50.42	1142.16	112.42	30.62	144.77	854.35
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	45.40	48.96	1188.55	112.33	29.96	159.44	886.82
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	47.93	1172.41	110.64	30.95	163.21	867.61
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	49.25	1142.70	108.69	31.02	167.70	835.29
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	43.96	1121.55	107.33	30.44	165.72	818.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	42.61	1108.57	105.65	31.07	171.12	800.73
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	41.09	1072.04	103.96	31.19	170.18	766.71
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.06	1036.89	102.14	31.24	173.11	730.40
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	39.10	1004.51	100.39	31.52	177.39	695.21
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	40.40	970.46	98.68	31.28	169.24	671.26
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	36.88	908.95	97.04	31.88	143.22	636.80
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	45.40	36.35	868.34	95.39	32.05	143.17	597.72
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.40	35.83	833.30	93.71	32.03	148.54	559.02
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	45.66	38.28	801.36	92.06	31.99	161.73	515.58
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	46.04	34.83	820.22	90.75	30.50	178.54	520.43
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	46.10	37.76	798.55	88.69	55.27	181.70	472.90
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	46.36	37.30	781.59	87.10	61.53	194.06	438.91
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	46.75	36.85	769.46	85.69	64.71	209.31	409.75
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	47.06	42.27	766.10	84.44	74.75	223.68	383.23
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	47.69	44.81	734.74	82.55	96.76	229.50	325.93
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.74	45.53	717.57	81.06	117.38	238.69	280.44
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	44.25	701.64	79.76	122.80	254.47	244.61
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	42.98	717.98	81.12	112.31	240.89	283.66
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	47.74	45.58	717.98	81.12	112.31	240.89	283.66
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	47.74	44.04	717.98	81.12	112.31	240.89	283.66
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	47.74	43.70	717.98	81.12	112.31	240.89	283.66
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	47.74	43.38	717.98	81.12	112.31	240.89	283.66
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	47.74	43.06	717.98	81.12	112.31	240.89	283.66
2054	0.00	0.00	0.00	0.00	14.11	14.92	29.03	47.74	42.75	717.98	81.12	112.31	240.89	283.66
2055	0.00	0.00	0.00	0.00	0.64	15.47	16.11	47.74	43.63	717.98	81.12	112.31	240.89	283.66
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.74	56.21	717.98	81.12	112.31	240.89	283.66
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	47.74	40.10	717.98	81.12	112.31	240.89	283.66
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	47.74	55.66	717.98	81.12	112.31	240.89	283.66
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	47.74	42.53	717.98	81.12	112.31	240.89	283.66
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	47.74	52.37	717.98	81.12	112.31	240.89	283.66
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	68.20	717.98	81.12	112.31	240.89	283.66
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	47.74	68.20	717.98	81.12	112.31	240.89	283.66
2065	0.00	0.00	0.00	0.00	6.95	3.37	10.32	47.74	39.50	717.98	81.12	112.31	240.89	283.66
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	47.74	68.20	717.98	81.12	112.31	240.89	283.66
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	47.74	68.20	717.98	81.12	112.31	240.89	283.66
2069	0.00	0.00	51.92	0.00	26.41	45.47	123.80	47.74	39.50	717.98	81.12	112.31	240.89	283.66
2070	0.00	0.00	70.63	0.00	1.96	47.15	119.74	47.74	54.15	717.98	81.12	112.31	240.89	283.66
2071	0.00	0.00	10.67	0.00	23.96	0.00	34.63	47.74	38.32	717.98	81.12	112.31	240.89	283.66
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	47.74	54.15	717.98	81.12	112.31	240.89	283.66
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	47.74	37.43	717.98	81.12	112.31	240.89	283.66
2074	0.00	0.00	62.88	0.00	37.68	0.00	100.56	47.74	52.37	717.98	81.12	112.31	240.89	283.66
2075	0.00	0.00	70.98	0.00	55.81	0.00	126.79	47.74	39.50	717.98	81.12	112.31	240.89	283.66
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	47.74	54.15	717.98	81.12	112.31	240.89	283.66
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	38.32	717.98	81.12	112.31	240.89	283.66
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	47.74	54.15	717.98	81.12	112.31	240.89	283.66
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	41.28	717.98	81.12	112.31	240.89	283.66
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	47.74	54.15	717.98	81.12	112.31	240.89	283.66
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	47.74	39.50	717.98	81.12	112.31	240.89	283.66
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	47.74	36.54	717.98	81.12	112.31	240.89	283.66
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	47.74	39.50	717.98	81.12	112.31	240.89	283.66
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	47.74	39.50	717.98	81.12	112.31	240.89	283.66
Salvage Value	0.79	0.00	1.53	0.00	2.91	1.39	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	85.85	0.00	307.55	252.30	6575.59	528.85	494.22	12176.07	1610.50	731.81	2682.71	7151.05

Net Present Value -448

K19/C25/750MW

TABLE 392
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	4.37	260.63	1.30	0.00	378.60	105.26	29.90	115.53	127.90
2015	87.06	457.15	0.00	0.00	17.36	7.04	568.61	4.15	0.00	431.52	103.31	34.17	121.47	172.56
2016	173.05	602.85	0.00	0.00	22.96	14.52	813.38	8.21	0.00	447.06	101.43	36.47	124.70	184.46
2017	199.14	728.47	0.00	0.00	32.60	20.13	980.34	13.11	0.00	482.54	99.40	39.13	131.87	212.14
2018	237.78	512.16	0.00	0.00	32.01	121.01	902.97	17.63	0.00	465.16	97.23	39.93	135.22	192.78
2019	241.61	365.25	0.00	0.00	40.52	82.31	729.69	21.28	13.29	500.55	97.17	37.38	135.87	230.13
2020	664.05	148.71	0.00	0.00	2.60	233.37	1048.74	26.52	49.02	796.69	104.58	29.25	154.33	508.53
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	32.25	47.22	862.68	105.23	32.12	170.89	554.43
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	37.09	45.88	864.48	104.05	31.94	175.79	552.71
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	40.62	43.85	825.36	101.68	31.53	181.18	510.98
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	43.20	42.12	798.19	99.38	34.87	191.10	472.83
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	45.06	54.92	892.67	104.06	30.78	141.22	616.61
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	46.00	53.22	1154.32	112.43	30.77	138.69	872.43
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	46.17	51.65	1189.61	112.35	29.73	144.80	902.73
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	50.50	1175.01	110.65	30.92	147.73	885.71
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	51.71	1148.49	108.69	30.99	152.53	856.28
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	46.31	1131.11	107.33	30.44	151.39	841.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	44.86	1123.48	105.64	31.20	156.89	829.74
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	43.24	1091.22	103.96	31.26	156.62	799.39
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	42.11	1059.48	102.16	31.17	159.14	767.01
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	41.06	1031.79	100.41	31.36	163.98	736.03
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	42.27	960.69	98.76	31.59	137.42	692.93
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	38.67	922.75	97.05	31.93	137.66	656.11
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	46.17	38.06	889.80	95.37	31.97	141.57	620.90
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.17	37.47	855.76	93.71	31.97	146.49	583.59
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	46.43	39.86	824.59	92.06	32.05	159.43	541.04
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	46.82	36.34	822.88	90.74	30.51	175.90	525.72
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	46.87	39.20	796.42	88.69	55.27	179.24	473.22
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	47.13	38.68	780.10	87.10	61.53	192.07	439.40
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	47.52	38.18	768.18	85.69	64.71	207.54	410.24
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	47.84	43.53	765.22	84.44	74.75	222.12	383.91
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	48.46	46.02	733.73	82.55	96.76	228.07	326.35
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	48.52	46.69	716.54	81.06	117.38	237.24	280.87
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	45.35	700.28	79.76	122.80	252.78	244.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	44.04	716.85	81.12	112.31	239.36	284.05
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	48.52	46.58	716.85	81.12	112.31	239.36	284.05
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	48.52	45.00	716.85	81.12	112.31	239.36	284.05
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	48.52	44.62	716.85	81.12	112.31	239.36	284.05
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	48.52	44.24	716.85	81.12	112.31	239.36	284.05
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	48.52	43.89	716.85	81.12	112.31	239.36	284.05
2054	0.00	0.00	0.00	0.00	14.11	14.92	29.03	48.52	43.53	716.85	81.12	112.31	239.36	284.05
2055	0.00	0.00	0.00	0.00	0.64	15.47	16.11	48.52	44.38	716.85	81.12	112.31	239.36	284.05
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	48.52	56.92	716.85	81.12	112.31	239.36	284.05
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	48.52	40.77	716.85	81.12	112.31	239.36	284.05
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	48.52	56.29	716.85	81.12	112.31	239.36	284.05
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	48.52	43.13	716.85	81.12	112.31	239.36	284.05
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	48.52	52.37	716.85	81.12	112.31	239.36	284.05
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	68.20	716.85	81.12	112.31	239.36	284.05
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	48.52	68.20	716.85	81.12	112.31	239.36	284.05
2065	0.00	0.00	0.00	0.00	6.95	3.37	10.32	48.52	39.50	716.85	81.12	112.31	239.36	284.05
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	48.52	68.20	716.85	81.12	112.31	239.36	284.05
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	48.52	68.20	716.85	81.12	112.31	239.36	284.05
2069	0.00	0.00	51.92	0.00	26.41	45.47	123.80	48.52	39.50	716.85	81.12	112.31	239.36	284.05
2070	0.00	0.00	70.63	0.00	1.96	47.15	119.74	48.52	54.15	716.85	81.12	112.31	239.36	284.05
2071	0.00	0.00	10.67	0.00	23.96	0.00	34.63	48.52	38.32	716.85	81.12	112.31	239.36	284.05
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	48.52	54.15	716.85	81.12	112.31	239.36	284.05
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	48.52	37.43	716.85	81.12	112.31	239.36	284.05
2074	0.00	0.00	62.88	0.00	37.68	0.00	100.56	48.52	52.37	716.85	81.12	112.31	239.36	284.05
2075	0.00	0.00	70.98	0.00	55.81	0.00	126.79	48.52	39.50	716.85	81.12	112.31	239.36	284.05
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	48.52	54.15	716.85	81.12	112.31	239.36	284.05
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	38.32	716.85	81.12	112.31	239.36	284.05
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	48.52	54.15	716.85	81.12	112.31	239.36	284.05
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	41.28	716.85	81.12	112.31	239.36	284.05
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	48.52	54.15	716.85	81.12	112.31	239.36	284.05
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	48.52	39.50	716.85	81.12	112.31	239.36	284.05
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	48.52	36.54	716.85	81.12	112.31	239.36	284.05
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	48.52	39.50	716.85	81.12	112.31	239.36	284.05
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	48.52	39.50	716.85	81.12	112.31	239.36	284.05
Salvage Value	0.79	0.00	1.53	0.00	2.91	1.39	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	85.85	0.00	307.55	363.70	6686.99	537.88	518.00	12339.92	1610.49	731.84	2616.12	7381.47

Net Present Value -361

K19/Gas25/750MW (WPS Sale & INV)

TABLE 393
ECONOMIC SUMMARY
NFAT 2012

Energy Price	**High**
Discount Rate	**High**
Capital Cost	**Low**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	3.09	228.33	1.14	0.00	372.48	105.26	29.92	116.00	121.30
2015	0.00	457.15	0.00	0.00	17.36	5.50	480.00	3.54	0.00	422.65	103.33	34.17	121.54	163.61
2016	0.00	602.85	0.00	0.00	22.96	13.86	639.67	6.74	0.00	438.22	101.44	36.49	124.81	175.49
2017	0.00	728.47	0.00	0.00	32.60	20.13	781.20	10.65	0.00	472.66	99.40	39.09	132.03	202.14
2018	0.00	512.16	0.00	0.00	32.01	84.64	628.81	13.79	0.00	455.44	97.24	39.96	135.31	182.94
2019	0.00	365.25	0.00	0.00	37.93	69.15	472.33	16.15	13.29	491.94	97.18	37.38	136.04	221.35
2020	0.00	148.71	0.00	0.00	0.01	130.92	279.64	17.55	45.83	774.88	104.58	29.25	155.60	485.45
2021	0.00	51.45	0.37	0.00	0.00	0.00	51.82	17.81	43.92	848.69	105.23	31.91	171.63	539.92
2022	0.00	0.00	0.05	0.00	0.00	0.00	0.05	17.81	42.55	851.70	104.05	31.86	176.57	539.22
2023	0.00	0.00	73.38	0.00	0.00	0.00	73.38	18.06	40.67	808.10	101.14	33.63	182.23	491.09
2024	0.00	0.00	142.93	0.00	6.90	0.00	149.83	18.70	39.07	785.31	99.03	36.73	190.87	458.67
2025	0.00	0.00	82.20	0.00	54.34	0.00	136.54	19.37	41.46	741.25	98.76	35.72	166.34	440.43
2026	0.00	0.00	61.76	0.00	0.00	0.00	61.76	19.68	43.74	747.53	97.41	42.83	179.34	427.94
2027	0.00	0.00	69.72	0.00	0.00	0.00	69.72	20.03	42.42	723.61	95.38	42.08	194.12	392.03
2028	0.00	0.00	10.53	0.00	0.00	0.00	10.53	20.08	45.24	700.13	92.99	64.01	202.00	341.13
2029	0.00	0.00	51.40	0.00	0.00	0.00	51.40	20.34	46.73	678.50	91.14	71.11	213.23	303.02
2030	0.00	0.00	69.92	0.00	45.72	0.00	115.64	20.92	41.50	673.65	90.03	78.05	220.45	285.12
2031	0.00	0.00	62.07	0.00	0.00	0.00	62.07	21.23	44.41	687.72	89.66	85.75	225.49	286.81
2032	0.00	0.00	70.06	0.00	0.00	0.00	70.06	21.58	43.28	656.60	87.20	103.75	238.92	226.72
2033	0.00	0.00	10.59	0.00	0.00	0.00	10.59	21.63	46.25	643.52	85.63	124.36	248.87	184.66
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	45.18	638.67	84.88	132.38	255.03	166.37
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	43.70	562.50	82.69	125.64	245.95	108.21
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	43.15	490.59	81.21	126.55	212.34	70.50
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	42.62	461.33	79.76	138.56	215.76	27.26
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.63	42.10	457.77	79.00	137.36	230.51	10.90
2039	0.00	0.00	104.41	0.00	0.00	0.00	104.41	22.15	44.56	424.12	77.01	168.34	240.89	-62.11
2040	0.00	0.00	150.24	0.00	0.00	0.00	150.24	22.90	41.11	417.94	75.64	187.09	250.81	-95.60
2041	0.00	0.00	67.02	0.00	6.90	0.00	73.92	23.27	40.64	438.62	75.94	186.76	249.60	-73.68
2042	0.00	0.00	4.91	0.00	0.00	0.00	4.91	23.30	47.24	505.45	73.60	299.93	242.31	-110.40
2043	0.00	0.00	52.13	0.00	0.00	0.00	52.13	23.56	46.80	474.29	71.82	323.28	256.00	-176.80
2044	0.00	0.00	70.91	0.00	45.72	0.00	116.63	24.14	48.14	444.28	70.15	348.22	268.38	-242.47
2045	0.00	0.00	33.69	0.00	0.00	0.00	33.69	24.31	51.81	428.55	68.82	381.50	278.30	-300.07
2046	0.00	0.00	31.25	0.00	0.00	0.00	31.25	24.47	51.40	410.21	67.57	408.57	288.93	-354.86
2047	0.00	0.00	4.72	0.00	0.00	0.00	4.72	24.49	51.60	401.88	66.77	425.25	301.41	-391.54
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	50.33	413.55	67.72	405.11	289.55	-348.82
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	24.49	52.93	413.55	67.72	405.11	289.55	-348.82
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	24.49	49.62	413.55	67.72	405.11	289.55	-348.82
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	24.49	49.28	413.55	67.72	405.11	289.55	-348.82
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	24.49	48.95	413.55	67.72	405.11	289.55	-348.82
2053	0.00	0.00	51.10	0.00	16.51	14.92	82.53	24.49	48.63	413.55	67.72	405.11	289.55	-348.82
2054	0.00	0.00	120.65	0.00	13.47	14.92	149.04	24.49	48.32	413.55	67.72	405.11	289.55	-348.82
2055	0.00	0.00	80.08	0.00	0.00	15.47	95.55	24.49	48.02	413.55	67.72	405.11	289.55	-348.82
2056	0.00	0.00	61.76	0.00	0.00	0.00	61.76	24.49	63.56	413.55	67.72	405.11	289.55	-348.82
2057	0.00	0.00	69.72	0.00	0.00	0.00	69.72	24.49	47.45	413.55	67.72	405.11	289.55	-348.82
2058	0.00	0.00	10.53	0.00	0.00	0.00	10.53	24.49	63.01	413.55	67.72	405.11	289.55	-348.82
2059	0.00	0.00	51.40	0.00	6.90	0.00	58.30	24.49	49.87	413.55	67.72	405.11	289.55	-348.82
2060	0.00	0.00	69.92	0.00	40.76	0.00	110.68	24.49	59.72	413.55	67.72	405.11	289.55	-348.82
2061	0.00	0.00	62.07	0.00	0.00	0.00	62.07	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2062	0.00	0.00	70.06	0.00	0.00	0.00	70.06	24.49	59.72	413.55	67.72	405.11	289.55	-348.82
2063	0.00	0.00	10.59	0.00	0.00	0.00	10.59	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2064	0.00	0.00	0.00	0.00	8.37	1.68	10.06	24.49	59.72	413.55	67.72	405.11	289.55	-348.82
2065	0.00	0.00	0.00	0.00	41.24	3.37	44.61	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2066	0.00	0.00	0.00	0.00	0.84	10.10	10.94	24.49	59.72	413.55	67.72	405.11	289.55	-348.82
2067	0.00	0.00	0.00	0.00	7.25	15.16	22.40	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	24.49	59.72	413.55	67.72	405.11	289.55	-348.82
2069	0.00	0.00	104.41	0.00	24.45	45.47	174.33	24.49	46.85	413.55	67.72	405.11	289.55	-348.82
2070	0.00	0.00	150.24	0.00	0.01	47.15	197.40	24.49	45.66	413.55	67.72	405.11	289.55	-348.82
2071	0.00	0.00	67.02	0.00	0.00	0.00	67.02	24.49	45.66	413.55	67.72	405.11	289.55	-348.82
2072	0.00	0.00	4.91	0.00	0.00	0.00	4.91	24.49	45.66	413.55	67.72	405.11	289.55	-348.82
2073	0.00	0.00	52.13	0.00	0.00	0.00	52.13	24.49	44.77	413.55	67.72	405.11	289.55	-348.82
2074	0.00	0.00	70.91	0.00	0.00	0.00	70.91	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2075	0.00	0.00	33.69	0.00	13.59	0.00	47.28	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2076	0.00	0.00	31.25	0.00	6.90	0.00	38.16	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2077	0.00	0.00	4.72	0.00	0.00	0.00	4.72	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	24.49	46.85	413.55	67.72	405.11	289.55	-348.82
2080	0.00	0.00	0.00	0.00	11.43	0.00	11.43	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2083	0.00	0.00	51.10	0.00	0.00	0.00	51.10	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2084	0.00	0.00	120.65	0.00	10.66	0.55	131.87	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2085	0.00	0.00	80.08	0.00	10.41	1.10	91.59	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2086	0.00	0.00	61.76	0.00	22.12	3.31	87.20	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2087	0.00	0.00	69.72	0.00	25.36	4.97	100.04	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2088	0.00	0.00	10.53	0.00	16.51	14.92	41.96	24.49	43.89	413.55	67.72	405.11	289.55	-348.82
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	24.49	46.85	413.55	67.72	405.11	289.55	-348.82
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	24.49	46.85	413.55	67.72	405.11	289.55	-348.82
Salvage Value	0.00	0.00	5.09	0.00	1.66	1.39	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	465.67	0.00	206.87	252.30	3494.59	274.27	507.22	9262.77	1492.42	1839.87	3108.58	2821.89

Net Present Value -1454

K19/C31/750MW

TABLE 394
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	206.20	0.00	0.00	19.04	4.37	259.99	1.30	0.00	378.60	105.26	29.90	115.53	127.90
2015	38.25	457.15	0.00	0.00	17.36	7.04	519.79	3.90	0.00	431.52	103.31	34.17	121.47	172.56
2016	10.75	602.85	0.00	0.00	22.96	14.52	651.08	7.15	0.00	447.06	101.43	36.48	124.68	184.48
2017	10.78	728.47	0.00	0.00	32.60	20.13	791.98	11.11	0.00	483.11	99.39	39.13	131.84	212.75
2018	12.78	512.16	0.00	0.00	32.01	121.01	677.96	14.50	0.00	465.86	97.22	39.91	135.15	193.58
2019	12.81	365.25	0.00	0.00	37.93	82.31	498.30	17.00	13.29	501.73	97.16	37.43	135.86	231.29
2020	12.85	148.71	0.00	0.00	0.01	233.37	394.94	18.97	49.02	798.76	104.57	29.32	154.10	510.77
2021	16.21	51.45	0.00	0.00	0.00	0.00	67.66	19.31	47.22	865.59	105.22	32.04	170.50	557.83
2022	152.49	0.00	0.00	0.00	0.00	0.00	152.49	20.07	45.88	868.74	104.06	31.88	175.51	557.29
2023	234.24	0.00	0.00	0.00	0.00	0.00	234.24	21.24	43.85	823.39	101.04	34.05	181.52	506.79
2024	251.18	0.00	0.00	0.00	0.00	0.00	251.18	22.50	42.12	799.40	98.83	37.60	191.43	471.54
2025	253.97	0.00	0.00	0.00	2.60	0.00	256.57	23.78	40.31	755.75	98.78	27.06	173.70	456.22
2026	684.03	0.00	0.00	0.00	2.60	0.00	686.63	27.21	38.38	735.33	96.82	27.83	192.68	418.01
2027	1082.05	0.00	0.00	0.00	31.66	0.00	1113.71	32.78	36.95	680.19	94.88	26.33	185.77	373.21
2028	968.69	0.00	0.00	0.00	16.57	0.00	985.26	37.71	35.58	653.51	93.25	27.33	202.13	330.80
2029	689.74	0.00	0.00	0.00	27.94	0.00	717.69	41.30	36.97	631.35	91.60	28.15	224.18	287.42
2030	476.30	0.00	0.00	0.00	48.59	0.00	524.89	43.92	31.62	623.82	90.23	28.70	243.21	261.68
2031	311.94	0.00	0.00	0.00	64.31	0.00	376.25	45.80	44.95	748.82	94.34	33.18	156.69	464.61
2032	114.56	0.00	0.00	0.00	75.32	0.00	189.88	46.75	43.93	1000.15	101.80	32.65	145.53	720.17
2033	36.05	0.00	0.00	0.00	0.00	0.00	36.05	46.93	42.59	1064.74	102.25	31.98	159.96	770.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	41.65	1031.94	100.41	31.35	163.91	736.26
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	39.90	959.49	98.75	31.38	137.27	692.09
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	39.21	922.77	97.05	32.11	137.82	655.79
2037	0.00	0.00	0.37	0.00	0.00	0.00	0.37	46.93	38.42	890.43	95.38	32.04	141.65	621.35
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	37.46	855.85	93.71	31.96	146.47	583.72
2039	0.00	0.00	74.20	0.00	0.00	0.00	74.20	47.19	39.92	824.69	92.07	32.03	159.44	541.15
2040	0.00	0.00	92.91	0.00	6.90	0.00	99.81	47.58	36.52	822.89	90.74	30.50	175.90	525.75
2041	0.00	0.00	10.67	0.00	0.00	0.00	10.67	47.63	42.83	796.41	88.69	55.27	179.20	473.25
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	47.89	39.35	780.10	87.10	61.53	192.02	439.45
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	48.28	38.85	768.18	85.69	64.71	207.49	410.30
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	48.60	44.21	765.22	84.44	74.75	222.13	383.90
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	49.22	43.73	733.73	82.55	96.76	228.06	326.36
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	49.28	47.36	716.54	81.06	117.38	237.26	280.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	45.35	700.28	79.76	122.80	252.75	244.97
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	44.04	716.85	81.12	112.31	239.36	284.06
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	49.28	46.58	716.85	81.12	112.31	239.36	284.06
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	49.28	43.22	716.85	81.12	112.31	239.36	284.06
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	49.28	45.80	716.85	81.12	112.31	239.36	284.06
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	49.28	42.47	716.85	81.12	112.31	239.36	284.06
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	49.28	42.11	716.85	81.12	112.31	239.36	284.06
2054	0.00	0.00	0.00	0.00	13.47	14.92	28.39	49.28	41.76	716.85	81.12	112.31	239.36	284.06
2055	0.00	0.00	0.00	0.00	0.00	15.47	15.47	49.28	41.42	716.85	81.12	112.31	239.36	284.06
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	58.69	716.85	81.12	112.31	239.36	284.06
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	42.55	716.85	81.12	112.31	239.36	284.06
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	58.07	716.85	81.12	112.31	239.36	284.06
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	44.90	716.85	81.12	112.31	239.36	284.06
2060	0.00	0.00	0.00	0.00	0.64	0.00	0.64	49.28	54.15	716.85	81.12	112.31	239.36	284.06
2061	0.00	0.00	0.00	0.00	0.64	0.00	0.64	49.28	39.50	716.85	81.12	112.31	239.36	284.06
2062	0.00	0.00	0.00	0.00	7.70	0.00	7.70	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2063	0.00	0.00	0.00	0.00	3.85	0.00	3.85	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2064	0.00	0.00	0.00	0.00	14.79	1.68	16.47	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2065	0.00	0.00	0.00	0.00	17.86	3.37	21.22	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2066	0.00	0.00	0.00	0.00	16.23	10.10	26.34	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2067	0.00	0.00	0.00	0.00	25.85	15.16	41.01	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2068	0.00	0.00	0.00	0.00	15.50	45.47	60.97	49.28	68.20	716.85	81.12	112.31	239.36	284.06
2069	0.00	0.00	51.92	0.00	24.45	45.47	121.84	49.28	39.50	716.85	81.12	112.31	239.36	284.06
2070	0.00	0.00	70.63	0.00	0.01	47.15	117.79	49.28	54.15	716.85	81.12	112.31	239.36	284.06
2071	0.00	0.00	10.67	0.00	0.00	0.00	10.67	49.28	41.28	716.85	81.12	112.31	239.36	284.06
2072	0.00	0.00	52.07	0.00	0.00	0.00	52.07	49.28	54.15	716.85	81.12	112.31	239.36	284.06
2073	0.00	0.00	70.84	0.00	0.00	0.00	70.84	49.28	37.43	716.85	81.12	112.31	239.36	284.06
2074	0.00	0.00	62.88	0.00	0.00	0.00	62.88	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2075	0.00	0.00	70.98	0.00	8.86	0.00	79.84	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2076	0.00	0.00	10.72	0.00	1.96	0.00	12.68	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2077	0.00	0.00	0.00	0.00	23.96	0.00	23.96	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2078	0.00	0.00	0.00	0.00	19.62	0.00	19.62	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2079	0.00	0.00	0.00	0.00	21.53	0.00	21.53	49.28	39.50	716.85	81.12	112.31	239.36	284.06
2080	0.00	0.00	0.00	0.00	78.44	0.00	78.44	49.28	52.37	716.85	81.12	112.31	239.36	284.06
2081	0.00	0.00	0.00	0.00	48.91	0.00	48.91	49.28	39.50	716.85	81.12	112.31	239.36	284.06
2082	0.00	0.00	0.00	0.00	56.72	0.00	56.72	49.28	54.15	716.85	81.12	112.31	239.36	284.06
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.28	38.32	716.85	81.12	112.31	239.36	284.06
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	49.28	54.15	716.85	81.12	112.31	239.36	284.06
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	49.28	38.32	716.85	81.12	112.31	239.36	284.06
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	49.28	54.15	716.85	81.12	112.31	239.36	284.06
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2088	0.00	0.00	0.00	0.00	16.51	14.92	31.43	49.28	36.54	716.85	81.12	112.31	239.36	284.06
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	49.28	39.50	716.85	81.12	112.31	239.36	284.06
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	49.28	39.50	716.85	81.12	112.31	239.36	284.06
Salvage Value	5.74	0.00	1.53	0.00	3.25	1.39	11.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2399.77	2569.75	85.85	0.00	259.45	363.70	5678.51	455.81	479.28	11098.77	1567.48	728.12	2755.94	6047.23

Net Present Value -566

K19/Gas31/750MW

TABLE 395
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	4.37	229.61	1.15	0.00	378.60	105.26	29.90	115.53	127.90
2015	0.00	457.15	0.00	0.00	17.36	7.04	481.54	3.56	0.00	431.52	103.31	34.17	121.47	172.56
2016	0.00	602.85	0.00	0.00	22.96	14.52	640.33	6.76	0.00	447.06	101.43	36.48	124.68	184.48
2017	0.00	728.47	0.00	0.00	32.60	20.13	781.20	10.66	0.00	483.11	99.39	39.13	131.84	212.75
2018	0.00	512.16	0.00	0.00	32.01	121.01	665.19	13.99	0.00	465.86	97.22	39.91	135.15	193.58
2019	0.00	365.25	0.00	0.00	37.93	82.31	485.49	16.42	13.29	501.73	97.16	37.43	135.86	231.29
2020	0.00	148.71	0.00	0.00	0.01	233.37	382.09	18.33	49.02	798.76	104.57	29.32	154.10	510.77
2021	0.00	51.45	0.00	0.00	0.00	0.00	51.45	18.58	47.22	865.59	105.22	32.04	170.50	557.83
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	45.88	868.65	104.06	31.91	175.51	557.16
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	43.85	824.10	101.04	34.05	181.55	507.46
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	42.12	800.77	98.84	37.62	191.41	472.89
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	40.31	759.10	98.77	27.08	174.53	458.72
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.58	38.38	742.00	96.81	28.02	194.77	422.40
2027	0.00	0.00	0.37	0.00	0.00	0.00	0.37	18.58	36.95	688.61	94.86	26.41	187.65	379.69
2028	0.00	0.00	0.05	0.00	0.00	0.00	0.05	18.58	35.58	665.89	93.23	27.35	206.13	339.18
2029	0.00	0.00	125.09	0.00	0.00	0.00	125.09	19.10	36.97	641.12	91.65	27.78	224.70	296.99
2030	0.00	0.00	213.58	0.00	13.80	0.00	227.39	20.12	31.62	642.78	91.05	24.57	236.56	290.60
2031	0.00	0.00	93.25	0.00	54.34	0.00	147.59	20.85	38.48	630.67	88.81	57.91	200.73	283.22
2032	0.00	0.00	62.13	0.00	0.00	0.00	62.13	21.16	41.32	616.99	87.19	73.81	209.60	246.38
2033	0.00	0.00	70.13	0.00	0.00	0.00	70.13	21.51	40.12	598.93	85.71	80.92	220.55	211.75
2034	0.00	0.00	10.60	0.00	0.00	0.00	10.60	21.57	43.03	601.04	84.90	88.31	230.66	197.18
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.57	41.46	519.87	82.74	106.64	200.80	129.69
2036	0.00	0.00	104.10	0.00	0.00	0.00	104.10	22.09	40.82	490.70	81.26	116.51	204.91	88.02
2037	0.00	0.00	149.79	0.00	0.00	0.00	149.79	22.84	40.22	471.81	79.90	127.71	213.91	50.29
2038	0.00	0.00	66.82	0.00	45.72	0.00	112.54	23.40	39.63	483.36	79.81	120.42	226.63	56.50
2039	0.00	0.00	4.89	0.00	0.00	0.00	4.89	23.42	49.10	551.01	77.48	247.73	210.13	15.66
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.42	45.59	521.91	75.54	266.61	224.37	-44.60
2041	0.00	0.00	52.02	0.00	0.00	0.00	52.02	23.68	45.05	498.90	74.04	284.23	235.90	-95.27
2042	0.00	0.00	175.49	0.00	0.00	0.00	175.49	24.56	44.53	477.35	72.65	304.09	246.38	-145.77
2043	0.00	0.00	161.38	0.00	0.00	0.00	161.38	25.37	48.10	471.17	71.77	322.54	255.57	-178.71
2044	0.00	0.00	67.22	0.00	45.72	0.00	112.94	25.93	49.39	474.61	71.45	312.82	272.41	-182.08
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	25.96	56.01	551.55	69.42	462.87	241.93	-222.67
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	55.55	529.90	68.18	479.35	254.23	-271.85
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	54.22	506.41	66.90	504.51	263.14	-328.13
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	52.90	529.29	68.17	482.24	253.10	-274.22
2049	0.00	0.00	0.00	0.00	10.66	0.55	11.22	25.96	55.45	529.29	68.17	482.24	253.10	-274.22
2050	0.00	0.00	0.00	0.00	10.41	1.10	11.51	25.96	52.10	529.29	68.17	482.24	253.10	-274.22
2051	0.00	0.00	0.00	0.00	22.12	3.31	25.44	25.96	51.71	529.29	68.17	482.24	253.10	-274.22
2052	0.00	0.00	0.00	0.00	25.36	4.97	30.33	25.96	51.34	529.29	68.17	482.24	253.10	-274.22
2053	0.00	0.00	0.00	0.00	16.51	14.92	31.43	25.96	50.98	529.29	68.17	482.24	253.10	-274.22
2054	0.00	0.00	0.00	0.00	13.47	14.92	28.39	25.96	50.63	529.29	68.17	482.24	253.10	-274.22
2055	0.00	0.00	0.00	0.00	0.00	15.47	15.47	25.96	50.28	529.29	68.17	482.24	253.10	-274.22
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	65.79	529.29	68.17	482.24	253.10	-274.22
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	49.64	529.29	68.17	482.24	253.10	-274.22
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	65.16	529.29	68.17	482.24	253.10	-274.22
2059	0.00	0.00	102.81	0.00	0.00	0.00	102.81	25.96	51.99	529.29	68.17	482.24	253.10	-274.22
2060	0.00	0.00	191.30	0.00	0.00	0.00	191.30	25.96	61.24	529.29	68.17	482.24	253.10	-274.22
2061	0.00	0.00	91.13	0.00	0.00	0.00	91.13	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2062	0.00	0.00	62.13	0.00	0.00	0.00	62.13	25.96	61.24	529.29	68.17	482.24	253.10	-274.22
2063	0.00	0.00	70.13	0.00	0.00	0.00	70.13	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2064	0.00	0.00	10.60	0.00	8.37	1.68	20.65	25.96	61.24	529.29	68.17	482.24	253.10	-274.22
2065	0.00	0.00	0.00	0.00	20.75	3.37	24.12	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2066	0.00	0.00	104.10	0.00	41.59	10.10	155.79	25.96	61.24	529.29	68.17	482.24	253.10	-274.22
2067	0.00	0.00	149.79	0.00	7.25	15.16	172.19	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2068	0.00	0.00	66.82	0.00	15.50	45.47	127.79	25.96	61.24	529.29	68.17	482.24	253.10	-274.22
2069	0.00	0.00	4.89	0.00	24.45	45.47	74.82	25.96	48.37	529.29	68.17	482.24	253.10	-274.22
2070	0.00	0.00	0.00	0.00	0.01	47.15	47.16	25.96	47.18	529.29	68.17	482.24	253.10	-274.22
2071	0.00	0.00	52.02	0.00	0.00	0.00	52.02	25.96	47.18	529.29	68.17	482.24	253.10	-274.22
2072	0.00	0.00	175.49	0.00	0.00	0.00	175.49	25.96	47.18	529.29	68.17	482.24	253.10	-274.22
2073	0.00	0.00	161.38	0.00	34.29	0.00	195.67	25.96	46.30	529.29	68.17	482.24	253.10	-274.22
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2075	0.00	0.00	4.92	0.00	0.00	0.00	4.92	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	25.96	48.37	529.29	68.17	482.24	253.10	-274.22
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2081	0.00	0.00	0.00	0.00	13.59	0.00	13.59	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2084	0.00	0.00	0.00	0.00	10.66	0.55	11.22	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2085	0.00	0.00	0.00	0.00	10.41	1.10	11.51	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2086	0.00	0.00	0.00	0.00	22.12	3.31	25.44	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2087	0.00	0.00	0.00	0.00	25.36	4.97	30.33	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2088	0.00	0.00	0.00	0.00	27.94	14.92	42.86	25.96	45.41	529.29	68.17	482.24	253.10	-274.22
2089	0.00	0.00	0.00	0.00	13.47	14.92	28.39	25.96	48.37	529.29	68.17	482.24	253.10	-274.22
2090	0.00	0.00	0.00	0.00	0.00	15.47	15.47	25.96	48.37	529.29	68.17	482.24	253.10	-274.22
Salvage Value	0.00	0.00	2.93	0.00	1.80	1.39	6.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	404.68	0.00	190.27	363.70	3528.39	278.38	500.27	9566.20	1493.05	1926.82	2984.14	3162.19

Net Present Value -1145

K19/C25/250MW

TABLE 396
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	31.02	206.20	0.00	0.00	19.04	3.87	260.13	1.31	0.00	378.60	105.26	29.90	115.53	127.90
2015	87.06	457.15	0.00	0.00	17.36	2.40	563.97	4.13	0.00	431.52	103.31	34.17	121.47	172.56
2016	173.05	602.85	0.00	0.00	22.96	2.91	801.77	8.14	0.00	447.06	101.43	36.47	124.70	184.46
2017	199.14	728.47	0.00	0.00	32.60	4.36	964.57	12.97	0.00	482.54	99.40	39.13	131.87	212.14
2018	237.78	512.16	0.00	0.00	32.01	13.09	795.04	16.94	0.00	460.92	96.62	42.74	137.43	184.13
2019	241.61	365.25	0.00	0.00	40.52	13.09	660.47	20.24	13.29	491.35	96.26	42.47	138.01	214.60
2020	664.05	148.71	0.00	0.00	2.60	13.57	828.94	24.39	13.51	742.42	104.93	30.26	131.28	475.95
2021	1062.96	51.45	0.00	0.00	31.66	0.00	1146.08	30.12	13.26	787.40	105.65	30.82	138.64	512.28
2022	951.61	0.00	0.00	0.00	16.57	0.00	968.17	34.96	13.48	773.20	103.70	31.98	144.69	492.83
2023	677.58	0.00	0.00	0.00	27.94	0.00	705.52	38.49	13.31	754.38	101.44	31.75	158.66	462.53
2024	467.90	0.00	0.00	0.00	48.59	0.00	516.49	41.07	13.26	741.45	99.07	34.99	176.85	430.54
2025	306.44	0.00	0.00	0.00	64.31	0.00	370.74	42.92	27.65	823.59	103.86	31.13	120.14	568.46
2026	112.54	0.00	0.00	0.00	75.32	0.00	187.86	43.86	27.45	1055.68	111.74	30.27	115.47	798.20
2027	35.41	0.00	0.00	0.00	0.00	0.00	35.41	44.04	27.33	1066.91	111.05	28.66	119.64	807.56
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	27.62	1049.44	109.28	29.89	123.04	787.23
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	30.20	1022.41	107.45	30.16	125.60	759.20
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	26.13	1006.09	106.15	29.84	124.68	745.42
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.96	991.92	104.51	30.48	127.51	729.41
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.58	961.40	102.87	30.74	127.98	699.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.65	923.04	101.19	30.94	124.71	666.20
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	25.77	891.88	99.51	31.21	126.83	634.33
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	27.88	864.38	97.87	31.48	122.96	612.08
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	44.04	24.92	830.69	96.26	31.95	124.31	578.17
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.04	24.92	795.48	94.66	31.90	126.29	542.63
2038	0.00	0.00	74.15	0.00	0.00	0.00	74.15	44.30	24.92	758.69	93.08	31.93	129.03	504.65
2039	0.00	0.00	92.84	0.00	6.90	0.00	99.74	44.69	27.88	747.10	91.86	30.22	143.33	481.69
2040	0.00	0.00	10.66	0.00	0.00	0.00	10.66	44.74	28.99	725.23	89.79	53.97	149.88	431.59
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.74	28.32	707.75	88.24	60.49	159.75	399.26
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	45.00	28.32	693.85	86.87	64.15	170.02	372.80
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	45.39	28.32	680.30	85.45	64.14	187.51	343.20
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	45.70	34.16	663.47	83.84	97.10	187.56	294.97
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	46.33	37.12	644.06	82.40	106.85	198.78	256.03
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	46.38	38.25	630.82	81.00	121.44	211.97	216.41
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	37.36	611.36	79.56	123.17	232.16	176.46
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.47	628.74	80.99	117.16	214.30	216.30
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	46.38	39.43	628.74	80.99	117.16	214.30	216.30
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	46.38	38.25	628.74	80.99	117.16	214.30	216.30
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	46.38	38.26	628.74	80.99	117.16	214.30	216.30
2052	0.00	0.00	0.00	0.00	25.36	1.08	26.43	46.38	38.27	628.74	80.99	117.16	214.30	216.30
2053	0.00	0.00	0.00	0.00	16.51	3.23	19.75	46.38	38.27	628.74	80.99	117.16	214.30	216.30
2054	0.00	0.00	0.00	0.00	14.11	3.23	17.35	46.38	38.27	628.74	80.99	117.16	214.30	216.30
2055	0.00	0.00	0.00	0.00	0.64	3.35	3.99	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2056	0.00	0.00	0.00	0.00	7.70	0.00	7.70	46.38	52.33	628.74	80.99	117.16	214.30	216.30
2057	0.00	0.00	0.00	0.00	3.85	0.00	3.85	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2058	0.00	0.00	0.00	0.00	6.42	0.00	6.42	46.38	52.33	628.74	80.99	117.16	214.30	216.30
2059	0.00	0.00	0.00	0.00	10.91	0.00	10.91	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2060	0.00	0.00	0.00	0.00	15.40	0.00	15.40	46.38	52.33	628.74	80.99	117.16	214.30	216.30
2061	0.00	0.00	0.00	0.00	18.61	0.00	18.61	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	68.16	628.74	80.99	117.16	214.30	216.30
2063	0.00	0.00	0.00	0.00	0.00	2.86	2.86	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2064	0.00	0.00	0.00	0.00	8.37	3.75	12.12	46.38	68.16	628.74	80.99	117.16	214.30	216.30
2065	0.00	0.00	0.00	0.00	6.95	2.16	9.11	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2066	0.00	0.00	0.00	0.00	0.84	2.19	3.03	46.38	68.16	628.74	80.99	117.16	214.30	216.30
2067	0.00	0.00	0.00	0.00	7.25	3.28	10.53	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2068	0.00	0.00	51.87	0.00	15.50	9.85	77.22	46.38	68.16	628.74	80.99	117.16	214.30	216.30
2069	0.00	0.00	70.56	0.00	26.41	9.85	106.82	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2070	0.00	0.00	10.66	0.00	1.96	10.22	22.84	46.38	54.10	628.74	80.99	117.16	214.30	216.30
2071	0.00	0.00	0.00	0.00	23.96	0.00	23.96	46.38	38.27	628.74	80.99	117.16	214.30	216.30
2072	0.00	0.00	52.07	0.00	12.72	0.00	64.79	46.38	54.10	628.74	80.99	117.16	214.30	216.30
2073	0.00	0.00	70.84	0.00	21.53	0.00	92.37	46.38	37.38	628.74	80.99	117.16	214.30	216.30
2074	0.00	0.00	62.88	0.00	44.58	0.00	107.46	46.38	52.33	628.74	80.99	117.16	214.30	216.30
2075	0.00	0.00	70.98	0.00	48.91	0.00	119.89	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2076	0.00	0.00	10.72	0.00	56.72	0.00	67.44	46.38	54.10	628.74	80.99	117.16	214.30	216.30
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	38.27	628.74	80.99	117.16	214.30	216.30
2078	0.00	0.00	0.00	0.00	6.90	0.00	6.90	46.38	54.10	628.74	80.99	117.16	214.30	216.30
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	41.23	628.74	80.99	117.16	214.30	216.30
2080	0.00	0.00	0.00	0.00	40.76	0.00	40.76	46.38	54.10	628.74	80.99	117.16	214.30	216.30
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2084	0.00	0.00	0.00	0.00	10.66	0.12	10.78	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2087	0.00	0.00	0.00	0.00	25.36	1.08	26.43	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2088	0.00	0.00	0.00	0.00	16.51	3.23	19.75	46.38	36.50	628.74	80.99	117.16	214.30	216.30
2089	0.00	0.00	0.00	0.00	13.47	3.23	16.70	46.38	39.46	628.74	80.99	117.16	214.30	216.30
2090	0.00	0.00	0.00	0.00	0.00	3.35	3.35	46.38	39.46	628.74	80.99	117.16	214.30	216.30
Salvage Value	0.79	0.00	1.49	0.00	2.91	0.36	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3360.15	2569.75	88.42	0.00	307.65	46.64	6372.61	512.89	303.25	11287.66	1604.09	755.32	2346.47	6581.77

Net Present Value -607

K19/Gas24/250MW

TABLE 397
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	206.20	0.00	0.00	19.04	3.87	229.11	1.16	0.00	378.60	105.26	29.90	115.53	127.90
2015	0.00	457.15	0.00	0.00	17.36	2.40	476.91	3.54	0.00	431.52	103.31	34.17	121.47	172.56
2016	0.00	602.85	0.00	0.00	22.96	2.91	628.72	6.69	0.00	447.06	101.43	36.48	124.69	184.46
2017	0.00	728.47	0.00	0.00	32.60	4.36	765.43	10.52	0.00	483.11	99.39	39.13	131.84	212.75
2018	0.00	512.16	0.00	0.00	32.01	13.09	557.26	13.30	0.00	461.70	96.62	42.68	137.34	185.06
2019	0.00	365.25	0.00	0.00	37.93	13.09	416.26	15.38	13.29	492.64	96.25	42.46	137.94	215.99
2020	0.00	148.71	0.37	0.00	0.01	13.57	162.66	16.19	13.51	744.57	104.92	30.28	131.29	478.07
2021	0.00	51.45	0.00	0.00	0.00	0.00	51.45	16.45	13.26	790.78	105.63	30.82	138.50	515.82
2022	0.00	0.00	73.33	0.00	0.00	0.00	73.33	16.71	13.48	783.44	104.17	30.19	143.23	505.85
2023	0.00	0.00	91.72	0.00	6.90	0.00	98.62	17.09	13.31	778.35	103.07	25.34	148.79	501.15
2024	0.00	0.00	10.49	0.00	0.00	0.00	10.49	17.14	17.33	771.93	101.16	41.28	153.87	475.62
2025	0.00	0.00	0.05	0.00	0.00	0.00	0.05	17.14	17.11	679.89	98.84	31.52	139.36	410.16
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.14	16.68	652.50	96.50	35.69	148.19	372.12
2027	0.00	0.00	51.30	0.00	0.00	0.00	51.30	17.40	16.71	617.79	94.40	38.73	150.86	333.80
2028	0.00	0.00	71.91	0.00	54.34	0.00	126.25	18.02	16.77	597.17	92.51	44.88	158.91	300.88
2029	0.00	0.00	113.91	0.00	0.00	0.00	113.91	18.59	23.61	582.95	90.73	61.94	165.82	264.46
2030	0.00	0.00	148.74	0.00	0.00	0.00	148.74	19.33	19.59	579.69	89.80	66.81	169.64	253.43
2031	0.00	0.00	66.35	0.00	6.90	0.00	73.25	19.70	19.59	607.00	90.40	58.00	171.31	287.29
2032	0.00	0.00	4.86	0.00	0.00	0.00	4.86	19.72	26.66	641.80	87.81	158.09	147.99	247.91
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.72	26.66	628.79	86.26	168.54	158.43	215.56
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.72	26.67	614.34	84.74	181.26	167.48	180.86
2035	0.00	0.00	103.99	0.00	0.00	0.00	103.99	20.24	26.00	543.00	82.68	181.87	158.11	120.34
2036	0.00	0.00	149.64	0.00	0.00	0.00	149.64	20.99	26.01	515.93	81.18	192.60	162.77	79.38
2037	0.00	0.00	66.75	0.00	0.00	0.00	66.75	21.32	26.01	533.87	81.63	185.25	161.65	105.34
2038	0.00	0.00	109.19	0.00	0.00	0.00	109.19	21.87	33.08	575.52	79.16	302.02	142.70	51.63
2039	0.00	0.00	150.09	0.00	0.00	0.00	150.09	22.62	36.03	559.75	77.74	316.26	160.19	5.56
2040	0.00	0.00	66.95	0.00	45.72	0.00	112.67	23.18	33.08	559.26	77.11	320.79	168.80	-7.45
2041	0.00	0.00	4.90	0.00	0.00	0.00	4.90	23.21	40.15	609.40	75.21	438.41	145.62	-49.85
2042	0.00	0.00	104.72	0.00	0.00	0.00	104.72	23.73	40.15	587.68	73.37	466.39	156.27	-108.36
2043	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.49	40.15	571.91	72.01	488.55	164.30	-152.94
2044	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.82	41.93	563.97	71.51	489.28	172.38	-169.20
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	24.85	49.00	609.39	69.16	628.13	154.15	-242.05
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	49.01	618.08	69.35	622.14	154.81	-228.21
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	48.12	589.51	67.33	665.46	167.76	-311.04
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	24.85	50.20	605.66	68.61	638.58	158.91	-260.43
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2052	0.00	0.00	51.04	0.00	25.36	1.08	77.48	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2053	0.00	0.00	69.44	0.00	16.51	3.23	89.18	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2054	0.00	0.00	10.49	0.00	13.47	3.23	27.20	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2055	0.00	0.00	0.00	0.00	0.00	3.35	3.35	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2057	0.00	0.00	51.30	0.00	0.00	0.00	51.30	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2058	0.00	0.00	69.79	0.00	6.90	0.00	76.69	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2059	0.00	0.00	113.91	0.00	0.00	0.00	113.91	24.85	50.20	605.66	68.61	638.58	158.91	-260.43
2060	0.00	0.00	148.74	0.00	0.00	0.00	148.74	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2061	0.00	0.00	66.35	0.00	0.00	0.00	66.35	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2062	0.00	0.00	4.86	0.00	0.00	0.00	4.86	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2063	0.00	0.00	0.00	0.00	40.76	2.86	43.62	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2064	0.00	0.00	0.00	0.00	8.37	3.75	12.12	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2065	0.00	0.00	103.99	0.00	6.95	2.16	113.10	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2066	0.00	0.00	149.64	0.00	7.74	2.19	159.56	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2067	0.00	0.00	66.75	0.00	7.25	3.28	77.28	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2068	0.00	0.00	109.19	0.00	15.50	9.85	134.55	24.85	63.07	605.66	68.61	638.58	158.91	-260.43
2069	0.00	0.00	150.09	0.00	24.45	9.85	184.40	24.85	50.20	605.66	68.61	638.58	158.91	-260.43
2070	0.00	0.00	66.95	0.00	0.01	10.22	77.18	24.85	49.02	605.66	68.61	638.58	158.91	-260.43
2071	0.00	0.00	4.90	0.00	0.00	0.00	4.90	24.85	49.02	605.66	68.61	638.58	158.91	-260.43
2072	0.00	0.00	104.72	0.00	0.00	0.00	104.72	24.85	49.02	605.66	68.61	638.58	158.91	-260.43
2073	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.85	48.13	605.66	68.61	638.58	158.91	-260.43
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2075	0.00	0.00	4.92	0.00	34.29	0.00	39.21	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2078	0.00	0.00	0.00	0.00	13.59	0.00	13.59	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	50.20	605.66	68.61	638.58	158.91	-260.43
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2082	0.00	0.00	51.04	0.00	0.00	0.00	51.04	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2083	0.00	0.00	69.44	0.00	0.00	0.00	69.44	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2084	0.00	0.00	10.49	0.00	10.66	0.12	21.27	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2087	0.00	0.00	51.30	0.00	25.36	1.08	77.73	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2088	0.00	0.00	69.79	0.00	16.51	3.23	89.53	24.85	47.24	605.66	68.61	638.58	158.91	-260.43
2089	0.00	0.00	10.54	0.00	13.47	3.23	27.25	24.85	50.20	605.66	68.61	638.58	158.91	-260.43
2090	0.00	0.00	0.00	0.00	11.43	3.35	14.78	24.85	50.20	605.66	68.61	638.58	158.91	-260.43
Salvage Value	0.00	0.00	5.34	0.00	1.58	0.36	7.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2569.75	546.72	0.00	187.31	46.64	3350.42	262.26	309.00	9496.82	1496.27	2626.11	2361.31	3013.13

Net Present Value -909

K19/C31/250MW

TABLE 398
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	2.86	2.86	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	206.20	0.00	0.00	19.04	3.87	259.48	1.31	0.00	378.60	105.26	29.90	115.53	127.90
2015	38.25	457.15	0.00	0.00	17.36	2.40	515.16	3.89	0.00	431.52	103.31	34.17	121.47	172.56
2016	10.75	602.85	0.00	0.00	22.96	2.91	639.47	7.08	0.00	447.06	101.43	36.48	124.69	184.46
2017	10.78	728.47	0.00	0.00	32.60	4.36	776.21	10.97	0.00	483.11	99.39	39.13	131.84	212.75
2018	12.78	512.16	0.00	0.00	32.01	13.09	570.04	13.82	0.00	461.70	96.62	42.68	137.34	185.06
2019	12.81	365.25	0.00	0.00	37.93	13.09	429.08	15.96	13.29	492.64	96.25	42.46	137.94	215.99
2020	12.85	148.71	0.37	0.00	0.01	13.57	175.51	16.84	13.51	744.57	104.92	30.28	131.29	478.07
2021	16.21	51.45	0.00	0.00	0.00	0.00	67.66	17.18	13.26	790.78	105.63	30.82	138.50	515.82
2022	152.49	0.00	73.33	0.00	0.00	0.00	225.82	18.19	13.48	783.26	104.15	30.23	143.29	505.60
2023	234.24	0.00	91.72	0.00	6.90	0.00	332.86	19.75	13.31	777.50	103.03	25.52	149.07	499.88
2024	251.18	0.00	10.49	0.00	0.00	0.00	261.67	21.05	17.33	771.11	101.13	41.55	154.40	474.03
2025	253.97	0.00	0.00	0.00	2.60	0.00	256.57	22.34	17.11	678.51	98.80	31.70	140.17	407.84
2026	684.03	0.00	0.00	0.00	2.60	0.00	686.63	25.77	16.68	650.79	96.49	35.95	148.79	369.57
2027	1082.05	0.00	51.30	0.00	31.66	0.00	1165.01	31.60	16.71	615.23	94.39	39.16	151.50	330.18
2028	968.69	0.00	69.79	0.00	23.47	0.00	1061.95	36.91	16.77	593.36	92.43	46.06	159.71	295.16
2029	689.74	0.00	10.54	0.00	27.94	0.00	728.23	40.55	23.60	578.72	90.69	63.20	167.20	257.62
2030	476.30	0.00	0.00	0.00	48.59	0.00	524.89	43.17	19.58	607.92	91.79	55.25	161.15	299.73
2031	311.94	0.00	0.00	0.00	64.31	0.00	376.25	45.05	34.19	696.39	94.97	46.25	125.01	430.16
2032	114.56	0.00	0.00	0.00	75.32	0.00	189.88	46.00	34.42	928.24	102.25	44.65	117.44	663.91
2033	36.05	0.00	0.00	0.00	0.00	0.00	36.05	46.18	34.27	960.29	102.16	46.30	124.72	687.10
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	34.50	924.19	100.35	47.44	127.11	649.30
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.65	893.96	98.63	48.12	123.42	623.80
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.60	862.58	96.96	49.32	124.86	591.44
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.42	821.29	95.07	51.14	128.14	546.94
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.05	773.87	93.05	53.28	131.47	496.07
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	36.08	741.15	91.11	58.91	144.32	446.82
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.24	720.76	89.37	66.65	151.91	412.82
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	36.02	699.21	87.68	75.53	161.13	374.86
2042	0.00	0.00	0.05	0.00	0.00	0.00	0.05	46.18	33.06	697.19	86.81	76.51	167.65	366.22
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.18	33.06	684.88	85.44	76.22	184.17	339.05
2044	0.00	0.00	52.18	0.00	0.00	0.00	52.18	46.44	34.84	663.74	83.85	97.05	187.55	295.29
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	47.07	34.84	644.17	82.40	106.82	198.72	256.23
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.12	38.92	630.94	81.00	121.43	211.96	216.56
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	37.36	611.37	79.56	123.17	232.16	176.48
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	36.47	628.83	80.99	117.14	214.28	216.42
2049	0.00	0.00	0.00	0.00	10.66	0.12	10.78	47.12	39.43	628.83	80.99	117.14	214.28	216.42
2050	0.00	0.00	0.00	0.00	10.41	0.24	10.65	47.12	36.48	628.83	80.99	117.14	214.28	216.42
2051	0.00	0.00	0.00	0.00	22.12	0.72	22.84	47.12	39.44	628.83	80.99	117.14	214.28	216.42
2052	0.00	0.00	51.04	0.00	25.36	1.08	77.48	47.12	36.49	628.83	80.99	117.14	214.28	216.42
2053	0.00	0.00	69.44	0.00	16.51	3.23	89.18	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2054	0.00	0.00	10.49	0.00	13.47	3.23	27.20	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2055	0.00	0.00	0.00	0.00	0.00	3.35	3.35	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2057	0.00	0.00	51.30	0.00	0.00	0.00	51.30	47.12	38.27	628.83	80.99	117.14	214.28	216.42
2058	0.00	0.00	69.79	0.00	6.90	0.00	76.69	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2059	0.00	0.00	10.54	0.00	0.00	0.00	10.54	47.12	41.23	628.83	80.99	117.14	214.28	216.42
2060	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2061	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.12	39.46	628.83	80.99	117.14	214.28	216.42
2062	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2063	0.00	0.00	0.00	0.00	10.75	2.86	13.62	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2064	0.00	0.00	0.00	0.00	14.79	3.75	18.54	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2065	0.00	0.00	0.00	0.00	17.86	2.16	20.02	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2066	0.00	0.00	0.00	0.00	16.23	2.19	18.42	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2067	0.00	0.00	0.00	0.00	25.85	3.28	29.14	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2068	0.00	0.00	0.00	0.00	15.50	9.85	25.35	47.12	68.16	628.83	80.99	117.14	214.28	216.42
2069	0.00	0.00	0.00	0.00	24.45	9.85	34.31	47.12	39.46	628.83	80.99	117.14	214.28	216.42
2070	0.00	0.00	0.00	0.00	0.01	10.22	10.23	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2071	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	41.23	628.83	80.99	117.14	214.28	216.42
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.12	37.38	628.83	80.99	117.14	214.28	216.42
2074	0.00	0.00	52.18	0.00	0.00	0.00	52.18	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2075	0.00	0.00	70.98	0.00	1.96	0.00	72.94	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2076	0.00	0.00	10.72	0.00	1.96	0.00	12.68	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2077	0.00	0.00	0.00	0.00	23.96	0.00	23.96	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2078	0.00	0.00	0.00	0.00	12.72	0.00	12.72	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2079	0.00	0.00	0.00	0.00	21.53	0.00	21.53	47.12	39.46	628.83	80.99	117.14	214.28	216.42
2080	0.00	0.00	0.00	0.00	78.44	0.00	78.44	47.12	52.33	628.83	80.99	117.14	214.28	216.42
2081	0.00	0.00	0.00	0.00	48.91	0.00	48.91	47.12	39.46	628.83	80.99	117.14	214.28	216.42
2082	0.00	0.00	51.04	0.00	56.72	0.00	107.76	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2083	0.00	0.00	69.44	0.00	0.00	0.00	69.44	47.12	38.27	628.83	80.99	117.14	214.28	216.42
2084	0.00	0.00	10.49	0.00	10.66	0.12	21.27	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2085	0.00	0.00	0.00	0.00	10.41	0.24	10.65	47.12	38.27	628.83	80.99	117.14	214.28	216.42
2086	0.00	0.00	0.00	0.00	22.12	0.72	22.84	47.12	54.10	628.83	80.99	117.14	214.28	216.42
2087	0.00	0.00	51.30	0.00	25.36	1.08	77.73	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2088	0.00	0.00	69.79	0.00	16.51	3.23	89.53	47.12	36.50	628.83	80.99	117.14	214.28	216.42
2089	0.00	0.00	10.54	0.00	13.47	3.23	27.25	47.12	39.46	628.83	80.99	117.14	214.28	216.42
2090	0.00	0.00	0.00	0.00	0.00	3.35	3.35	47.12	39.46	628.83	80.99	117.14	214.28	216.42
Salvage Value	5.74	0.00	2.63	0.00	3.20	0.36	11.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2399.77	2569.75	200.69	0.00	264.30	46.64	5481.14	437.84	302.94	10291.24	1567.71	842.93	2409.30	5471.29

Net Present Value -751

All Gas

TABLE 399
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	433.97	103.30	34.19	121.38	175.11
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	449.67	101.42	36.46	124.60	187.19
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	490.81	99.77	37.68	130.27	223.10
2018	0.00	0.00	0.37	0.00	0.00	0.00	0.37	0.52	0.00	468.40	96.90	41.06	136.08	194.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	451.83	94.93	36.39	138.99	181.52
2020	0.00	0.00	73.22	0.00	0.00	0.00	73.22	0.78	0.00	483.24	94.99	28.74	145.25	214.26
2021	0.00	0.00	91.63	0.00	6.90	0.00	98.53	1.16	0.00	474.33	93.20	26.90	158.17	196.06
2022	0.00	0.00	10.47	0.00	0.00	0.00	10.47	1.21	4.07	461.85	90.88	49.97	163.68	157.31
2023	0.00	0.00	51.10	0.00	0.00	0.00	51.10	1.47	4.07	443.46	88.65	61.52	174.48	118.82
2024	0.00	0.00	71.63	0.00	54.34	0.00	125.97	2.09	4.07	435.04	87.14	70.23	183.66	94.01
2025	0.00	0.00	10.50	0.00	0.00	0.00	10.50	2.14	8.16	381.25	86.65	58.83	160.55	75.21
2026	0.00	0.00	51.25	0.00	0.00	0.00	51.25	2.39	8.16	361.91	85.31	60.87	165.57	50.15
2027	0.00	0.00	69.72	0.00	0.00	0.00	69.72	2.74	8.16	339.71	83.42	61.19	184.15	10.96
2028	0.00	0.00	113.80	0.00	0.00	0.00	113.80	3.31	12.23	316.07	81.43	95.42	182.77	-43.54
2029	0.00	0.00	148.60	0.00	0.00	0.00	148.60	4.06	12.23	294.51	79.94	108.49	190.66	-84.57
2030	0.00	0.00	66.29	0.00	6.90	0.00	73.19	4.42	12.24	313.35	80.90	100.96	184.88	-53.39
2031	0.00	0.00	4.86	0.00	0.00	0.00	4.86	4.45	19.31	338.88	78.44	188.34	164.78	-92.68
2032	0.00	0.00	51.56	0.00	0.00	0.00	51.56	4.70	19.32	308.10	76.49	206.03	175.11	-149.53
2033	0.00	0.00	70.13	0.00	45.72	0.00	115.85	5.28	19.32	280.58	74.70	223.74	185.97	-203.84
2034	0.00	0.00	114.49	0.00	0.00	0.00	114.49	5.85	23.40	262.43	73.26	250.98	192.41	-254.23
2035	0.00	0.00	149.49	0.00	0.00	0.00	149.49	6.60	23.40	246.29	72.35	263.70	198.53	-288.29
2036	0.00	0.00	66.69	0.00	0.00	0.00	66.69	6.94	23.40	245.22	72.31	256.49	208.73	-292.30
2037	0.00	0.00	109.08	0.00	0.00	0.00	109.08	7.48	30.46	256.01	70.27	350.54	177.26	-342.07
2038	0.00	0.00	149.94	0.00	0.00	0.00	149.94	8.23	30.47	233.84	69.03	369.21	187.14	-391.53
2039	0.00	0.00	66.89	0.00	0.00	0.00	66.89	8.57	30.48	229.77	68.98	374.99	195.36	-409.56
2040	0.00	0.00	4.90	0.00	0.00	0.00	4.90	8.59	37.55	249.01	67.00	467.59	173.84	-459.43
2041	0.00	0.00	104.62	0.00	0.00	0.00	104.62	9.11	37.55	232.67	65.19	505.84	190.19	-528.56
2042	0.00	0.00	150.54	0.00	0.00	0.00	150.54	9.87	37.55	222.78	64.12	532.27	202.40	-576.00
2043	0.00	0.00	67.15	0.00	45.72	0.00	112.87	10.43	37.55	226.01	64.12	537.66	206.95	-582.71
2044	0.00	0.00	4.92	0.00	0.00	0.00	4.92	10.45	44.63	247.64	62.50	634.18	180.93	-629.98
2045	0.00	0.00	22.98	0.00	0.00	0.00	22.98	10.57	44.63	234.46	60.94	675.60	196.79	-698.88
2046	0.00	0.00	31.25	0.00	0.00	0.00	31.25	10.73	44.63	224.51	59.82	709.87	208.92	-754.10
2047	0.00	0.00	4.72	0.00	0.00	0.00	4.72	10.75	46.11	220.54	58.94	748.13	215.11	-801.64
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.11	226.50	59.90	711.20	206.94	-751.54
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	10.75	46.12	226.50	59.90	711.20	206.94	-751.54
2050	0.00	0.00	50.94	0.00	10.08	0.00	61.02	10.75	46.12	226.50	59.90	711.20	206.94	-751.54
2051	0.00	0.00	69.30	0.00	10.08	0.00	79.38	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2052	0.00	0.00	10.47	0.00	10.08	0.00	20.55	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2053	0.00	0.00	51.10	0.00	0.00	0.00	51.10	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2054	0.00	0.00	69.51	0.00	0.00	0.00	69.51	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2055	0.00	0.00	10.50	0.00	0.00	0.00	10.50	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2056	0.00	0.00	51.25	0.00	6.90	0.00	58.15	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2057	0.00	0.00	69.72	0.00	0.00	0.00	69.72	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2058	0.00	0.00	113.80	0.00	0.00	0.00	113.80	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2059	0.00	0.00	148.60	0.00	40.76	0.00	189.35	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2060	0.00	0.00	66.29	0.00	0.00	0.00	66.29	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2061	0.00	0.00	4.86	0.00	0.00	0.00	4.86	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2062	0.00	0.00	51.56	0.00	0.00	0.00	51.56	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2063	0.00	0.00	70.13	0.00	0.00	0.00	70.13	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2064	0.00	0.00	114.49	0.00	0.00	0.00	114.49	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2065	0.00	0.00	149.49	0.00	6.90	0.00	156.39	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2066	0.00	0.00	66.69	0.00	0.00	0.00	66.69	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2067	0.00	0.00	109.08	0.00	0.00	0.00	109.08	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2068	0.00	0.00	149.94	0.00	34.29	0.00	184.23	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2069	0.00	0.00	66.89	0.00	0.00	0.00	66.89	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2070	0.00	0.00	4.90	0.00	0.00	0.00	4.90	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2071	0.00	0.00	104.62	0.00	0.00	0.00	104.62	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2072	0.00	0.00	150.54	0.00	0.00	0.00	150.54	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2073	0.00	0.00	67.15	0.00	0.00	0.00	67.15	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2074	0.00	0.00	4.92	0.00	13.59	0.00	18.50	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2075	0.00	0.00	22.98	0.00	0.00	0.00	22.98	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2076	0.00	0.00	31.25	0.00	0.00	0.00	31.25	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2077	0.00	0.00	4.72	0.00	0.00	0.00	4.72	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2078	0.00	0.00	0.00	0.00	34.29	0.00	34.29	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2080	0.00	0.00	50.94	0.00	0.00	0.00	50.94	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2081	0.00	0.00	69.30	0.00	0.00	0.00	69.30	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2082	0.00	0.00	10.47	0.00	0.00	0.00	10.47	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2083	0.00	0.00	51.10	0.00	11.43	0.00	62.52	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2084	0.00	0.00	69.51	0.00	10.08	0.00	79.59	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2085	0.00	0.00	10.50	0.00	10.08	0.00	20.58	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2086	0.00	0.00	51.25	0.00	10.08	0.00	61.33	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2087	0.00	0.00	69.72	0.00	10.08	0.00	79.79	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2088	0.00	0.00	10.53	0.00	0.00	0.00	10.53	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.75	46.13	226.50	59.90	711.20	206.94	-751.54
Salvage Value	0.00	0.00	22.70	0.00	0.81	0.00	23.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	712.65	0.00	102.94	0.00	879.91	61.35	224.68	5914.61	1375.74	3191.85	2678.75	-1331.74

Net Present Value: -2498

Wind/Gas

TABLE 400
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	64.32	0.00	0.00	10.08	0.00	74.40	0.37	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.42	0.00	433.97	103.30	34.19	121.40	175.09
2016	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.47	0.00	449.67	101.42	36.46	124.62	187.17
2017	0.00	0.00	0.00	0.00	10.08	0.00	10.08	0.52	0.00	490.86	99.77	37.68	130.29	223.13
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	468.40	96.90	41.06	136.08	194.35
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	451.83	94.93	36.39	138.99	181.52
2020	0.00	0.00	0.00	7.22	10.78	0.00	18.00	0.61	0.00	477.57	94.51	30.99	146.66	205.40
2021	0.00	0.00	0.37	220.30	17.97	0.00	238.64	1.80	0.00	468.59	92.73	29.77	159.11	186.98
2022	0.00	0.00	0.00	224.43	21.71	0.00	246.14	3.04	6.34	478.85	91.07	29.87	160.82	197.10
2023	0.00	0.00	124.47	217.21	11.36	0.00	353.04	4.69	12.69	475.73	88.53	34.15	166.62	186.43
2024	0.00	0.00	161.34	4.12	19.13	0.00	184.59	5.50	19.03	482.55	86.73	34.43	171.13	190.27
2025	0.00	0.00	21.00	3.61	3.46	0.00	28.07	5.64	27.18	443.37	86.81	40.23	141.74	174.59
2026	0.00	0.00	51.25	110.15	8.70	0.00	170.10	6.49	27.18	432.40	85.79	38.46	145.84	162.30
2027	0.00	0.00	71.84	112.21	68.17	0.00	252.22	7.74	30.35	414.21	83.37	47.25	153.93	129.66
2028	0.00	0.00	10.53	112.21	19.16	0.00	141.91	8.45	37.60	407.80	81.59	61.26	159.35	105.60
2029	0.00	0.00	51.40	112.21	19.24	0.00	182.85	9.37	40.78	396.42	79.98	66.51	165.05	84.88
2030	0.00	0.00	69.92	112.21	19.24	0.00	201.37	10.37	43.95	399.04	79.04	69.72	166.35	83.92
2031	0.00	0.00	62.07	112.21	19.24	0.00	193.52	11.34	51.19	404.10	77.80	82.67	170.18	73.44
2032	0.00	0.00	70.06	112.21	64.95	0.00	247.23	12.58	54.37	399.88	76.68	83.44	175.97	63.80
2033	0.00	0.00	10.59	112.21	19.24	0.00	142.04	13.29	61.63	408.80	76.02	88.89	179.54	64.35
2034	0.00	0.00	51.66	112.21	19.24	0.00	183.11	14.20	64.81	391.90	74.17	104.62	184.10	29.00
2035	0.00	0.00	70.28	112.21	19.24	0.00	201.72	15.21	67.99	374.91	72.48	112.88	193.03	-3.47
2036	0.00	0.00	62.38	112.21	19.24	0.00	193.83	16.18	75.23	368.05	71.10	129.73	197.84	-30.62
2037	0.00	0.00	70.42	112.21	19.24	0.00	201.87	17.19	78.41	356.60	69.79	137.45	205.02	-55.66
2038	0.00	0.00	62.51	112.21	19.24	0.00	193.96	18.16	85.66	356.13	68.75	151.46	210.72	-74.80
2039	0.00	0.00	70.56	112.21	64.95	0.00	247.72	19.40	88.84	349.43	67.59	151.91	231.51	-101.58
2040	0.00	0.00	10.66	119.43	19.24	0.00	149.33	20.14	96.10	356.18	66.78	160.86	240.86	-112.32
2041	0.00	0.00	52.02	332.52	19.24	0.00	403.78	22.16	99.28	338.29	65.24	193.12	238.07	-158.14
2042	0.00	0.00	70.77	336.64	19.24	0.00	426.64	24.30	102.45	323.72	63.85	206.62	248.72	-195.47
2043	0.00	0.00	62.82	329.42	19.09	0.00	411.34	26.35	109.69	317.37	62.66	228.50	255.52	-229.31
2044	0.00	0.00	70.91	116.34	18.66	0.00	205.91	27.38	112.87	311.59	61.73	237.54	263.74	-251.41
2045	0.00	0.00	33.69	115.82	17.51	0.00	167.02	28.22	120.12	307.67	60.63	251.49	277.25	-281.69
2046	0.00	0.00	31.25	218.76	15.77	0.00	265.78	29.55	123.30	301.08	59.57	253.06	297.31	-308.87
2047	0.00	0.00	4.72	114.28	10.53	0.00	129.53	30.19	127.95	292.71	58.51	261.68	301.84	-329.33
2048	0.00	0.00	0.00	112.21	5.41	0.00	117.62	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2049	0.00	0.00	0.00	112.21	10.15	0.00	122.36	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2050	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2051	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2052	0.00	0.00	0.00	112.21	10.08	0.00	122.29	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2053	0.00	0.00	102.19	112.21	0.00	0.00	214.40	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2054	0.00	0.00	139.01	112.21	0.00	0.00	251.23	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2055	0.00	0.00	21.00	112.21	2.70	0.00	135.91	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2056	0.00	0.00	51.25	112.21	4.49	0.00	167.96	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2057	0.00	0.00	69.72	112.21	5.46	0.00	187.39	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2058	0.00	0.00	10.53	112.21	3.06	0.00	125.80	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2059	0.00	0.00	51.40	112.21	15.35	0.00	178.97	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2060	0.00	0.00	69.92	119.43	1.51	0.00	190.87	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2061	0.00	0.00	62.07	332.52	2.43	0.00	397.02	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2062	0.00	0.00	70.06	336.64	44.27	0.00	450.97	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2063	0.00	0.00	10.59	329.42	4.81	0.00	344.82	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2064	0.00	0.00	51.66	116.34	4.81	0.00	172.81	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2065	0.00	0.00	70.28	115.82	4.81	0.00	190.91	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2066	0.00	0.00	62.38	218.76	4.81	0.00	285.95	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2067	0.00	0.00	70.42	114.28	39.10	0.00	223.79	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2068	0.00	0.00	62.51	112.21	4.81	0.00	179.53	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2069	0.00	0.00	70.56	112.21	4.81	0.00	187.58	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2070	0.00	0.00	10.66	112.21	12.90	0.00	135.77	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2071	0.00	0.00	52.02	112.21	18.29	0.00	182.53	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2072	0.00	0.00	70.77	112.21	21.06	0.00	204.04	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2073	0.00	0.00	62.82	112.21	13.11	0.00	188.15	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2074	0.00	0.00	70.91	112.21	42.88	0.00	226.00	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2075	0.00	0.00	33.69	112.21	6.76	0.00	152.66	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2076	0.00	0.00	31.25	112.21	11.08	0.00	154.55	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2077	0.00	0.00	4.72	112.21	28.71	0.00	145.65	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2078	0.00	0.00	0.00	112.21	19.09	0.00	131.31	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2079	0.00	0.00	0.00	112.21	18.88	0.00	131.09	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2080	0.00	0.00	0.00	119.43	18.59	0.00	138.02	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2081	0.00	0.00	0.00	332.52	17.72	0.00	350.24	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2082	0.00	0.00	0.00	336.64	28.24	0.00	364.88	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2083	0.00	0.00	102.19	329.42	15.73	0.00	447.34	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2084	0.00	0.00	139.01	116.34	24.43	0.00	279.78	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2085	0.00	0.00	21.00	115.82	24.29	0.00	161.12	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2086	0.00	0.00	51.25	218.76	23.42	0.00	293.43	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2087	0.00	0.00	69.72	114.28	22.56	0.00	206.55	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2088	0.00	0.00	10.53	112.21	8.15	0.00	130.90	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2089	0.00	0.00	0.00	108.61	15.54	0.00	124.15	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
2090	0.00	0.00	0.00	2.06	0.07	0.00	2.13	30.19	127.95	300.48	59.57	255.41	292.13	-306.63
Salvage Value	0.00	0.00	5.23	14.12	2.97	0.00	22.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	64.32	534.25	1420.96	252.38	0.00	2271.91	154.27	641.69	6679.11	1373.24	1423.00	2859.17	1023.70

Net Present Value -2044

K22/Gas

TABLE 401
ECONOMIC SUMMARY
NFAT 2012

Energy Price: High
Discount Rate: High
Capital Cost: Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	102.05	0.00	0.00	10.08	0.00	112.13	0.56	0.00	379.57	105.25	29.87	115.46	129.00
2015	0.00	30.48	0.00	0.00	10.82	0.00	41.30	0.77	0.00	433.97	103.30	34.19	121.38	175.11
2016	0.00	26.48	0.00	0.00	10.88	0.00	37.37	0.95	0.00	449.12	101.42	36.47	124.60	186.63
2017	0.00	196.98	0.00	0.00	23.98	0.00	220.95	2.06	0.00	489.42	99.78	37.70	130.34	221.60
2018	0.00	383.04	0.00	0.00	7.13	0.00	390.17	4.01	0.00	465.38	96.91	41.08	136.23	191.16
2019	0.00	622.95	0.00	0.00	12.41	0.00	635.36	7.19	0.00	448.74	94.94	36.40	139.14	178.26
2020	0.00	691.73	0.00	0.00	22.58	0.00	714.30	10.76	0.00	470.62	94.33	31.96	147.72	196.60
2021	0.00	563.84	0.00	0.00	32.03	0.00	595.87	13.74	0.00	465.49	92.68	30.39	161.40	181.03
2022	0.00	326.51	0.00	0.00	37.93	0.00	364.43	15.56	13.29	474.23	92.65	34.56	149.08	197.95
2023	0.00	151.35	0.00	0.00	0.01	0.00	151.35	16.32	13.51	627.65	98.45	33.99	132.37	362.84
2024	0.00	52.18	0.00	0.00	0.00	0.00	52.18	16.58	13.21	653.04	98.30	38.40	141.60	374.74
2025	0.00	0.00	0.37	0.00	0.00	0.00	0.37	16.58	13.43	622.49	98.29	26.77	123.78	373.65
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.58	13.26	601.30	96.39	27.11	129.76	348.04
2027	0.00	0.00	73.58	0.00	0.00	0.00	73.58	16.83	13.21	555.27	94.51	25.93	126.32	308.51
2028	0.00	0.00	92.11	0.00	6.90	0.00	99.01	17.22	12.96	529.24	92.93	27.03	130.95	278.32
2029	0.00	0.00	10.54	0.00	0.00	0.00	10.54	17.27	16.59	522.30	92.08	34.09	132.57	263.55
2030	0.00	0.00	51.45	0.00	0.00	0.00	51.45	17.53	16.59	505.81	90.28	42.26	139.51	233.76
2031	0.00	0.00	175.69	0.00	54.34	0.00	230.04	18.67	16.64	493.01	88.58	49.55	148.27	206.61
2032	0.00	0.00	159.62	0.00	0.00	0.00	159.62	19.46	23.48	478.54	86.94	66.73	155.56	169.31
2033	0.00	0.00	66.49	0.00	6.90	0.00	73.39	19.83	19.46	493.25	87.13	58.75	159.17	188.20
2034	0.00	0.00	4.87	0.00	0.00	0.00	4.87	19.86	26.52	528.98	84.66	159.16	136.26	148.90
2035	0.00	0.00	103.99	0.00	0.00	0.00	103.99	20.38	26.52	501.26	82.56	174.56	146.70	97.44
2036	0.00	0.00	149.64	0.00	0.00	0.00	149.64	21.12	26.53	484.35	81.01	189.13	154.83	59.37
2037	0.00	0.00	66.75	0.00	0.00	0.00	66.75	21.46	26.53	500.97	81.46	179.33	154.99	85.19
2038	0.00	0.00	109.19	0.00	0.00	0.00	109.19	22.00	32.93	536.79	79.04	289.54	135.99	32.22
2039	0.00	0.00	150.09	0.00	0.00	0.00	150.09	22.75	32.94	521.79	77.65	304.59	153.12	-13.58
2040	0.00	0.00	66.95	0.00	45.72	0.00	112.67	23.32	32.94	524.75	77.16	307.52	161.00	-20.92
2041	0.00	0.00	4.90	0.00	0.00	0.00	4.90	23.34	40.02	567.29	75.14	422.16	138.09	-68.09
2042	0.00	0.00	104.72	0.00	0.00	0.00	104.72	23.87	42.97	545.64	73.29	451.17	148.93	-127.75
2043	0.00	0.00	150.69	0.00	0.00	0.00	150.69	24.62	40.02	530.40	71.92	473.53	157.46	-172.52
2044	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.96	40.02	527.47	71.56	473.62	164.57	-182.28
2045	0.00	0.00	4.92	0.00	0.00	0.00	4.92	24.98	47.09	578.79	69.93	594.30	141.86	-227.29
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.09	561.53	68.66	616.01	151.93	-275.07
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	48.87	545.50	67.27	646.33	161.98	-330.08
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	48.88	561.94	68.62	618.88	151.92	-277.48
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	48.88	561.94	68.62	618.88	151.92	-277.48
2050	0.00	0.00	0.00	0.00	10.41	0.00	10.41	24.98	47.99	561.94	68.62	618.88	151.92	-277.48
2051	0.00	0.00	0.00	0.00	10.45	0.00	10.45	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2052	0.00	0.00	0.00	0.00	10.46	0.00	10.46	24.98	50.06	561.94	68.62	618.88	151.92	-277.48
2053	0.00	0.00	0.00	0.00	0.35	0.00	0.35	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2054	0.00	0.00	0.00	0.00	11.52	0.00	11.52	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2055	0.00	0.00	0.00	0.00	15.28	0.00	15.28	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2056	0.00	0.00	0.00	0.00	16.51	0.00	16.51	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2057	0.00	0.00	51.30	0.00	13.47	0.00	64.77	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2058	0.00	0.00	69.79	0.00	0.00	0.00	69.79	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2059	0.00	0.00	10.54	0.00	0.00	0.00	10.54	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2060	0.00	0.00	51.45	0.00	0.00	0.00	51.45	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2061	0.00	0.00	173.57	0.00	0.00	0.00	173.57	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2062	0.00	0.00	159.62	0.00	0.00	0.00	159.62	24.98	50.06	561.94	68.62	618.88	151.92	-277.48
2063	0.00	0.00	66.49	0.00	6.90	0.00	73.39	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2064	0.00	0.00	4.87	0.00	0.00	0.00	4.87	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2065	0.00	0.00	103.99	0.00	0.41	0.00	104.40	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2066	0.00	0.00	149.64	0.00	41.19	0.00	190.83	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2067	0.00	0.00	66.75	0.00	13.52	0.00	80.27	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2068	0.00	0.00	109.19	0.00	13.68	0.00	122.87	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2069	0.00	0.00	150.09	0.00	0.89	0.00	150.98	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2070	0.00	0.00	66.95	0.00	7.30	0.00	74.25	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2071	0.00	0.00	4.90	0.00	15.51	0.00	20.42	24.98	62.94	561.94	68.62	618.88	151.92	-277.48
2072	0.00	0.00	104.72	0.00	24.45	0.00	129.18	24.98	50.06	561.94	68.62	618.88	151.92	-277.48
2073	0.00	0.00	150.69	0.00	0.01	0.00	150.70	24.98	48.88	561.94	68.62	618.88	151.92	-277.48
2074	0.00	0.00	67.22	0.00	0.00	0.00	67.22	24.98	48.88	561.94	68.62	618.88	151.92	-277.48
2075	0.00	0.00	4.92	0.00	34.29	0.00	39.21	24.98	48.88	561.94	68.62	618.88	151.92	-277.48
2076	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.99	561.94	68.62	618.88	151.92	-277.48
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2081	0.00	0.00	0.00	0.00	13.59	0.00	13.59	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	50.06	561.94	68.62	618.88	151.92	-277.48
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2087	0.00	0.00	51.30	0.00	10.08	0.00	61.38	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2088	0.00	0.00	69.79	0.00	0.00	0.00	69.79	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2089	0.00	0.00	10.54	0.00	0.00	0.00	10.54	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
2090	0.00	0.00	0.00	0.00	11.43	0.00	11.43	24.98	47.10	561.94	68.62	618.88	151.92	-277.48
Salvage Value	0.00	0.00	4.68	0.00	1.22	0.00	5.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	0.00	2217.37	488.31	0.00	168.48	0.00	2874.16	224.78	263.16	8256.44	1468.90	2449.38	2265.28	2072.88

Net Present Value: -1289

K22/C29

TABLE 402
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	High
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	102.05	0.00	0.00	10.08	0.00	142.51	0.71	0.00	379.57	105.25	29.87	115.46	129.00
2015	38.78	30.48	0.00	0.00	10.82	0.00	80.08	1.11	0.00	433.97	103.30	34.19	121.38	175.11
2016	11.28	26.48	0.00	0.00	10.88	0.00	48.65	1.36	0.00	449.12	101.42	36.47	124.60	186.63
2017	11.98	196.98	0.00	0.00	23.98	0.00	232.94	2.52	0.00	489.42	99.78	37.70	130.34	221.60
2018	12.02	383.04	0.00	0.00	7.13	0.00	402.19	4.53	0.00	465.38	96.91	41.08	136.23	191.16
2019	14.33	622.95	0.00	0.00	12.41	0.00	649.69	7.78	0.00	448.74	94.94	36.40	139.14	178.26
2020	154.77	691.73	0.00	0.00	22.58	0.00	869.07	12.13	0.00	470.63	94.33	31.96	147.73	196.60
2021	236.04	563.84	0.00	0.00	32.03	0.00	831.91	16.29	0.00	465.18	92.68	30.40	161.67	180.43
2022	249.69	326.51	0.00	0.00	37.93	0.00	614.13	19.36	13.29	473.85	92.66	34.51	149.36	197.32
2023	252.47	151.35	0.00	0.00	2.60	0.00	406.42	21.39	13.51	626.29	98.44	34.08	132.49	361.28
2024	679.98	52.18	0.00	0.00	2.60	0.00	734.76	25.06	13.21	650.28	98.29	38.41	141.70	371.89
2025	1075.65	0.00	0.00	0.00	31.66	0.00	1107.31	30.60	13.43	619.05	98.31	26.81	123.94	369.99
2026	962.96	0.00	0.00	0.00	16.57	0.00	979.53	35.50	13.26	597.04	96.39	27.18	130.07	343.40
2027	685.66	0.00	0.00	0.00	27.94	0.00	713.61	39.06	13.21	553.07	94.76	24.90	126.32	307.08
2028	473.49	0.00	0.00	0.00	48.59	0.00	522.07	41.67	12.96	519.57	92.83	27.36	132.19	267.19
2029	310.10	0.00	0.00	0.00	64.31	0.00	374.40	43.55	27.13	681.72	96.67	31.37	117.52	436.17
2030	113.88	0.00	0.00	0.00	75.32	0.00	189.20	44.49	27.36	905.49	103.98	30.51	107.94	663.06
2031	35.83	0.00	0.00	0.00	0.00	0.00	35.83	44.67	27.26	937.52	103.67	31.20	113.36	689.29
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	30.24	905.44	101.98	30.84	114.38	658.24
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	26.04	869.78	100.34	30.83	112.00	626.61
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.99	842.34	98.72	31.49	114.00	598.13
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.82	810.73	97.14	31.70	114.73	567.16
2036	0.00	0.00	0.37	0.00	0.00	0.00	0.37	44.67	25.44	776.93	95.57	31.65	115.81	533.89
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.67	25.52	742.78	94.01	31.82	117.69	499.26
2038	0.00	0.00	74.15	0.00	0.00	0.00	74.15	44.93	24.96	709.71	92.48	31.87	121.21	464.15
2039	0.00	0.00	92.84	0.00	6.90	0.00	99.74	45.32	27.74	698.26	91.10	31.21	138.58	437.37
2040	0.00	0.00	10.66	0.00	0.00	0.00	10.66	45.37	28.85	682.34	89.34	55.58	141.07	396.36
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.37	28.85	665.13	87.85	62.02	149.66	365.60
2042	0.00	0.00	52.12	0.00	0.00	0.00	52.12	45.63	31.81	651.59	86.42	63.95	163.64	337.59
2043	0.00	0.00	70.84	0.00	6.90	0.00	77.74	46.02	28.85	635.13	84.91	65.18	180.83	304.22
2044	0.00	0.00	62.88	0.00	0.00	0.00	62.88	46.33	32.92	619.81	83.43	100.52	177.19	258.68
2045	0.00	0.00	73.10	0.00	54.34	0.00	127.45	46.96	32.25	605.95	82.14	107.71	188.15	227.94
2046	0.00	0.00	10.72	0.00	0.00	0.00	10.72	47.02	36.33	623.97	81.78	106.65	198.30	237.24
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.11	579.38	79.53	142.76	205.21	151.88
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.11	603.10	81.15	119.04	197.22	205.69
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	41.07	603.10	81.15	119.04	197.22	205.69
2050	0.00	0.00	0.00	0.00	10.41	0.00	10.41	47.02	37.23	603.10	81.15	119.04	197.22	205.69
2051	0.00	0.00	0.00	0.00	10.45	0.00	10.45	47.02	36.35	603.10	81.15	119.04	197.22	205.69
2052	0.00	0.00	0.00	0.00	10.46	0.00	10.46	47.02	39.31	603.10	81.15	119.04	197.22	205.69
2053	0.00	0.00	0.00	0.00	0.35	0.00	0.35	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2054	0.00	0.00	0.00	0.00	11.52	0.00	11.52	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2055	0.00	0.00	0.00	0.00	15.28	0.00	15.28	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2056	0.00	0.00	0.00	0.00	16.51	0.00	16.51	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2057	0.00	0.00	0.00	0.00	13.47	0.00	13.47	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2058	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2059	0.00	0.00	0.00	0.00	0.64	0.00	0.64	47.02	55.15	603.10	81.15	119.04	197.22	205.69
2060	0.00	0.00	0.00	0.00	7.70	0.00	7.70	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2061	0.00	0.00	0.00	0.00	3.85	0.00	3.85	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2062	0.00	0.00	0.00	0.00	6.42	0.00	6.42	47.02	39.32	603.10	81.15	119.04	197.22	205.69
2063	0.00	0.00	0.00	0.00	10.91	0.00	10.91	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2064	0.00	0.00	0.00	0.00	15.40	0.00	15.40	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2065	0.00	0.00	0.00	0.00	19.02	0.00	19.02	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2066	0.00	0.00	0.00	0.00	0.44	0.00	0.44	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2067	0.00	0.00	0.00	0.00	13.52	0.00	13.52	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2068	0.00	0.00	51.87	0.00	6.77	0.00	58.64	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2069	0.00	0.00	70.56	0.00	0.89	0.00	71.45	47.02	55.15	603.10	81.15	119.04	197.22	205.69
2070	0.00	0.00	10.66	0.00	7.30	0.00	17.96	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2071	0.00	0.00	0.00	0.00	15.51	0.00	15.51	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2072	0.00	0.00	52.07	0.00	24.45	0.00	76.53	47.02	55.15	603.10	81.15	119.04	197.22	205.69
2073	0.00	0.00	70.84	0.00	1.96	0.00	72.80	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2074	0.00	0.00	62.88	0.00	8.86	0.00	71.74	47.02	53.96	603.10	81.15	119.04	197.22	205.69
2075	0.00	0.00	70.98	0.00	23.96	0.00	94.94	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2076	0.00	0.00	10.72	0.00	12.72	0.00	23.44	47.02	53.08	603.10	81.15	119.04	197.22	205.69
2077	0.00	0.00	0.00	0.00	21.53	0.00	21.53	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2078	0.00	0.00	0.00	0.00	44.58	0.00	44.58	47.02	52.19	603.10	81.15	119.04	197.22	205.69
2079	0.00	0.00	0.00	0.00	48.91	0.00	48.91	47.02	39.32	603.10	81.15	119.04	197.22	205.69
2080	0.00	0.00	0.00	0.00	97.47	0.00	97.47	47.02	53.96	603.10	81.15	119.04	197.22	205.69
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	56.92	603.10	81.15	119.04	197.22	205.69
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	38.13	603.10	81.15	119.04	197.22	205.69
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	53.96	603.10	81.15	119.04	197.22	205.69
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	36.36	603.10	81.15	119.04	197.22	205.69
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	39.32	603.10	81.15	119.04	197.22	205.69
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.02	36.36	603.10	81.15	119.04	197.22	205.69
Salvage Value	4.04	0.00	1.49	0.00	2.72	0.00	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	2679.97	2217.37	88.42	0.00	260.56	0.00	5246.32	421.26	248.53	9420.60	1548.35	754.09	2275.97	4842.19

Net Present Value -1074

SCGT/C26

TABLE 403
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	High
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	379.57	105.25	29.87	115.46	129.00
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	433.97	103.30	34.19	121.39	175.10
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	449.67	101.42	36.46	124.60	187.19
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	490.85	99.77	37.68	130.30	223.11
2018	199.73	0.00	0.37	0.00	0.00	0.00	200.10	3.18	0.00	467.79	96.90	41.08	136.13	193.68
2019	238.48	0.00	0.00	0.00	0.00	0.00	238.48	4.37	0.00	450.87	94.93	36.40	139.03	180.51
2020	242.33	0.00	73.22	0.00	0.00	0.00	315.55	5.84	0.00	481.47	94.96	28.90	145.36	212.25
2021	666.03	0.00	91.58	0.00	6.90	0.00	764.51	9.55	0.00	472.60	93.17	27.23	158.75	193.46
2022	1066.12	0.00	10.47	0.00	0.49	0.00	1077.08	14.93	4.07	460.12	90.91	50.61	164.38	154.23
2023	954.43	0.00	0.00	0.00	0.99	0.00	955.42	19.71	4.07	439.65	88.50	63.95	175.70	111.50
2024	679.59	0.00	0.00	0.00	1.97	0.00	681.56	23.12	4.07	434.52	87.32	69.62	183.57	94.00
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	25.49	4.07	388.53	87.84	43.19	164.60	92.89
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	27.03	18.69	495.66	91.86	32.86	130.98	239.96
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	27.60	18.91	709.91	99.82	30.41	118.56	461.13
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	27.78	18.61	746.21	99.83	33.29	130.12	482.97
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.83	712.99	98.08	34.31	132.41	448.19
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.65	684.39	96.87	33.84	127.67	426.01
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.60	656.01	94.85	36.86	133.39	390.91
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	18.36	611.12	92.92	39.25	133.76	345.20
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.92	581.45	90.96	46.10	139.32	305.07
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.92	566.98	89.37	53.21	148.34	276.06
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.78	17.96	553.17	88.04	59.19	154.25	251.69
2036	0.00	0.00	51.76	0.00	0.00	0.00	51.76	28.03	20.74	546.12	86.95	59.78	163.69	235.70
2037	0.00	0.00	70.46	0.00	6.90	0.00	77.36	28.42	17.78	530.66	85.42	60.85	181.11	203.28
2038	0.00	0.00	10.64	0.00	0.00	0.00	10.64	28.47	21.85	516.82	83.89	93.92	179.29	159.72
2039	0.00	0.00	51.92	0.00	0.00	0.00	51.92	28.73	21.85	503.85	82.61	102.00	195.79	123.45
2040	0.00	0.00	72.75	0.00	54.34	0.00	127.09	29.36	21.85	493.89	81.25	101.39	217.75	93.51
2041	0.00	0.00	62.69	0.00	0.00	0.00	62.69	29.67	25.94	475.75	79.56	143.14	217.29	35.76
2042	0.00	0.00	70.77	0.00	0.00	0.00	70.77	30.03	25.27	457.40	78.21	161.09	225.29	-7.19
2043	0.00	0.00	62.82	0.00	0.00	0.00	62.82	30.34	29.34	447.96	76.87	180.53	239.85	-49.28
2044	0.00	0.00	70.91	0.00	45.72	0.00	116.63	30.92	29.34	433.41	75.54	182.94	265.20	-90.27
2045	0.00	0.00	10.71	0.00	0.00	0.00	10.71	30.98	33.43	422.06	74.18	251.02	249.26	-152.40
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	36.39	408.61	73.00	276.98	256.96	-198.33
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.44	394.70	71.65	282.12	286.73	-245.80
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.45	408.46	72.94	270.04	264.32	-198.84
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.45	408.46	72.94	270.04	264.32	-198.84
2050	0.00	0.00	50.94	0.00	10.08	0.00	61.02	30.98	33.46	408.46	72.94	270.04	264.32	-198.84
2051	0.00	0.00	69.30	0.00	10.08	0.00	79.38	30.98	35.24	408.46	72.94	270.04	264.32	-198.84
2052	0.00	0.00	10.47	0.00	10.08	0.00	20.55	30.98	35.25	408.46	72.94	270.04	264.32	-198.84
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	408.46	72.94	270.04	264.32	-198.84
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	408.46	72.94	270.04	264.32	-198.84
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	408.46	72.94	270.04	264.32	-198.84
2056	0.00	0.00	0.00	0.00	6.90	0.00	6.90	30.98	36.43	408.46	72.94	270.04	264.32	-198.84
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2066	0.00	0.00	51.76	0.00	0.00	0.00	51.76	30.98	36.43	408.46	72.94	270.04	264.32	-198.84
2067	0.00	0.00	70.42	0.00	0.00	0.00	70.42	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2068	0.00	0.00	10.64	0.00	0.00	0.00	10.64	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2069	0.00	0.00	51.92	0.00	0.00	0.00	51.92	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2070	0.00	0.00	70.63	0.00	0.00	0.00	70.63	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2071	0.00	0.00	62.69	0.00	0.00	0.00	62.69	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2072	0.00	0.00	70.77	0.00	7.39	0.00	78.16	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2073	0.00	0.00	62.82	0.00	0.99	0.00	63.81	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2074	0.00	0.00	70.91	0.00	1.97	0.00	72.88	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2075	0.00	0.00	10.71	0.00	45.19	0.00	55.91	30.98	49.30	408.46	72.94	270.04	264.32	-198.84
2076	0.00	0.00	0.00	0.00	1.97	0.00	1.97	30.98	36.43	408.46	72.94	270.04	264.32	-198.84
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	51.08	408.46	72.94	270.04	264.32	-198.84
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	35.25	408.46	72.94	270.04	264.32	-198.84
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	30.98	51.08	408.46	72.94	270.04	264.32	-198.84
2080	0.00	0.00	50.94	0.00	0.00	0.00	50.94	30.98	35.25	408.46	72.94	270.04	264.32	-198.84
2081	0.00	0.00	69.30	0.00	0.00	0.00	69.30	30.98	51.08	408.46	72.94	270.04	264.32	-198.84
2082	0.00	0.00	10.47	0.00	0.00	0.00	10.47	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	36.43	408.46	72.94	270.04	264.32	-198.84
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
2090	0.00	0.00	0.00	0.00	13.59	0.00	13.59	30.98	33.47	408.46	72.94	270.04	264.32	-198.84
Salvage Value	1.60	0.00	2.56	0.00	0.91	0.00	5.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	246.26	0.00	71.41	0.00	3584.28	284.53	196.32	7934.15	1485.54	1279.56	2658.78	2510.26

Net Present Value -1555

CCGT/C26

TABLE 404
ECONOMIC SUMMARY
NFAT 2012

Energy Price	High
Discount Rate	High
Capital Cost	Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	379.57	105.25	29.87	115.46	129.00
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	433.97	103.30	34.19	121.39	175.10
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	449.67	101.42	36.46	124.60	187.19
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	490.85	99.77	37.68	130.30	223.11
2018	199.73	0.00	0.37	0.00	0.00	0.00	200.10	3.18	0.00	467.79	96.90	41.08	136.13	193.68
2019	238.48	0.00	102.34	0.00	0.00	0.00	340.83	4.88	0.00	450.87	94.93	36.40	139.03	180.51
2020	242.33	0.00	169.55	0.00	0.00	0.00	411.87	6.83	0.00	481.47	94.96	28.90	145.36	212.25
2021	666.03	0.00	87.98	0.00	6.90	0.00	760.90	10.52	0.00	483.05	93.95	24.02	155.87	209.21
2022	1066.12	0.00	4.81	0.00	0.49	0.00	1071.42	15.88	7.06	506.34	91.44	98.81	131.89	184.20
2023	954.43	0.00	0.00	0.00	0.99	0.00	955.42	20.66	7.06	497.79	89.35	113.83	140.45	154.15
2024	679.59	0.00	0.00	0.00	1.97	0.00	681.56	24.07	7.06	498.24	88.35	121.16	145.34	143.40
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	26.43	7.06	451.14	88.03	102.34	136.31	124.45
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	27.98	21.68	545.80	91.79	87.76	113.07	253.19
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	28.55	21.90	754.22	99.80	77.00	103.81	473.62
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	28.72	21.60	792.48	99.98	79.05	113.25	500.20
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.82	763.20	98.22	86.66	112.56	465.76
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.65	722.67	96.05	94.30	112.36	419.95
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.60	734.37	96.02	89.87	108.64	439.85
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	21.35	677.71	93.09	101.47	112.89	370.26
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.91	649.87	91.42	107.65	113.44	337.37
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.91	625.38	89.37	118.61	120.61	296.79
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	20.95	611.51	87.88	127.48	125.92	270.23
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.72	23.74	594.13	86.22	139.83	133.08	235.00
2037	0.00	0.00	51.82	0.00	0.00	0.00	51.82	28.98	20.78	591.95	85.47	144.19	136.32	225.97
2038	0.00	0.00	70.53	0.00	6.90	0.00	77.43	29.37	20.78	583.87	84.26	146.88	148.78	203.93
2039	0.00	0.00	10.65	0.00	0.00	0.00	10.65	29.42	24.85	567.54	82.46	176.31	160.95	147.82
2040	0.00	0.00	51.97	0.00	0.00	0.00	51.97	29.68	24.85	553.06	81.01	188.56	171.05	112.43
2041	0.00	0.00	72.82	0.00	54.34	0.00	127.16	30.31	24.85	538.74	79.67	196.76	183.80	78.51
2042	0.00	0.00	62.76	0.00	0.00	0.00	62.76	30.62	28.26	528.90	78.31	213.90	197.61	39.08
2043	0.00	0.00	70.84	0.00	0.00	0.00	70.84	30.98	28.26	509.33	76.88	242.19	198.36	-8.11
2044	0.00	0.00	10.70	0.00	0.00	0.00	10.70	31.03	32.33	495.41	75.54	267.30	206.98	-54.41
2045	0.00	0.00	52.23	0.00	0.00	0.00	52.23	31.29	32.33	479.85	74.20	275.46	226.38	-96.19
2046	0.00	0.00	71.05	0.00	45.72	0.00	116.77	31.87	35.30	471.72	73.28	274.59	244.47	-120.62
2047	0.00	0.00	10.74	0.00	0.00	0.00	10.74	31.93	36.43	446.46	71.67	329.51	238.54	-193.27
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.43	466.01	73.05	293.19	236.47	-136.70
2049	0.00	0.00	102.34	0.00	10.08	0.00	112.42	31.93	36.44	466.01	73.05	293.19	236.47	-136.70
2050	0.00	0.00	147.26	0.00	10.08	0.00	157.34	31.93	36.44	466.01	73.05	293.19	236.47	-136.70
2051	0.00	0.00	65.69	0.00	10.08	0.00	75.77	31.93	38.22	466.01	73.05	293.19	236.47	-136.70
2052	0.00	0.00	4.81	0.00	10.08	0.00	14.89	31.93	38.23	466.01	73.05	293.19	236.47	-136.70
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.23	466.01	73.05	293.19	236.47	-136.70
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	466.01	73.05	293.19	236.47	-136.70
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	466.01	73.05	293.19	236.47	-136.70
2056	0.00	0.00	0.00	0.00	6.90	0.00	6.90	31.93	39.42	466.01	73.05	293.19	236.47	-136.70
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2062	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2063	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2064	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2066	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	39.42	466.01	73.05	293.19	236.47	-136.70
2067	0.00	0.00	51.82	0.00	0.00	0.00	51.82	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2068	0.00	0.00	70.49	0.00	0.00	0.00	70.49	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2069	0.00	0.00	10.65	0.00	0.00	0.00	10.65	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2070	0.00	0.00	51.97	0.00	0.00	0.00	51.97	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2071	0.00	0.00	70.70	0.00	0.00	0.00	70.70	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2072	0.00	0.00	62.76	0.00	0.49	0.00	63.25	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2073	0.00	0.00	70.84	0.00	7.89	0.00	78.73	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2074	0.00	0.00	10.70	0.00	1.97	0.00	12.67	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2075	0.00	0.00	52.23	0.00	4.43	0.00	56.66	31.93	52.29	466.01	73.05	293.19	236.47	-136.70
2076	0.00	0.00	71.05	0.00	42.73	0.00	113.78	31.93	39.42	466.01	73.05	293.19	236.47	-136.70
2077	0.00	0.00	10.74	0.00	0.00	0.00	10.74	31.93	54.07	466.01	73.05	293.19	236.47	-136.70
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	38.24	466.01	73.05	293.19	236.47	-136.70
2079	0.00	0.00	102.34	0.00	0.00	0.00	102.34	31.93	54.07	466.01	73.05	293.19	236.47	-136.70
2080	0.00	0.00	147.26	0.00	0.00	0.00	147.26	31.93	38.24	466.01	73.05	293.19	236.47	-136.70
2081	0.00	0.00	65.69	0.00	34.29	0.00	99.98	31.93	54.07	466.01	73.05	293.19	236.47	-136.70
2082	0.00	0.00	4.81	0.00	0.00	0.00	4.81	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2084	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	39.42	466.01	73.05	293.19	236.47	-136.70
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.93	36.46	466.01	73.05	293.19	236.47	-136.70
Salvage Value	1.60	0.00	4.07	0.00	0.83	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	394.77	0.00	69.68	0.00	3731.07	294.74	222.15	8499.33	1487.92	1769.09	2380.58	2861.75

Net Present Value -1386

Wind/C26

TABLE 405
ECONOMIC SUMMARY
NFAT 2012

Energy Price High
Discount Rate High
Capital Cost Low

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.38	64.32	0.00	0.00	10.08	0.00	104.78	0.52	0.00	379.57	105.25	29.87	115.46	129.00
2015	38.78	0.00	0.00	0.00	10.08	0.00	48.86	0.77	0.00	433.97	103.30	34.19	121.40	175.09
2016	88.60	0.00	0.00	0.00	10.08	0.00	98.68	1.26	0.00	449.67	101.42	36.46	124.62	187.17
2017	173.57	0.00	0.00	0.00	10.08	0.00	183.65	2.18	0.00	490.86	99.77	37.68	130.29	223.13
2018	199.73	0.00	0.00	0.00	0.00	0.00	199.73	3.18	0.00	467.79	96.90	41.08	136.12	193.70
2019	238.48	0.00	0.00	0.00	0.00	0.00	238.48	4.37	0.00	450.87	94.93	36.40	139.04	180.50
2020	242.33	0.00	0.00	7.22	10.78	0.00	260.33	5.67	0.00	476.30	94.52	30.96	146.70	204.11
2021	666.03	0.00	0.00	220.30	17.97	0.00	904.30	10.19	0.00	467.62	92.73	29.90	159.83	185.17
2022	1066.12	0.00	0.00	224.43	22.06	0.00	1312.61	16.76	6.34	477.26	91.07	29.82	162.19	194.17
2023	954.43	0.00	0.00	217.21	11.77	0.00	1183.41	22.67	12.69	474.19	88.55	34.03	168.06	183.55
2024	679.59	0.00	0.00	4.12	5.57	0.00	689.28	26.12	19.03	478.61	86.62	34.78	174.70	182.50
2025	469.29	0.00	0.00	0.00	4.43	0.00	473.73	28.49	19.03	427.18	86.53	22.86	183.09	134.69
2026	307.35	0.00	0.00	0.00	1.97	0.00	309.32	30.04	33.65	572.96	90.60	27.16	130.08	325.12
2027	112.87	0.00	0.00	0.00	0.00	0.00	112.87	30.60	33.87	788.02	98.53	24.53	116.00	548.96
2028	35.52	0.00	0.00	0.00	0.00	0.00	35.52	30.78	33.57	816.47	98.33	26.74	126.36	565.03
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.79	785.18	96.65	27.14	128.88	532.51
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.62	763.72	95.57	26.50	125.98	515.66
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	33.57	747.29	94.11	27.45	128.75	496.98
2032	0.00	0.00	0.37	0.00	0.00	0.00	0.37	30.78	33.32	712.80	92.69	27.37	127.53	465.20
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.78	32.88	670.89	91.16	27.25	124.22	428.26
2034	0.00	0.00	73.94	0.00	0.00	0.00	73.94	31.04	32.88	637.72	89.68	27.42	126.10	394.53
2035	0.00	0.00	92.56	0.00	6.90	0.00	99.46	31.42	32.92	626.12	88.65	25.37	131.96	380.14
2036	0.00	0.00	62.38	0.00	0.00	0.00	62.38	31.73	39.78	601.65	86.52	47.18	138.73	329.22
2037	0.00	0.00	70.46	0.00	6.90	0.00	77.36	32.12	36.82	584.48	85.03	53.26	148.36	297.83
2038	0.00	0.00	10.64	0.00	0.00	0.00	10.64	32.17	40.89	575.79	83.74	69.24	155.05	267.75
2039	0.00	0.00	51.92	0.00	0.00	0.00	51.92	32.43	40.89	566.86	82.55	68.24	176.72	239.35
2040	0.00	0.00	72.75	7.22	54.34	0.00	134.31	33.09	40.89	544.76	80.83	88.03	182.95	192.95
2041	0.00	0.00	62.69	220.30	0.00	0.00	283.00	34.51	44.97	531.85	79.40	107.77	192.50	152.18
2042	0.00	0.00	70.77	224.43	0.00	0.00	295.20	35.99	44.30	516.53	78.09	112.74	207.31	118.39
2043	0.00	0.00	62.82	217.21	0.00	0.00	280.03	37.39	48.37	506.52	76.76	125.99	224.66	79.11
2044	0.00	0.00	70.91	4.12	45.72	0.00	120.75	37.99	48.37	484.60	75.37	158.67	222.28	28.28
2045	0.00	0.00	10.71	0.00	0.00	0.00	10.71	38.04	52.46	471.85	74.08	185.20	231.21	-18.64
2046	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	55.43	456.24	72.79	189.02	253.88	-59.45
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.47	442.07	71.52	191.91	281.29	-102.65
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.48	456.72	72.80	188.71	255.46	-60.25
2049	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.49	456.72	72.80	188.71	255.46	-60.25
2050	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.49	456.72	72.80	188.71	255.46	-60.25
2051	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	54.27	456.72	72.80	188.71	255.46	-60.25
2052	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	54.28	456.72	72.80	188.71	255.46	-60.25
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	456.72	72.80	188.71	255.46	-60.25
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	456.72	72.80	188.71	255.46	-60.25
2055	0.00	0.00	0.00	0.00	2.70	0.00	2.70	38.04	54.28	456.72	72.80	188.71	255.46	-60.25
2056	0.00	0.00	0.00	0.00	4.49	0.00	4.49	38.04	55.46	456.72	72.80	188.71	255.46	-60.25
2057	0.00	0.00	0.00	0.00	5.39	0.00	5.39	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2058	0.00	0.00	0.00	0.00	2.70	0.00	2.70	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2059	0.00	0.00	0.00	0.00	0.90	0.00	0.90	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2060	0.00	0.00	0.00	7.22	0.00	0.00	7.22	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2061	0.00	0.00	0.00	220.30	0.00	0.00	220.30	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2062	0.00	0.00	0.00	224.43	0.00	0.00	224.43	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2063	0.00	0.00	0.00	217.21	0.00	0.00	217.21	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2064	0.00	0.00	51.66	4.12	0.00	0.00	55.78	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2065	0.00	0.00	70.28	0.00	0.00	0.00	70.28	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2066	0.00	0.00	62.38	0.00	0.00	0.00	62.38	38.04	55.46	456.72	72.80	188.71	255.46	-60.25
2067	0.00	0.00	70.42	0.00	0.00	0.00	70.42	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2068	0.00	0.00	10.64	0.00	0.00	0.00	10.64	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2069	0.00	0.00	51.92	0.00	0.00	0.00	51.92	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2070	0.00	0.00	70.63	0.00	14.99	0.00	85.62	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2071	0.00	0.00	62.69	0.00	13.48	0.00	76.18	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2072	0.00	0.00	70.77	0.00	23.57	0.00	94.34	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2073	0.00	0.00	62.82	0.00	9.07	0.00	71.89	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2074	0.00	0.00	70.91	0.00	4.67	0.00	75.58	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2075	0.00	0.00	10.71	0.00	45.19	0.00	55.91	38.04	68.33	456.72	72.80	188.71	255.46	-60.25
2076	0.00	0.00	0.00	0.00	1.97	0.00	1.97	38.04	55.46	456.72	72.80	188.71	255.46	-60.25
2077	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	70.11	456.72	72.80	188.71	255.46	-60.25
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	54.28	456.72	72.80	188.71	255.46	-60.25
2079	0.00	0.00	0.00	0.00	34.29	0.00	34.29	38.04	70.11	456.72	72.80	188.71	255.46	-60.25
2080	0.00	0.00	0.00	7.22	0.00	0.00	7.22	38.04	54.28	456.72	72.80	188.71	255.46	-60.25
2081	0.00	0.00	0.00	220.30	0.00	0.00	220.30	38.04	70.11	456.72	72.80	188.71	255.46	-60.25
2082	0.00	0.00	0.00	224.43	0.00	0.00	224.43	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2083	0.00	0.00	0.00	217.21	0.00	0.00	217.21	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2084	0.00	0.00	0.00	4.12	10.08	0.00	14.20	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2085	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2086	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	55.46	456.72	72.80	188.71	255.46	-60.25
2087	0.00	0.00	0.00	0.00	10.08	0.00	10.08	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
2090	0.00	0.00	0.00	0.00	13.59	0.00	13.59	38.04	52.50	456.72	72.80	188.71	255.46	-60.25
Salvage Value	1.60	0.00	1.93	3.59	1.22	0.00	8.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 6.50%	3202.29	64.32	170.10	562.03	110.63	0.00	4109.37	325.49	347.44	8493.76	1480.50	956.20	2567.65	3489.40

Net Present Value -1293

TABLE 406
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**Reference**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	6348	9269	-2921	8872	7176	1696
K19/C25/750MW	6262	9452	-3191	8786	7359	1427
K19/Gas25/750MW (WPS Sale & INV)	1948	5469	-3521	4472	3376	1097
K19/C31/750MW	5116	8374	-3257	7641	6281	1360
K19/Gas31/750MW	2011	5537	-3527	4535	3445	1091
K19/C25/250MW	5428	8751	-3323	7952	6658	1295
K19/Gas24/250MW	1859	5130	-3271	4383	3037	1346
K19/C31/250MW	4493	7895	-3402	7017	5802	1215
All Gas	-2524	2093	-4617	-	-	-
Wind/Gas	-57	5336	-5393	2468	3243	-775
K22/Gas	855	4585	-3730	3379	2492	887
K22/C29	3757	7568	-3811	6281	5475	806
SCGT/C26	1344	5223	-3879	3868	3130	738
CCGT/C26	1691	5524	-3834	4215	3431	784
Wind/C26	2322	6409	-4087	4847	4316	531

TABLE 407
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**Reference**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	6348	10495	-4147	8872	7731	1141
K19/C25/750MW	6262	10709	-4447	8786	7945	841
K19/Gas25/750MW (WPS Sale & INV)	1948	6456	-4508	4472	3692	780
K19/C31/750MW	5116	9544	-4428	7641	6780	861
K19/Gas31/750MW	2011	6544	-4533	4535	3780	756
K19/C25/250MW	5428	9893	-4465	7952	7129	823
K19/Gas24/250MW	1859	6135	-4276	4383	3371	1012
K19/C31/250MW	4493	9006	-4514	7017	6242	775
All Gas	-2524	2764	-5288	-	-	-
Wind/Gas	-57	6914	-6971	2468	4151	-1683
K22/Gas	855	5518	-4664	3379	2754	625
K22/C29	3757	8611	-4854	6281	5847	434
SCGT/C26	1344	5938	-4594	3868	3174	694
CCGT/C26	1691	6351	-4660	4215	3587	628
Wind/C26	2322	7471	-5149	4847	4707	140

TABLE 408
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**Reference**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	6348	8320	-1972	8872	6769	2103
K19/C25/750MW	6262	8478	-2216	8786	6926	1860
K19/Gas25/750MW (WPS Sale & INV)	1948	4752	-2804	4472	3201	1272
K19/C31/750MW	5116	7464	-2347	7641	5912	1729
K19/Gas31/750MW	2011	4804	-2793	4535	3253	1282
K19/C25/250MW	5428	7856	-2428	7952	6305	1648
K19/Gas24/250MW	1859	4387	-2529	4383	2836	1547
K19/C31/250MW	4493	7021	-2529	7017	5470	1547
All Gas	-2524	1551	-4076	-	-	-
Wind/Gas	-57	4181	-4238	2468	2630	-162
K22/Gas	855	3899	-3044	3379	2348	1031
K22/C29	3757	6750	-2993	6281	5199	1083
SCGT/C26	1344	4635	-3291	3868	3084	784
CCGT/C26	1691	4849	-3159	4215	3298	917
Wind/C26	2322	5564	-3241	4847	4012	834

TABLE 409
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**Low**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	8397	10731	-2333	13902	7599	6304
K19/C25/750MW	8284	10939	-2654	13789	7807	5983
K19/Gas25/750MW (WPS Sale & INV)	1117	6599	-5482	6622	3467	3155
K19/C31/750MW	6864	10066	-3202	12369	6934	5435
K19/Gas31/750MW	1370	6740	-5370	6875	3608	3267
K19/C25/250MW	7036	10113	-3076	12541	6981	5561
K19/Gas24/250MW	1208	6308	-5100	6713	3176	3537
K19/C31/250MW	5873	9484	-3611	11378	6352	5026
All Gas	-5505	3132	-8637	-	-	-
Wind/Gas	-1215	8204	-9419	4290	5072	-782
K22/Gas	-4	5864	-5869	5501	2732	2768
K22/C29	5009	9188	-4179	10514	6056	4458
SCGT/C26	913	6383	-5470	6418	3251	3167
CCGT/C26	1495	6769	-5273	7000	3637	3364
Wind/C26	2511	8095	-5584	8016	4963	3053

TABLE 410
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**Low**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	8397	12162	-3765	13902	8036	5866
K19/C25/750MW	8284	12404	-4120	13789	8278	5511
K19/Gas25/750MW (WPS Sale & INV)	1117	7838	-6721	6622	3712	2910
K19/C31/750MW	6864	11482	-4618	12369	7356	5013
K19/Gas31/750MW	1370	8028	-6658	6875	3902	2973
K19/C25/250MW	7036	11447	-4411	12541	7322	5220
K19/Gas24/250MW	1208	7621	-6413	6713	3495	3218
K19/C31/250MW	5873	10824	-4951	11378	6698	4680
All Gas	-5505	4126	-9631	-	-	-
Wind/Gas	-1215	10570	-11785	4290	6444	-2154
K22/Gas	-4	7124	-7129	5501	2998	2502
K22/C29	5009	10466	-5457	10514	6340	4174
SCGT/C26	913	7290	-6378	6418	3164	3253
CCGT/C26	1495	7816	-6321	7000	3690	3310
Wind/C26	2511	9488	-6978	8016	5362	2653

TABLE 411
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**Low**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	8397	9612	-1215	13902	7283	6620
K19/C25/750MW	8284	9792	-1507	13789	7462	6327
K19/Gas25/750MW (WPS Sale & INV)	1117	5686	-4569	6622	3356	3266
K19/C31/750MW	6864	8950	-2086	12369	6620	5749
K19/Gas31/750MW	1370	5785	-4415	6875	3455	3420
K19/C25/250MW	7036	9057	-2021	12541	6727	5814
K19/Gas24/250MW	1208	5322	-4113	6713	2992	3721
K19/C31/250MW	5873	8417	-2544	11378	6087	5291
All Gas	-5505	2330	-7835	-	-	-
Wind/Gas	-1215	6467	-7681	4290	4137	153
K22/Gas	-4	4922	-4926	5501	2592	2908
K22/C29	5009	8175	-3166	10514	5845	4669
SCGT/C26	913	5637	-4724	6418	3307	3111
CCGT/C26	1495	5913	-4418	7000	3583	3417
Wind/C26	2511	6987	-4476	8016	4657	3359

TABLE 412
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**High**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	5216	8453	-3237	6449	6881	-432
K19/C25/750MW	5147	8622	-3474	6380	7049	-669
K19/Gas25/750MW (WPS Sale & INV)	2171	4891	-2720	3404	3318	86
K19/C31/750MW	4185	7406	-3221	5418	5833	-416
K19/Gas31/750MW	2167	4926	-2758	3400	3353	47
K19/C25/250MW	4521	7994	-3473	5754	6421	-668
K19/Gas24/250MW	2025	4538	-2513	3258	2966	292
K19/C31/250MW	3736	6983	-3247	4969	5411	-441
All Gas	-1233	1572	-2805	-	-	-
Wind/Gas	409	3929	-3520	1642	2357	-714
K22/Gas	1147	3913	-2767	2380	2341	39
K22/C29	3076	6620	-3544	4309	5048	-739
SCGT/C26	1434	4564	-3131	2667	2992	-325
CCGT/C26	1674	4824	-3149	2907	3251	-344
Wind/C26	2121	5485	-3364	3354	3913	-558

TABLE 413
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**High**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	5216	9565	-4349	6449	7489	-1040
K19/C25/750MW	5147	9762	-4615	6380	7686	-1306
K19/Gas25/750MW (WPS Sale & INV)	2171	5748	-3577	3404	3672	-268
K19/C31/750MW	4185	8436	-4252	5418	6360	-942
K19/Gas31/750MW	2167	5787	-3619	3400	3710	-310
K19/C25/250MW	4521	9029	-4508	5754	6953	-1199
K19/Gas24/250MW	2025	5385	-3359	3258	3308	-50
K19/C31/250MW	3736	7962	-4226	4969	5886	-917
All Gas	-1233	2076	-3309	-	-	-
Wind/Gas	409	5108	-4699	1642	3032	-1390
K22/Gas	1147	4673	-3527	2380	2597	-218
K22/C29	3076	7525	-4449	4309	5449	-1140
SCGT/C26	1434	5172	-3738	2667	3095	-429
CCGT/C26	1674	5528	-3853	2907	3452	-544
Wind/C26	2121	6368	-4247	3354	4292	-938

TABLE 414
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Reference**
Discount Rate	**High**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	5216	7599	-2383	6449	6433	16
K19/C25/750MW	5147	7743	-2595	6380	6577	-196
K19/Gas25/750MW (WPS Sale & INV)	2171	4276	-2105	3404	3110	294
K19/C31/750MW	4185	6614	-2429	5418	5448	-30
K19/Gas31/750MW	2167	4307	-2140	3400	3141	259
K19/C25/250MW	4521	7189	-2668	5754	6023	-269
K19/Gas24/250MW	2025	3922	-1896	3258	2756	503
K19/C31/250MW	3736	6222	-2486	4969	5056	-87
All Gas	-1233	1166	-2399	-	-	-
Wind/Gas	409	3068	-2659	1642	1902	-260
K22/Gas	1147	3362	-2215	2380	2196	184
K22/C29	3076	5916	-2840	4309	4750	-441
SCGT/C26	1434	4065	-2632	2667	2899	-233
CCGT/C26	1674	4248	-2574	2907	3082	-175
Wind/C26	2121	4782	-2661	3354	3616	-262

TABLE 415
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**Reference**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	3723	9269	-5546	6039	7176	-1137
K19/C25/750MW	3276	9452	-6177	5592	7359	-1768
K19/Gas25/750MW (WPS Sale & INV)	1109	5469	-4360	3425	3376	49
K19/C31/750MW	2603	8374	-5771	4919	6281	-1362
K19/Gas31/750MW	735	5537	-4802	3051	3445	-393
K19/C25/250MW	2766	8751	-5985	5082	6658	-1576
K19/Gas24/250MW	607	5130	-4523	2923	3037	-114
K19/C31/250MW	2228	7895	-5667	4544	5802	-1258
All Gas	-2316	2093	-4409	-	-	-
Wind/Gas	-759	5336	-6095	1557	3243	-1686
K22/Gas	-311	4585	-4896	2006	2492	-487
K22/C29	1455	7568	-6113	3771	5475	-1704
SCGT/C26	24	5223	-5199	2340	3130	-790
CCGT/C26	203	5524	-5322	2519	3431	-913
Wind/C26	611	6409	-5798	2927	4316	-1389

TABLE 416
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**Reference**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	3723	10495	-6772	6039	7731	-1692
K19/C25/750MW	3276	10709	-7433	5592	7945	-2353
K19/Gas25/750MW (WPS Sale & INV)	1109	6456	-5347	3425	3692	-267
K19/C31/750MW	2603	9544	-6941	4919	6780	-1861
K19/Gas31/750MW	735	6544	-5809	3051	3780	-729
K19/C25/250MW	2766	9893	-7127	5082	7129	-2047
K19/Gas24/250MW	607	6135	-5528	2923	3371	-448
K19/C31/250MW	2228	9006	-6779	4544	6242	-1699
All Gas	-2316	2764	-5080	-	-	-
Wind/Gas	-759	6914	-7673	1557	4151	-2593
K22/Gas	-311	5518	-5829	2006	2754	-749
K22/C29	1455	8611	-7156	3771	5847	-2076
SCGT/C26	24	5938	-5914	2340	3174	-834
CCGT/C26	203	6351	-6148	2519	3587	-1068
Wind/C26	611	7471	-6860	2927	4707	-1780

TABLE 417
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**Reference**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	3723	8320	-4597	6039	6769	-730
K19/C25/750MW	3276	8478	-5202	5592	6926	-1335
K19/Gas25/750MW (WPS Sale & INV)	1109	4752	-3643	3425	3201	224
K19/C31/750MW	2603	7464	-4860	4919	5912	-993
K19/Gas31/750MW	735	4804	-4069	3051	3253	-202
K19/C25/250MW	2766	7856	-5090	5082	6305	-1223
K19/Gas24/250MW	607	4387	-3780	2923	2836	87
K19/C31/250MW	2228	7021	-4794	4544	5470	-926
All Gas	-2316	1551	-3867	-	-	-
Wind/Gas	-759	4181	-4940	1557	2630	-1072
K22/Gas	-311	3899	-4210	2006	2348	-342
K22/C29	1455	6750	-5295	3771	5199	-1428
SCGT/C26	24	4635	-4611	2340	3084	-744
CCGT/C26	203	4849	-4646	2519	3298	-779
Wind/C26	611	5564	-4953	2927	4012	-1085

TABLE 418
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**Low**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	4703	10731	-6027	9237	7599	1639
K19/C25/750MW	4145	10939	-6794	8679	7807	872
K19/Gas25/750MW (WPS Sale & INV)	366	6599	-6234	4900	3467	1433
K19/C31/750MW	3310	10066	-6756	7845	6934	911
K19/Gas31/750MW	-8	6740	-6747	4527	3608	919
K19/C25/250MW	3371	10113	-6742	7905	6981	924
K19/Gas24/250MW	-186	6308	-6494	4348	3176	1172
K19/C31/250MW	2701	9484	-6784	7235	6352	883
All Gas	-4534	3132	-7666	-	-	-
Wind/Gas	-1816	8204	-10020	2718	5072	-2354
K22/Gas	-1285	5864	-7150	3249	2732	517
K22/C29	1784	9188	-7403	6319	6056	263
SCGT/C26	-636	6383	-7018	3899	3251	648
CCGT/C26	-331	6769	-7099	4204	3637	567
Wind/C26	329	8095	-7767	4863	4963	-100

TABLE 419
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**Low**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	4703	12162	-7459	9237	8036	1202
K19/C25/750MW	4145	12404	-8259	8679	8278	401
K19/Gas25/750MW (WPS Sale & INV)	366	7838	-7472	4900	3712	1188
K19/C31/750MW	3310	11482	-8172	7845	7356	489
K19/Gas31/750MW	-8	8028	-8036	4527	3902	625
K19/C25/250MW	3371	11447	-8077	7905	7322	584
K19/Gas24/250MW	-186	7621	-7807	4348	3495	853
K19/C31/250MW	2701	10824	-8123	7235	6698	537
All Gas	-4534	4126	-8660	-	-	-
Wind/Gas	-1816	10570	-12386	2718	6444	-3726
K22/Gas	-1285	7124	-8410	3249	2998	251
K22/C29	1784	10466	-8682	6319	6340	-22
SCGT/C26	-636	7290	-7926	3899	3164	734
CCGT/C26	-331	7816	-8147	4204	3690	514
Wind/C26	329	9488	-9160	4863	5362	-500

TABLE 420
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**Low**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	4703	9612	-4909	9237	7283	1955
K19/C25/750MW	4145	9792	-5647	8679	7462	1217
K19/Gas25/750MW (WPS Sale & INV)	366	5686	-5320	4900	3356	1544
K19/C31/750MW	3310	8950	-5640	7845	6620	1224
K19/Gas31/750MW	-8	5785	-5792	4527	3455	1072
K19/C25/250MW	3371	9057	-5686	7905	6727	1178
K19/Gas24/250MW	-186	5322	-5508	4348	2992	1356
K19/C31/250MW	2701	8417	-5716	7235	6087	1148
All Gas	-4534	2330	-6864	-	-	-
Wind/Gas	-1816	6467	-8283	2718	4137	-1419
K22/Gas	-1285	4922	-6207	3249	2592	657
K22/C29	1784	8175	-6390	6319	5845	474
SCGT/C26	-636	5637	-6272	3899	3307	592
CCGT/C26	-331	5913	-6244	4204	3583	620
Wind/C26	329	6987	-6658	4863	4657	206

TABLE 421
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**High**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	3138	8453	-5316	4475	6881	-2406
K19/C25/750MW	2762	8622	-5860	4099	7049	-2950
K19/Gas25/750MW (WPS Sale & INV)	1333	4891	-3558	2670	3318	-648
K19/C31/750MW	2197	7406	-5209	3534	5833	-2299
K19/Gas31/750MW	987	4926	-3939	2324	3353	-1029
K19/C25/250MW	2383	7994	-5611	3720	6421	-2701
K19/Gas24/250MW	884	4538	-3654	2221	2966	-744
K19/C31/250MW	1932	6983	-5051	3269	5411	-2141
All Gas	-1337	1572	-2910	-	-	-
Wind/Gas	-305	3929	-4234	1033	2357	-1324
K22/Gas	81	3913	-3833	1418	2341	-923
K22/C29	1248	6620	-5372	2585	5048	-2462
SCGT/C26	270	4564	-4294	1607	2992	-1385
CCGT/C26	393	4824	-4430	1730	3251	-1521
Wind/C26	681	5485	-4804	2018	3913	-1894

TABLE 422
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**High**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	3138	9565	-6428	4475	7489	-3014
K19/C25/750MW	2762	9762	-7001	4099	7686	-3587
K19/Gas25/750MW (WPS Sale & INV)	1333	5748	-4415	2670	3672	-1001
K19/C31/750MW	2197	8436	-6240	3534	6360	-2826
K19/Gas31/750MW	987	5787	-4800	2324	3710	-1386
K19/C25/250MW	2383	9029	-6646	3720	6953	-3233
K19/Gas24/250MW	884	5385	-4501	2221	3308	-1087
K19/C31/250MW	1932	7962	-6030	3269	5886	-2617
All Gas	-1337	2076	-3414	-	-	-
Wind/Gas	-305	5108	-5413	1033	3032	-2000
K22/Gas	81	4673	-4593	1418	2597	-1179
K22/C29	1248	7525	-6277	2585	5449	-2863
SCGT/C26	270	5172	-4902	1607	3095	-1488
CCGT/C26	393	5528	-5135	1730	3452	-1721
Wind/C26	681	6368	-5687	2018	4292	-2274

TABLE 423
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**Low**
Discount Rate	**High**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	3138	7599	-4461	4475	6433	-1958
K19/C25/750MW	2762	7743	-4981	4099	6577	-2478
K19/Gas25/750MW (WPS Sale & INV)	1333	4276	-2943	2670	3110	-440
K19/C31/750MW	2197	6614	-4417	3534	5448	-1914
K19/Gas31/750MW	987	4307	-3320	2324	3141	-817
K19/C25/250MW	2383	7189	-4806	3720	6023	-2303
K19/Gas24/250MW	884	3922	-3038	2221	2756	-534
K19/C31/250MW	1932	6222	-4290	3269	5056	-1787
All Gas	-1337	1166	-2503	-	-	-
Wind/Gas	-305	3068	-3373	1033	1902	-869
K22/Gas	81	3362	-3281	1418	2196	-778
K22/C29	1248	5916	-4668	2585	4750	-2165
SCGT/C26	270	4065	-3795	1607	2899	-1292
CCGT/C26	393	4248	-3855	1730	3082	-1352
Wind/C26	681	4782	-4101	2018	3616	-1598

TABLE 424
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**Reference**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	8818	9269	-451	11829	7176	4653
K19/C25/750MW	9085	9452	-368	12096	7359	4737
K19/Gas25/750MW (WPS Sale & INV)	2552	5469	-2917	5563	3376	2187
K19/C31/750MW	7498	8374	-876	10509	6281	4228
K19/Gas31/750MW	3054	5537	-2484	6065	3445	2620
K19/C25/250MW	8021	8751	-729	11033	6658	4375
K19/Gas24/250MW	2916	5130	-2214	5927	3037	2890
K19/C31/250MW	6697	7895	-1198	9709	5802	3906
All Gas	-3011	2093	-5104	-	-	-
Wind/Gas	530	5336	-4806	3541	3243	298
K22/Gas	1842	4585	-2743	4853	2492	2361
K22/C29	6007	7568	-1561	9019	5475	3543
SCGT/C26	2561	5223	-2662	5572	3130	2442
CCGT/C26	3070	5524	-2455	6081	3431	2649
Wind/C26	3957	6409	-2451	6969	4316	2653

TABLE 425
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**Reference**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	8818	10495	-1677	11829	7731	4098
K19/C25/750MW	9085	10709	-1624	12096	7945	4151
K19/Gas25/750MW (WPS Sale & INV)	2552	6456	-3904	5563	3692	1871
K19/C31/750MW	7498	9544	-2046	10509	6780	3729
K19/Gas31/750MW	3054	6544	-3490	6065	3780	2285
K19/C25/250MW	8021	9893	-1872	11033	7129	3904
K19/Gas24/250MW	2916	6135	-3219	5927	3371	2556
K19/C31/250MW	6697	9006	-2309	9709	6242	3466
All Gas	-3011	2764	-5775	-	-	-
Wind/Gas	530	6914	-6385	3541	4151	-609
K22/Gas	1842	5518	-3676	4853	2754	2099
K22/C29	6007	8611	-2603	9019	5847	3172
SCGT/C26	2561	5938	-3377	5572	3174	2398
CCGT/C26	3070	6351	-3281	6081	3587	2494
Wind/C26	3957	7471	-3514	6969	4707	2261

TABLE 426
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**Reference**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	8818	8320	498	11829	6769	5060
K19/C25/750MW	9085	8478	607	12096	6926	5170
K19/Gas25/750MW (WPS Sale & INV)	2552	4752	-2200	5563	3201	2362
K19/C31/750MW	7498	7464	34	10509	5912	4597
K19/Gas31/750MW	3054	4804	-1751	6065	3253	2812
K19/C25/250MW	8021	7856	165	11033	6305	4728
K19/Gas24/250MW	2916	4387	-1472	5927	2836	3091
K19/C31/250MW	6697	7021	-324	9709	5470	4238
All Gas	-3011	1551	-4563	-	-	-
Wind/Gas	530	4181	-3651	3541	2630	912
K22/Gas	1842	3899	-2057	4853	2348	2505
K22/C29	6007	6750	-743	9019	5199	3820
SCGT/C26	2561	4635	-2074	5572	3084	2489
CCGT/C26	3070	4849	-1779	6081	3298	2783
Wind/C26	3957	5564	-1606	6969	4012	2956

TABLE 427
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	11917	10731	1186	18843	7599	11244
K19/C25/750MW	12242	10939	1303	19168	7807	11361
K19/Gas25/750MW (WPS Sale & INV)	1526	6599	-5073	8452	3467	4985
K19/C31/750MW	10274	10066	208	17200	6934	10266
K19/Gas31/750MW	2404	6740	-4336	9330	3608	5723
K19/C25/250MW	10650	10113	537	17576	6981	10595
K19/Gas24/250MW	2312	6308	-3996	9238	3176	6062
K19/C31/250MW	9003	9484	-482	15929	6352	9576
All Gas	-6926	3132	-10058	-	-	-
Wind/Gas	-766	8204	-8971	6160	5072	1087
K22/Gas	1008	5864	-4856	7934	2732	5202
K22/C29	8204	9188	-984	15130	6056	9074
SCGT/C26	2318	6383	-4065	9244	3251	5993
CCGT/C26	3175	6769	-3593	10101	3637	6465
Wind/C26	4604	8095	-3491	11530	4963	6567

TABLE 428
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	11917	12162	-245	18843	8036	10807
K19/C25/750MW	12242	12404	-162	19168	8278	10890
K19/Gas25/750MW (WPS Sale & INV)	1526	7838	-6312	8452	3712	4740
K19/C31/750MW	10274	11482	-1208	17200	7356	9844
K19/Gas31/750MW	2404	8028	-5624	9330	3902	5428
K19/C25/250MW	10650	11447	-798	17576	7322	10254
K19/Gas24/250MW	2312	7621	-5310	9238	3495	5742
K19/C31/250MW	9003	10824	-1822	15929	6698	9230
All Gas	-6926	4126	-11052	-	-	-
Wind/Gas	-766	10570	-11336	6160	6444	-284
K22/Gas	1008	7124	-6116	7934	2998	4936
K22/C29	8204	10466	-2262	15130	6340	8790
SCGT/C26	2318	7290	-4973	9244	3164	6079
CCGT/C26	3175	7816	-4641	10101	3690	6412
Wind/C26	4604	9488	-4885	11530	5362	6167

TABLE 429
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**Low**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	11917	9612	2304	18843	7283	11560
K19/C25/750MW	12242	9792	2450	19168	7462	11706
K19/Gas25/750MW (WPS Sale & INV)	1526	5686	-4160	8452	3356	5096
K19/C31/750MW	10274	8950	1324	17200	6620	10580
K19/Gas31/750MW	2404	5785	-3380	9330	3455	5875
K19/C25/250MW	10650	9057	1593	17576	6727	10849
K19/Gas24/250MW	2312	5322	-3010	9238	2992	6246
K19/C31/250MW	9003	8417	585	15929	6087	9841
All Gas	-6926	2330	-9256	-	-	-
Wind/Gas	-766	6467	-7233	6160	4137	2023
K22/Gas	1008	4922	-3914	7934	2592	5342
K22/C29	8204	8175	29	15130	5845	9285
SCGT/C26	2318	5637	-3319	9244	3307	5937
CCGT/C26	3175	5913	-2738	10101	3583	6518
Wind/C26	4604	6987	-2383	11530	4657	6873

TABLE 430
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**High**
Capital Cost	**Reference**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	7151	8453	-1302	8483	6881	1602
K19/C25/750MW	7381	8622	-1240	8713	7049	1664
K19/Gas25/750MW (WPS Sale & INV)	2822	4891	-2069	4154	3318	835
K19/C31/750MW	6047	7406	-1359	7379	5833	1546
K19/Gas31/750MW	3162	4926	-1764	4494	3353	1141
K19/C25/250MW	6582	7994	-1412	7914	6421	1492
K19/Gas24/250MW	3013	4538	-1525	4345	2966	1379
K19/C31/250MW	5471	6983	-1512	6803	5411	1392
All Gas	-1332	1572	-2904	-	-	-
Wind/Gas	1024	3929	-2905	2355	2357	-1
K22/Gas	2073	3913	-1840	3405	2341	1064
K22/C29	4842	6620	-1778	6174	5048	1126
SCGT/C26	2510	4564	-2054	3842	2992	850
CCGT/C26	2862	4824	-1962	4193	3251	942
Wind/C26	3489	5485	-1996	4821	3913	909

TABLE 431
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**High**
Capital Cost	**High**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	7151	9565	-2414	8483	7489	994
K19/C25/750MW	7381	9762	-2381	8713	7686	1027
K19/Gas25/750MW (WPS Sale & INV)	2822	5748	-2926	4154	3672	482
K19/C31/750MW	6047	8436	-2389	7379	6360	1019
K19/Gas31/750MW	3162	5787	-2624	4494	3710	783
K19/C25/250MW	6582	9029	-2447	7914	6953	961
K19/Gas24/250MW	3013	5385	-2371	4345	3308	1036
K19/C31/250MW	5471	7962	-2491	6803	5886	917
All Gas	-1332	2076	-3408	-	-	-
Wind/Gas	1024	5108	-4085	2355	3032	-677
K22/Gas	2073	4673	-2601	3405	2597	807
K22/C29	4842	7525	-2683	6174	5449	725
SCGT/C26	2510	5172	-2661	3842	3095	747
CCGT/C26	2862	5528	-2666	4193	3452	742
Wind/C26	3489	6368	-2879	4821	4292	529

TABLE 432
Comparison of Economic Summaries
NFAT 2012 (Present Value $2014)

Energy Price	**High**
Discount Rate	**High**
Capital Cost	**Low**

				Relative to All Gas		
Development Plan	**Revenue**	**Cost**	**Net**	**Revenue**	**Cost**	**Net**
K19/C25/750MW (WPS Sale &Inv)	7151	7599	-448	8483	6433	2050
K19/C25/750MW	7381	7743	-361	8713	6577	2136
K19/Gas25/750MW (WPS Sale & INV)	2822	4276	-1454	4154	3110	1043
K19/C31/750MW	6047	6614	-566	7379	5448	1931
K19/Gas31/750MW	3162	4307	-1145	4494	3141	1353
K19/C25/250MW	6582	7189	-607	7914	6023	1891
K19/Gas24/250MW	3013	3922	-909	4345	2756	1589
K19/C31/250MW	5471	6222	-751	6803	5056	1747
All Gas	-1332	1166	-2498	-	-	-
Wind/Gas	1024	3068	-2044	2355	1902	453
K22/Gas	2073	3362	-1289	3405	2196	1208
K22/C29	4842	5916	-1074	6174	4750	1424
SCGT/C26	2510	4065	-1555	3842	2899	943
CCGT/C26	2862	4248	-1386	4193	3082	1111
Wind/C26	3489	4782	-1293	4821	3616	1205

K19/C26/750MW (WPS Sale & Inv)

TABLE 433
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.74	188.05	0.00	0.00	21.09	18.82	258.70	1.29	0.00	0.00	0.00	0.00	0.00	0.00
2015	39.39	472.34	0.00	0.00	18.86	4.74	535.33	3.97	0.00	333.26	101.69	23.59	100.80	107.18
2016	86.94	637.34	0.00	0.00	25.81	28.48	778.57	7.86	0.00	362.30	99.78	25.39	106.81	130.33
2017	181.68	772.68	0.00	0.00	37.77	92.73	1084.86	13.29	0.00	397.86	97.84	27.92	111.92	160.19
2018	211.37	544.83	0.00	0.00	39.70	72.72	868.63	17.63	0.00	396.24	95.27	29.67	116.70	154.60
2019	254.07	389.68	0.00	0.00	47.03	55.64	746.42	21.36	12.97	420.07	95.13	27.13	117.38	180.42
2020	260.17	159.12	0.00	0.00	3.53	108.96	531.78	24.02	44.30	659.01	102.80	20.88	126.45	408.89
2021	717.14	55.22	0.00	0.00	3.52	0.40	776.28	27.90	42.52	736.03	103.31	21.58	135.97	475.17
2022	1151.28	0.00	0.00	0.00	42.77	0.00	1194.05	33.87	41.21	737.80	101.79	22.40	139.70	473.92
2023	1033.67	0.00	0.00	0.00	22.19	0.00	1055.85	39.15	39.39	724.63	99.73	21.90	145.91	457.09
2024	738.15	0.00	0.00	0.00	37.33	0.00	775.48	43.03	37.84	698.85	97.03	24.87	153.98	422.98
2025	511.21	0.00	0.00	0.00	64.64	0.00	575.85	45.91	36.24	626.52	95.08	22.83	150.15	358.46
2026	335.78	0.00	0.00	0.00	86.61	0.00	422.39	48.02	48.77	759.20	99.75	25.57	132.70	501.18
2027	123.67	0.00	0.00	0.00	102.07	0.00	225.74	49.15	47.75	950.52	107.65	23.32	121.23	698.32
2028	39.03	0.00	0.00	0.00	0.00	0.00	39.03	49.34	46.44	1014.17	108.31	24.54	132.80	748.52
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	48.13	993.08	106.10	25.07	136.25	725.66
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	42.86	974.30	104.63	23.67	132.94	713.06
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	41.68	968.14	102.87	24.44	137.58	703.26
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	40.42	950.91	100.93	24.56	140.95	684.46
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	39.00	932.36	99.07	24.93	144.56	663.81
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	38.04	911.71	97.27	25.21	146.06	643.16
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	36.72	877.96	95.52	25.39	139.95	617.11
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	38.89	805.14	93.87	25.44	116.16	569.67
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	35.49	773.62	92.14	25.62	116.21	539.65
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	34.98	749.91	90.44	25.72	118.89	514.86
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	37.39	725.54	88.75	25.90	129.09	481.80
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	34.03	704.61	87.10	25.94	132.88	458.70
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	33.57	680.87	85.50	26.00	136.61	432.76
2042	0.00	0.00	0.35	0.00	0.00	0.00	0.35	49.34	32.47	651.86	83.89	26.08	138.81	403.08
2043	0.00	0.00	79.47	0.00	0.00	0.00	79.47	49.74	32.04	629.73	82.32	26.15	144.01	377.25
2044	0.00	0.00	108.54	0.00	9.06	0.00	117.60	50.33	33.36	625.61	81.22	24.26	151.69	368.44
2045	0.00	0.00	16.47	0.00	0.00	0.00	16.47	50.41	36.93	600.92	79.19	42.27	153.89	325.58
2046	0.00	0.00	35.48	0.00	0.00	0.00	35.48	50.59	39.43	584.56	77.69	45.76	160.38	300.72
2047	0.00	0.00	48.46	0.00	9.06	0.00	57.52	50.88	35.30	570.13	76.33	49.00	166.32	278.48
2048	0.00	0.00	7.35	0.00	0.00	0.00	7.35	50.91	35.40	554.04	74.90	55.29	171.71	252.14
2049	0.00	0.00	0.00	0.00	10.59	0.37	10.96	50.91	37.94	569.58	76.31	50.02	166.14	277.11
2050	0.00	0.00	0.00	0.00	10.24	1.59	11.83	50.91	34.71	569.58	76.31	50.02	166.14	277.11
2051	0.00	0.00	0.00	0.00	24.77	20.62	45.39	50.91	36.11	569.58	76.31	50.02	166.14	277.11
2052	0.00	0.00	0.00	0.00	28.78	29.64	58.41	50.91	35.79	569.58	76.31	50.02	166.14	277.11
2053	0.00	0.00	0.00	0.00	20.48	14.01	34.49	50.91	35.48	569.58	76.31	50.02	166.14	277.11
2054	0.00	0.00	0.00	0.00	16.71	23.35	40.06	50.91	35.18	569.58	76.31	50.02	166.14	277.11
2055	0.00	0.00	0.00	0.00	0.87	23.52	24.39	50.91	34.89	569.58	76.31	50.02	166.14	277.11
2056	0.00	0.00	0.00	0.00	0.87	0.35	1.22	50.91	51.21	569.58	76.31	50.02	166.14	277.11
2057	0.00	0.00	0.00	0.00	10.43	0.00	10.44	50.91	32.60	569.58	76.31	50.02	166.14	277.11
2058	0.00	0.00	0.00	0.00	5.22	0.00	5.22	50.91	47.79	569.58	76.31	50.02	166.14	277.11
2059	0.00	0.00	0.00	0.00	8.69	0.00	8.69	50.91	34.97	569.58	76.31	50.02	166.14	277.11
2060	0.00	0.00	0.00	0.00	14.78	0.00	14.78	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2061	0.00	0.00	0.00	0.00	20.87	0.00	20.87	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2062	0.00	0.00	0.00	0.00	27.92	1.10	29.02	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2063	0.00	0.00	0.00	0.00	1.86	0.05	1.91	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2064	0.00	0.00	0.00	0.00	18.85	17.45	36.31	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2065	0.00	0.00	0.00	0.00	8.62	1.98	10.60	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2066	0.00	0.00	0.00	0.00	1.04	7.37	8.40	50.91	47.50	569.58	76.31	50.02	166.14	277.11
2067	0.00	0.00	0.00	0.00	8.99	63.09	72.08	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2068	0.00	0.00	0.00	0.00	19.22	32.22	51.44	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2069	0.00	0.00	0.00	0.00	30.33	22.86	53.18	50.91	47.50	569.58	76.31	50.02	166.14	277.11
2070	0.00	0.00	0.00	0.00	2.66	13.13	15.79	50.91	30.90	569.58	76.31	50.02	166.14	277.11
2071	0.00	0.00	0.00	0.00	2.65	0.05	2.70	50.91	46.34	569.58	76.31	50.02	166.14	277.11
2072	0.00	0.00	0.00	0.00	32.34	0.00	32.34	50.91	30.90	569.58	76.31	50.02	166.14	277.11
2073	0.00	0.00	79.47	0.00	16.97	0.00	96.44	50.91	45.48	569.58	76.31	50.02	166.14	277.11
2074	0.00	0.00	108.54	0.00	28.64	0.00	137.18	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2075	0.00	0.00	16.47	0.00	49.86	0.00	66.33	50.91	44.61	569.58	76.31	50.02	166.14	277.11
2076	0.00	0.00	35.48	0.00	65.74	0.00	101.23	50.91	32.05	569.58	76.31	50.02	166.14	277.11
2077	0.00	0.00	48.46	0.00	76.86	0.00	125.32	50.91	46.34	569.58	76.31	50.02	166.14	277.11
2078	0.00	0.00	7.35	0.00	0.00	0.00	7.35	50.91	30.90	569.58	76.31	50.02	166.14	277.11
2079	0.00	0.00	0.00	0.00	9.06	0.00	9.06	50.91	49.23	569.58	76.31	50.02	166.14	277.11
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.91	30.90	569.58	76.31	50.02	166.14	277.11
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.91	46.34	569.58	76.31	50.02	166.14	277.11
2082	0.00	0.00	0.00	0.00	9.06	0.00	9.06	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2084	0.00	0.00	0.00	0.00	10.59	0.37	10.96	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2085	0.00	0.00	0.00	0.00	10.24	1.59	11.83	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2086	0.00	0.00	0.00	0.00	24.77	20.62	45.39	50.91	32.05	569.58	76.31	50.02	166.14	277.11
2087	0.00	0.00	0.00	0.00	28.78	29.64	58.41	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2088	0.00	0.00	0.00	0.00	20.48	14.01	34.49	50.91	29.16	569.58	76.31	50.02	166.14	277.11
2089	0.00	0.00	0.00	0.00	16.71	23.35	40.06	50.91	32.05	569.58	76.31	50.02	166.14	277.11
2090	0.00	0.00	0.00	0.00	0.00	23.52	23.52	50.91	32.05	569.58	76.31	50.02	166.14	277.11
2091	0.00	0.00	0.00	0.00	0.00	0.35	0.35	50.91	32.05	569.58	76.31	50.02	166.14	277.11
Salvage Value	1.73	0.00	2.56	0.00	6.86	4.07	15.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	3734.85	2765.11	69.05	0.00	405.10	332.24	7306.35	690.11	565.76	11925.13	1713.06	537.52	2472.33	7202.23

Net Present Value 1-1302

K19/C33/750MW

TABLE 434
ECONOMIC SUMMARY
NFAT 2013

Energy Price	**Reference**
Discount Rate	**Reference**
Capital Cost	**Reference**

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.74	188.05	0.00	0.00	21.09	20.31	260.19	1.30	0.00	0.00	0.00	0.00	0.00	0.00
2015	38.87	472.34	0.00	0.00	18.86	6.51	536.58	3.98	0.00	333.17	101.68	23.64	100.86	106.99
2016	10.52	637.34	0.00	0.00	25.81	29.23	702.89	7.50	0.00	363.53	99.78	25.36	106.71	131.68
2017	10.58	772.68	0.00	0.00	37.77	92.73	913.76	12.07	0.00	400.45	97.84	27.88	111.79	162.93
2018	11.39	544.83	0.00	0.00	39.70	112.46	708.37	15.61	0.00	400.82	95.25	29.70	116.70	159.17
2019	11.45	389.68	0.00	0.00	47.03	69.79	517.95	18.20	12.97	424.10	95.10	27.09	117.32	184.60
2020	11.52	159.12	0.00	0.00	0.01	217.43	388.08	20.14	47.41	665.99	102.82	20.79	125.79	416.60
2021	11.59	55.22	0.00	0.00	0.00	0.40	67.21	20.48	45.74	742.97	103.34	21.67	135.69	482.27
2022	11.66	0.00	0.00	0.00	0.00	0.00	11.66	20.53	44.45	745.31	101.77	22.34	139.40	481.80
2023	16.30	0.00	0.00	0.00	0.00	0.00	16.30	20.61	42.50	734.75	99.74	21.89	145.41	467.72
2024	165.36	0.00	0.00	0.00	0.00	0.00	165.36	21.44	40.82	716.17	97.53	23.68	150.39	444.57
2025	251.50	0.00	0.00	0.00	0.00	0.00	251.50	22.70	39.09	645.86	95.52	21.60	145.37	383.37
2026	273.71	0.00	0.00	0.00	0.00	0.00	273.71	24.07	37.25	639.02	94.36	22.26	147.84	374.56
2027	279.21	0.00	0.00	0.00	3.52	0.00	282.73	25.48	35.88	599.82	92.35	21.66	146.83	338.97
2028	755.40	0.00	0.00	0.00	3.52	0.00	758.92	29.28	34.59	572.29	90.16	24.68	151.33	306.12
2029	1199.58	0.00	0.00	0.00	42.77	0.00	1242.35	35.49	35.96	550.39	88.36	26.26	156.34	279.43
2030	1077.03	0.00	0.00	0.00	22.19	0.00	1099.22	40.98	30.76	541.56	88.11	21.83	172.43	259.19
2031	769.12	0.00	0.00	0.00	37.33	0.00	806.45	45.02	29.52	525.60	86.49	21.39	187.22	230.50
2032	532.66	0.00	0.00	0.00	64.64	0.00	597.30	48.00	28.32	503.93	84.63	22.79	201.24	195.27
2033	349.86	0.00	0.00	0.00	86.61	0.00	436.47	50.19	41.42	601.24	88.21	25.65	129.87	357.50
2034	128.86	0.00	0.00	0.00	102.07	0.00	230.93	51.34	40.53	821.27	95.33	26.53	123.80	575.61
2035	40.66	0.00	0.00	0.00	0.00	0.00	40.66	51.54	38.87	834.61	95.71	25.92	115.71	597.28
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.54	38.47	796.43	93.87	25.26	112.20	565.09
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.54	37.70	775.36	92.15	25.50	115.26	542.45
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.54	37.09	754.71	90.47	25.89	118.39	519.97
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.54	39.26	729.62	88.75	25.91	128.34	486.63
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.54	35.48	704.36	87.11	25.87	131.39	460.00
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.54	35.04	679.36	85.50	26.01	135.18	432.67
2042	0.00	0.00	0.35	0.00	0.00	0.00	0.35	51.54	34.65	650.40	83.89	26.08	137.34	403.08
2043	0.00	0.00	79.47	0.00	0.00	0.00	79.47	51.94	36.88	628.52	82.32	26.15	142.84	377.21
2044	0.00	0.00	108.54	0.00	9.06	0.00	117.60	52.53	35.25	624.69	81.22	24.26	150.77	368.45
2045	0.00	0.00	16.47	0.00	0.00	0.00	16.47	52.61	38.77	600.18	79.19	42.27	152.94	325.79
2046	0.00	0.00	35.48	0.00	0.00	0.00	35.48	52.79	38.33	583.95	77.69	45.76	159.68	300.82
2047	0.00	0.00	48.46	0.00	9.06	0.00	57.52	53.08	37.03	570.92	76.38	48.47	165.47	280.60
2048	0.00	0.00	7.35	0.00	0.00	0.00	7.35	53.11	37.09	553.90	74.90	54.59	171.48	252.93
2049	0.00	0.00	0.00	0.00	10.59	0.37	10.96	53.11	38.92	569.59	76.32	49.61	165.54	278.12
2050	0.00	0.00	0.00	0.00	10.24	1.59	11.83	53.11	35.64	569.59	76.32	49.61	165.54	278.12
2051	0.00	0.00	0.00	0.00	24.77	20.62	45.39	53.11	35.26	569.59	76.32	49.61	165.54	278.12
2052	0.00	0.00	0.00	0.00	28.78	29.64	58.41	53.11	34.90	569.59	76.32	49.61	165.54	278.12
2053	0.00	0.00	0.00	0.00	20.48	14.01	34.49	53.11	37.44	569.59	76.32	49.61	165.54	278.12
2054	0.00	0.00	0.00	0.00	16.71	23.35	40.06	53.11	34.21	569.59	76.32	49.61	165.54	278.12
2055	0.00	0.00	0.00	0.00	0.00	23.52	23.52	53.11	33.88	569.59	76.32	49.61	165.54	278.12
2056	0.00	0.00	0.00	0.00	0.00	0.35	0.35	53.11	49.01	569.59	76.32	49.61	165.54	278.12
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.11	33.25	569.59	76.32	49.61	165.54	278.12
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.11	50.14	569.59	76.32	49.61	165.54	278.12
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.11	37.29	569.59	76.32	49.61	165.54	278.12
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.11	30.90	569.59	76.32	49.61	165.54	278.12
2062	0.00	0.00	0.00	0.00	3.57	1.10	4.67	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2063	0.00	0.00	0.00	0.00	2.73	0.05	2.78	53.11	32.05	569.59	76.32	49.61	165.54	278.12
2064	0.00	0.00	0.00	0.00	29.29	17.45	46.74	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2065	0.00	0.00	0.00	0.00	13.84	1.98	15.81	53.11	29.16	569.59	76.32	49.61	165.54	278.12
2066	0.00	0.00	0.00	0.00	9.73	7.37	17.10	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2067	0.00	0.00	0.00	0.00	23.77	63.09	86.86	53.11	29.16	569.59	76.32	49.61	165.54	278.12
2068	0.00	0.00	0.00	0.00	40.09	32.22	72.31	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2069	0.00	0.00	0.00	0.00	55.54	22.86	78.40	53.11	32.05	569.59	76.32	49.61	165.54	278.12
2070	0.00	0.00	0.00	0.00	0.01	13.13	13.14	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2071	0.00	0.00	0.00	0.00	0.00	0.05	0.05	53.11	30.90	569.59	76.32	49.61	165.54	278.12
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2073	0.00	0.00	79.47	0.00	0.00	0.00	79.47	53.11	32.92	569.59	76.32	49.61	165.54	278.12
2074	0.00	0.00	108.54	0.00	0.00	0.00	108.54	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2075	0.00	0.00	16.47	0.00	0.00	0.00	16.47	53.11	29.16	569.59	76.32	49.61	165.54	278.12
2076	0.00	0.00	35.48	0.00	0.00	0.00	35.48	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2077	0.00	0.00	48.46	0.00	2.65	0.00	51.11	53.11	29.16	569.59	76.32	49.61	165.54	278.12
2078	0.00	0.00	7.35	0.00	2.65	0.00	10.00	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2079	0.00	0.00	0.00	0.00	41.40	0.00	41.40	53.11	32.05	569.59	76.32	49.61	165.54	278.12
2080	0.00	0.00	0.00	0.00	16.97	0.00	16.97	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2081	0.00	0.00	0.00	0.00	28.64	0.00	28.64	53.11	29.16	569.59	76.32	49.61	165.54	278.12
2082	0.00	0.00	0.00	0.00	58.92	0.00	58.92	53.11	44.61	569.59	76.32	49.61	165.54	278.12
2083	0.00	0.00	0.00	0.00	65.74	0.00	65.74	53.11	32.05	569.59	76.32	49.61	165.54	278.12
2084	0.00	0.00	0.00	0.00	87.45	0.37	87.82	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2085	0.00	0.00	0.00	0.00	10.24	1.59	11.83	53.11	30.90	569.59	76.32	49.61	165.54	278.12
2086	0.00	0.00	0.00	0.00	24.77	20.62	45.39	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2087	0.00	0.00	0.00	0.00	28.78	29.64	58.41	53.11	30.90	569.59	76.32	49.61	165.54	278.12
2088	0.00	0.00	0.00	0.00	20.48	14.01	34.49	53.11	46.34	569.59	76.32	49.61	165.54	278.12
2089	0.00	0.00	0.00	0.00	16.71	23.35	40.06	53.11	32.05	569.59	76.32	49.61	165.54	278.12
2090	0.00	0.00	0.00	0.00	0.00	23.52	23.52	53.11	32.05	569.59	76.32	49.61	165.54	278.12
2091	0.00	0.00	0.00	0.00	0.00	0.35	0.35	53.11	32.05	569.59	76.32	49.61	165.54	278.12
Salvage Value	14.71	0.00	2.56	0.00	7.94	4.07	29.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	2728.56	2765.11	69.05	0.00	335.76	458.26	6356.73	598.66	545.39	10613.77	1661.55	530.85	2539.10	5882.27

Net Present Value -1619

1103

K19/Gas30/250MW

TABLE 435
ECONOMIC SUMMARY
NFAT 2013

Energy Price — Reference
Discount Rate — Reference
Capital Cost — Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	188.05	0.00	0.00	21.09	3.96	213.10	1.07	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	472.34	0.00	0.00	18.86	2.71	493.91	3.54	0.00	333.17	101.68	23.64	100.86	106.99
2016	0.00	637.34	0.00	0.00	25.81	3.95	667.09	6.87	0.00	363.53	99.78	25.36	106.71	131.68
2017	0.00	772.68	0.00	0.00	37.77	5.92	816.37	10.95	0.00	400.45	97.84	27.88	111.79	162.93
2018	0.00	544.83	0.00	0.00	39.70	17.76	602.29	13.96	0.00	401.01	95.26	29.71	116.62	159.42
2019	0.00	389.68	0.00	0.00	47.03	17.76	454.48	16.24	12.97	424.36	95.11	27.10	117.16	184.99
2020	0.00	159.12	0.00	0.00	0.01	18.42	177.55	17.12	13.22	626.52	102.86	22.41	115.53	385.73
2021	0.00	55.22	0.00	0.00	0.00	0.00	55.22	17.40	12.98	686.76	103.32	22.51	121.34	439.59
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	13.19	683.78	101.62	22.90	124.17	435.10
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	13.02	672.26	99.65	22.92	128.27	421.43
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.99	654.48	97.60	23.99	132.02	400.87
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.79	584.59	95.61	21.94	128.00	339.04
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.40	580.09	94.39	22.62	131.00	332.08
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.40	12.44	542.55	92.43	21.49	129.45	299.18
2028	0.00	0.00	73.79	0.00	0.00	0.00	73.79	17.77	12.50	520.97	90.72	22.28	132.21	275.76
2029	0.00	0.00	174.83	0.00	9.06	0.00	183.89	18.69	15.19	531.68	91.54	13.58	126.32	300.25
2030	0.00	0.00	116.50	0.00	71.35	0.00	187.85	19.63	15.25	511.24	89.24	25.28	127.39	269.32
2031	0.00	0.00	15.35	0.00	0.00	0.00	15.35	19.70	19.24	496.64	86.85	39.90	134.18	235.71
2032	0.00	0.00	75.23	0.00	0.00	0.00	75.23	20.08	19.24	483.93	85.25	44.63	138.59	215.47
2033	0.00	0.00	102.75	0.00	0.00	0.00	102.75	20.59	19.24	490.22	84.62	46.41	143.17	216.02
2034	0.00	0.00	15.59	0.00	0.00	0.00	15.59	20.67	23.22	479.94	82.58	66.56	149.65	181.14
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.67	22.57	413.88	80.77	60.35	141.61	131.15
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.67	22.57	387.25	78.99	65.95	146.30	96.02
2037	0.00	0.00	77.13	0.00	0.00	0.00	77.13	21.06	22.58	358.49	76.59	78.55	157.37	45.98
2038	0.00	0.00	105.34	0.00	60.02	0.00	165.36	21.88	22.58	372.03	76.49	82.57	157.47	55.49
2039	0.00	0.00	176.57	0.00	0.00	0.00	176.57	22.77	29.46	359.90	74.77	103.74	170.94	10.45
2040	0.00	0.00	232.00	0.00	0.00	0.00	232.00	23.93	26.58	345.21	73.36	115.19	176.00	-19.34
2041	0.00	0.00	103.91	0.00	9.06	0.00	112.97	24.49	26.58	341.17	72.35	130.75	177.96	-39.89
2042	0.00	0.00	7.64	0.00	0.00	0.00	7.64	24.53	33.68	375.93	70.84	182.68	169.00	-46.59
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.53	33.69	359.07	69.35	194.02	176.01	-80.31
2044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.53	35.43	342.85	67.93	207.47	181.08	-113.63
2045	0.00	0.00	80.27	0.00	0.00	0.00	80.27	24.93	35.44	328.80	66.63	220.29	185.97	-144.09
2046	0.00	0.00	109.63	0.00	0.00	0.00	109.63	25.48	35.44	321.08	65.65	233.81	187.26	-165.64
2047	0.00	0.00	16.63	0.00	0.00	0.00	16.63	25.56	38.55	324.86	65.05	248.25	185.70	-174.14
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	299.10	63.18	273.83	192.40	-230.31
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
2050	0.00	0.00	0.00	0.00	10.24	0.33	10.57	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2051	0.00	0.00	0.00	0.00	24.77	0.98	25.75	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2052	0.00	0.00	0.00	0.00	28.78	1.46	30.24	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2053	0.00	0.00	0.00	0.00	20.48	4.39	24.87	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2054	0.00	0.00	0.00	0.00	16.71	4.39	21.10	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2055	0.00	0.00	0.00	0.00	0.00	4.55	4.55	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2058	0.00	0.00	73.74	0.00	0.00	0.00	73.74	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2059	0.00	0.00	174.83	0.00	0.00	0.00	174.83	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
2060	0.00	0.00	116.50	0.00	0.00	0.00	116.50	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2061	0.00	0.00	15.35	0.00	0.00	0.00	15.35	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2062	0.00	0.00	75.23	0.00	2.70	0.00	77.93	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2063	0.00	0.00	102.75	0.00	1.86	0.00	104.61	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2064	0.00	0.00	15.59	0.00	27.91	0.50	43.99	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2065	0.00	0.00	0.00	0.00	62.13	0.99	63.12	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2066	0.00	0.00	0.00	0.00	1.04	2.97	4.01	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2067	0.00	0.00	77.13	0.00	8.99	4.46	90.57	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2068	0.00	0.00	105.34	0.00	19.22	13.38	137.94	25.56	53.13	315.01	64.63	251.96	188.45	-190.03
2069	0.00	0.00	176.57	0.00	30.33	13.38	220.27	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
2070	0.00	0.00	232.00	0.00	0.01	13.87	245.88	25.56	39.42	315.01	64.63	251.96	188.45	-190.03
2071	0.00	0.00	103.91	0.00	0.00	0.00	103.91	25.56	39.42	315.01	64.63	251.96	188.45	-190.03
2072	0.00	0.00	7.64	0.00	0.00	0.00	7.64	25.56	39.42	315.01	64.63	251.96	188.45	-190.03
2073	0.00	0.00	0.00	0.00	45.02	0.00	45.02	25.56	38.55	315.01	64.63	251.96	188.45	-190.03
2074	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2075	0.00	0.00	80.27	0.00	0.00	0.00	80.27	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2076	0.00	0.00	109.63	0.00	9.06	0.00	118.69	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2077	0.00	0.00	16.63	0.00	0.00	0.00	16.63	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
2080	0.00	0.00	0.00	0.00	17.84	0.00	17.84	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2084	0.00	0.00	0.00	0.00	10.59	0.16	10.75	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2085	0.00	0.00	0.00	0.00	10.24	0.33	10.57	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2086	0.00	0.00	0.00	0.00	24.77	0.98	25.75	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2087	0.00	0.00	0.00	0.00	28.78	1.46	30.24	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2088	0.00	0.00	73.74	0.00	35.49	4.39	113.62	25.56	37.69	315.01	64.63	251.96	188.45	-190.03
2089	0.00	0.00	174.83	0.00	16.71	4.39	195.92	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
2090	0.00	0.00	116.50	0.00	0.00	4.55	121.05	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
2091	0.00	0.00	15.35	0.00	0.00	0.00	15.35	25.56	40.57	315.01	64.63	251.96	188.45	-190.03
Salvage Value	0.00	0.00	13.06	0.00	3.86	0.88	17.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	2765.11	560.19	0.00	244.04	60.94	3630.28	334.06	335.76	8262.74	1580.06	1504.88	2567.22	2610.58

Net Present Value 1-1994

K23/Gas

TABLE 436
ECONOMIC SUMMARY
NFAT 2013

Energy Price	Reference
Discount Rate	Reference
Capital Cost	Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	188.05	0.00	0.00	21.09	0.00	209.14	1.05	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	3.77	0.00	0.00	18.86	0.00	22.63	1.16	0.00	334.37	101.67	23.59	100.76	108.36
2016	0.00	5.17	0.00	0.00	9.83	0.00	15.00	1.23	0.00	365.46	99.76	25.33	106.66	133.70
2017	0.00	5.23	0.00	0.00	9.83	0.00	15.07	1.31	0.00	403.62	97.99	27.52	111.16	166.95
2018	0.00	5.27	0.00	0.00	1.33	0.00	6.59	1.34	0.00	403.60	95.22	29.76	116.56	162.07
2019	0.00	463.81	0.00	0.00	2.35	0.00	466.16	3.67	0.00	389.13	93.27	26.47	119.84	149.55
2020	0.00	652.52	0.00	0.00	12.30	0.00	664.82	7.00	0.00	405.16	92.52	22.87	125.90	163.88
2021	0.00	791.04	0.00	0.00	27.93	0.00	818.97	11.09	0.00	442.29	90.80	21.94	130.43	199.12
2022	0.00	557.78	0.00	0.00	39.70	0.00	597.48	14.08	0.00	444.01	89.30	23.23	136.31	195.16
2023	0.00	398.94	0.00	0.00	47.03	0.00	445.97	16.31	12.97	454.12	88.55	24.81	137.81	202.94
2024	0.00	162.90	0.00	0.00	0.01	0.00	162.91	17.12	13.22	589.32	94.75	24.46	119.03	351.09
2025	0.00	56.53	0.00	0.00	0.00	0.00	56.53	17.41	12.93	535.93	95.39	22.64	116.42	301.47
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.41	13.15	529.61	94.17	23.13	118.78	293.52
2027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.41	12.97	493.70	92.13	21.42	118.22	261.94
2028	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.41	12.94	468.33	89.94	24.05	121.81	232.53
2029	0.00	0.00	74.11	0.00	0.00	0.00	74.11	17.78	12.72	455.15	88.88	23.49	119.97	222.81
2030	0.00	0.00	101.22	0.00	9.06	0.00	110.28	18.33	12.31	446.83	88.84	15.87	113.08	229.04
2031	0.00	0.00	15.40	0.00	0.00	0.00	15.40	18.41	16.30	413.19	86.29	25.90	115.62	185.39
2032	0.00	0.00	75.23	0.00	0.00	0.00	75.23	18.78	16.35	393.90	84.54	29.03	118.62	161.72
2033	0.00	0.00	102.75	0.00	71.35	0.00	174.10	19.65	19.03	394.30	83.82	28.72	120.32	161.44
2034	0.00	0.00	15.59	0.00	0.00	0.00	15.59	19.73	19.10	374.35	81.41	45.88	126.87	120.20
2035	0.00	0.00	76.36	0.00	0.00	0.00	76.36	20.11	19.10	359.90	79.79	50.73	132.58	96.80
2036	0.00	0.00	104.29	0.00	0.00	0.00	104.29	20.63	19.10	354.78	78.99	51.72	133.21	90.85
2037	0.00	0.00	92.95	0.00	0.00	0.00	92.95	21.10	23.08	338.68	77.16	68.30	138.96	54.25
2038	0.00	0.00	105.34	0.00	0.00	0.00	105.34	21.62	23.09	325.16	75.75	78.00	144.25	27.16
2039	0.00	0.00	176.57	0.00	60.02	0.00	236.59	22.81	26.41	307.26	73.87	99.98	156.65	-23.24
2040	0.00	0.00	232.00	0.00	0.00	0.00	232.00	23.97	26.43	288.35	72.35	110.71	161.68	-56.39
2041	0.00	0.00	103.91	0.00	9.06	0.00	112.97	24.53	26.44	269.53	70.65	133.56	167.22	-101.90
2042	0.00	0.00	7.64	0.00	0.00	0.00	7.64	24.57	33.55	304.89	69.82	171.28	154.52	-90.73
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.57	36.43	293.36	68.51	181.82	161.99	-118.96
2044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.57	33.55	281.09	67.16	195.28	168.32	-149.67
2045	0.00	0.00	80.27	0.00	0.00	0.00	80.27	24.97	33.56	270.13	65.93	208.29	173.77	-177.86
2046	0.00	0.00	109.63	0.00	0.00	0.00	109.63	25.52	33.57	265.09	65.05	220.88	175.48	-196.33
2047	0.00	0.00	16.63	0.00	0.00	0.00	16.63	25.60	37.55	269.34	64.52	234.79	174.05	-204.02
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	39.28	251.45	62.78	262.25	181.87	-255.45
2049	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	39.28	261.96	64.12	239.31	177.13	-218.60
2050	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	39.28	261.96	64.12	239.31	177.13	-218.60
2051	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	38.42	261.96	64.12	239.31	177.13	-218.60
2052	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2053	0.00	0.00	0.00	0.00	0.76	0.00	0.76	25.60	40.44	261.96	64.12	239.31	177.13	-218.60
2054	0.00	0.00	0.00	0.00	0.41	0.00	0.41	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2055	0.00	0.00	0.00	0.00	14.94	0.00	14.94	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2056	0.00	0.00	0.00	0.00	18.94	0.00	18.94	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2057	0.00	0.00	0.00	0.00	20.48	0.00	20.48	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2058	0.00	0.00	0.00	0.00	16.71	0.00	16.71	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2059	0.00	0.00	74.11	0.00	0.00	0.00	74.11	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2060	0.00	0.00	101.22	0.00	0.00	0.00	101.22	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2061	0.00	0.00	15.35	0.00	0.00	0.00	15.35	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2062	0.00	0.00	75.23	0.00	0.00	0.00	75.23	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2063	0.00	0.00	102.75	0.00	0.00	0.00	102.75	25.60	40.44	261.96	64.12	239.31	177.13	-218.60
2064	0.00	0.00	15.59	0.00	0.00	0.00	15.59	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2065	0.00	0.00	76.36	0.00	9.06	0.00	85.42	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2066	0.00	0.00	104.29	0.00	2.70	0.00	107.00	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2067	0.00	0.00	92.95	0.00	1.86	0.00	94.81	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2068	0.00	0.00	105.34	0.00	72.36	0.00	177.70	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2069	0.00	0.00	176.57	0.00	8.62	0.00	185.19	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2070	0.00	0.00	232.00	0.00	1.04	0.00	233.04	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2071	0.00	0.00	103.91	0.00	8.99	0.00	112.90	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2072	0.00	0.00	7.64	0.00	19.22	0.00	26.86	25.60	53.00	261.96	64.12	239.31	177.13	-218.60
2073	0.00	0.00	0.00	0.00	30.33	0.00	30.33	25.60	40.44	261.96	64.12	239.31	177.13	-218.60
2074	0.00	0.00	0.00	0.00	45.03	0.00	45.03	25.60	39.28	261.96	64.12	239.31	177.13	-218.60
2075	0.00	0.00	80.27	0.00	0.00	0.00	80.27	25.60	39.28	261.96	64.12	239.31	177.13	-218.60
2076	0.00	0.00	109.63	0.00	9.06	0.00	118.69	25.60	39.28	261.96	64.12	239.31	177.13	-218.60
2077	0.00	0.00	16.63	0.00	0.00	0.00	16.63	25.60	38.42	261.96	64.12	239.31	177.13	-218.60
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2083	0.00	0.00	0.00	0.00	17.84	0.00	17.84	25.60	40.44	261.96	64.12	239.31	177.13	-218.60
2084	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2085	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2086	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2087	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2089	0.00	0.00	74.11	0.00	15.01	0.00	89.12	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2090	0.00	0.00	101.22	0.00	0.00	0.00	101.22	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
2091	0.00	0.00	15.35	0.00	0.00	0.00	15.35	25.60	37.55	261.96	64.12	239.31	177.13	-218.60
Salvage Value	0.00	0.00	10.36	0.00	2.97	0.00	13.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	2327.63	529.17	0.00	214.16	0.00	3070.95	280.90	288.24	6949.69	1538.79	1416.64	2449.03	1545.24

Net Present Value 1,209.5

All Gas

TABLE 437
ECONOMIC SUMMARY
NFAT 2013

Energy Price — Reference
Discount Rate — Reference
Capital Cost — Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	43.74	0.00	0.00	9.83	0.00	53.58	0.27	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	9.83	0.00	9.83	0.32	0.00	334.38	101.67	23.59	100.76	108.37
2016	0.00	0.00	0.00	0.00	9.83	0.00	9.83	0.37	0.00	365.48	99.77	25.32	106.67	133.71
2017	0.00	0.00	0.00	0.00	9.83	0.00	9.83	0.42	0.00	404.53	97.98	27.50	111.12	167.93
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	404.69	95.22	29.77	116.53	163.17
2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	391.19	93.26	26.49	119.78	151.66
2020	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.42	0.00	408.32	92.57	22.69	125.54	167.51
2021	0.00	0.00	71.21	0.00	0.00	0.00	71.21	0.77	0.00	399.58	90.88	21.62	129.04	158.04
2022	0.00	0.00	97.26	0.00	9.06	0.00	106.32	1.30	0.00	404.64	90.11	19.92	132.55	162.07
2023	0.00	0.00	14.75	0.00	0.00	0.00	14.75	1.38	3.98	407.65	88.49	32.85	136.27	150.04
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.38	3.98	399.61	86.89	35.90	142.72	134.10
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.38	3.98	315.64	84.47	28.58	138.43	64.15
2026	0.00	0.00	0.04	0.00	0.00	0.00	0.04	1.38	3.98	294.52	82.38	32.84	144.18	35.13
2027	0.00	0.00	73.38	0.00	0.00	0.00	73.38	1.74	3.98	279.89	80.72	37.83	148.06	13.28
2028	0.00	0.00	173.96	0.00	71.35	0.00	245.31	2.97	3.98	294.50	81.52	33.13	144.93	34.92
2029	0.00	0.00	268.70	0.00	0.00	0.00	268.70	4.31	7.97	278.97	79.31	49.34	153.30	-2.99
2030	0.00	0.00	235.99	0.00	0.00	0.00	235.99	5.49	11.95	276.70	78.01	72.01	148.34	-21.66
2031	0.00	0.00	98.85	0.00	9.06	0.00	107.91	6.03	11.95	274.82	76.84	84.62	153.36	-40.00
2032	0.00	0.00	7.27	0.00	0.00	0.00	7.27	6.07	19.06	308.58	75.18	137.72	141.77	-46.09
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.07	19.06	286.08	72.81	156.14	152.14	-95.02
2034	0.00	0.00	75.98	0.00	0.00	0.00	75.98	6.45	19.07	284.24	72.05	164.96	154.25	-107.02
2035	0.00	0.00	103.78	0.00	60.02	0.00	163.80	7.27	19.07	271.35	70.85	175.13	157.51	-132.14
2036	0.00	0.00	173.95	0.00	0.00	0.00	173.95	8.14	23.07	262.07	69.41	197.52	161.95	-166.81
2037	0.00	0.00	228.56	0.00	0.00	0.00	228.56	9.28	23.07	250.56	68.07	213.39	167.81	-198.70
2038	0.00	0.00	102.37	0.00	0.00	0.00	102.37	9.79	23.07	242.30	66.97	231.27	171.42	-227.35
2039	0.00	0.00	7.53	0.00	0.00	0.00	7.53	9.83	30.18	261.89	65.65	273.97	166.14	-243.87
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.83	30.19	246.30	64.27	290.74	171.95	-280.65
2041	0.00	0.00	78.68	0.00	0.00	0.00	78.68	10.22	30.19	231.86	63.02	307.00	176.75	-314.91
2042	0.00	0.00	107.46	0.00	60.02	0.00	167.49	11.06	30.20	223.51	61.96	323.00	183.08	-344.53
2043	0.00	0.00	16.30	0.00	0.00	0.00	16.30	11.14	34.20	216.13	60.76	346.36	188.66	-379.64
2044	0.00	0.00	79.87	0.00	0.00	0.00	79.87	11.54	34.20	207.52	59.62	366.04	193.37	-411.51
2045	0.00	0.00	109.08	0.00	0.00	0.00	109.08	12.09	34.20	200.15	58.57	387.06	197.35	-442.83
2046	0.00	0.00	16.55	0.00	0.00	0.00	16.55	12.17	38.17	194.15	57.44	412.77	200.68	-476.74
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.18	192.28	56.91	421.09	200.29	-486.01
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.19	179.48	55.38	453.60	205.80	-535.31
2049	0.00	0.00	0.00	0.00	9.83	0.00	9.83	12.17	38.19	188.63	56.58	429.15	202.26	-499.35
2050	0.00	0.00	0.00	0.00	9.83	0.00	9.83	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2051	0.00	0.00	71.21	0.00	9.83	0.00	81.05	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2052	0.00	0.00	97.26	0.00	9.83	0.00	107.10	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2053	0.00	0.00	14.75	0.00	0.00	0.00	14.75	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2057	0.00	0.00	73.38	0.00	9.06	0.00	82.44	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2058	0.00	0.00	173.96	0.00	0.00	0.00	173.96	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2059	0.00	0.00	268.70	0.00	0.00	0.00	268.70	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2060	0.00	0.00	235.99	0.00	0.00	0.00	235.99	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2061	0.00	0.00	98.85	0.00	0.00	0.00	98.85	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2062	0.00	0.00	7.27	0.00	0.00	0.00	7.27	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2063	0.00	0.00	0.00	0.00	53.51	0.00	53.51	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2064	0.00	0.00	75.98	0.00	0.00	0.00	75.98	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2065	0.00	0.00	103.78	0.00	0.00	0.00	103.78	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2066	0.00	0.00	173.95	0.00	9.06	0.00	183.01	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2067	0.00	0.00	228.56	0.00	0.00	0.00	228.56	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2068	0.00	0.00	102.37	0.00	0.00	0.00	102.37	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2069	0.00	0.00	7.53	0.00	0.00	0.00	7.53	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2070	0.00	0.00	0.00	0.00	45.02	0.00	45.02	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2071	0.00	0.00	78.68	0.00	0.00	0.00	78.68	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2072	0.00	0.00	107.46	0.00	0.00	0.00	107.46	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2073	0.00	0.00	16.30	0.00	0.00	0.00	16.30	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2074	0.00	0.00	79.87	0.00	0.00	0.00	79.87	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2075	0.00	0.00	109.08	0.00	0.00	0.00	109.08	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2076	0.00	0.00	16.55	0.00	0.00	0.00	16.55	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2077	0.00	0.00	0.00	0.00	45.02	0.00	45.02	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2078	0.00	0.00	0.00	0.00	17.84	0.00	17.84	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2081	0.00	0.00	71.21	0.00	0.00	0.00	71.21	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2082	0.00	0.00	97.26	0.00	0.00	0.00	97.26	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2083	0.00	0.00	14.75	0.00	0.00	0.00	14.75	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2084	0.00	0.00	0.00	0.00	9.83	0.00	9.83	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2085	0.00	0.00	0.00	0.00	24.84	0.00	24.84	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2086	0.00	0.00	0.00	0.00	9.83	0.00	9.83	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2087	0.00	0.00	73.38	0.00	9.83	0.00	83.21	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2088	0.00	0.00	173.96	0.00	0.00	0.00	173.96	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2089	0.00	0.00	115.92	0.00	0.00	0.00	115.92	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2090	0.00	0.00	15.28	0.00	0.00	0.00	15.28	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
2091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.17	38.20	188.63	56.58	429.15	202.26	-499.35
Salvage Value	0.00	0.00	14.80	0.00	2.03	0.00	16.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	43.74	978.78	0.00	129.15	0.00	1151.67	90.77	252.22	5557.75	1440.02	2714.04	2732.54	-1328.85

Net Present Value 1,404.96

K19/C26/750MW (WPS Sale & Inv) – 1.5x DSM

TABLE 438
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.74	188.05	0.00	0.00	21.09	18.82	258.70	1.29	0.00	0.00	0.00	0.00	0.00	0.00
2015	39.39	472.34	0.00	0.00	18.86	4.74	535.33	3.97	0.00	338.16	101.67	23.60	100.61	112.28
2016	86.94	637.34	0.00	0.00	25.81	28.48	778.57	7.86	0.00	369.67	99.75	25.45	106.50	137.98
2017	181.68	772.68	0.00	0.00	37.77	92.73	1084.86	13.29	0.00	407.66	97.81	27.91	111.49	170.46
2018	211.37	544.83	0.00	0.00	39.70	72.72	868.63	17.63	0.00	409.11	95.25	29.65	116.22	167.99
2019	254.07	389.68	0.00	0.00	47.03	55.64	746.42	21.36	12.97	434.42	95.10	27.14	116.80	195.38
2020	260.17	159.12	0.00	0.00	3.53	108.96	531.78	24.02	44.30	674.44	102.80	20.80	125.19	425.66
2021	717.14	55.22	0.00	0.00	3.52	0.40	776.28	27.90	42.52	753.12	103.32	21.44	134.40	493.97
2022	1151.28	0.00	0.00	0.00	42.77	0.00	1194.05	33.87	41.21	756.03	101.76	22.21	138.08	493.98
2023	1033.67	0.00	0.00	0.00	22.19	0.00	1055.85	39.15	39.39	744.59	99.73	21.78	143.98	479.10
2024	738.15	0.00	0.00	0.00	37.33	0.00	775.48	43.03	37.84	719.11	96.97	24.85	152.24	445.04
2025	511.21	0.00	0.00	0.00	64.64	0.00	575.85	45.91	36.24	646.87	95.03	22.77	148.07	380.99
2026	335.78	0.00	0.00	0.00	86.61	0.00	422.39	48.02	48.77	781.52	99.66	25.99	132.07	523.80
2027	123.67	0.00	0.00	0.00	102.07	0.00	225.74	49.15	47.75	974.30	107.61	23.34	120.18	723.18
2028	39.03	0.00	0.00	0.00	0.00	0.00	39.03	49.34	46.44	1035.61	108.22	24.43	130.88	772.08
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	48.13	1015.32	106.06	24.90	134.25	750.11
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	42.86	995.87	104.59	23.51	130.84	736.94
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	41.68	989.88	102.83	24.36	135.35	727.34
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	40.42	973.32	100.89	24.76	138.91	708.76
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	39.00	954.21	99.03	25.13	142.62	687.43
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	38.04	932.97	97.24	25.41	144.18	666.14
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	36.72	898.63	95.48	25.55	138.30	639.31
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	38.89	825.14	93.84	25.60	114.79	590.90
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	35.49	793.81	92.13	25.86	114.81	561.01
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	34.98	768.90	90.41	25.94	117.55	535.01
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	37.39	743.16	88.72	26.03	127.55	500.85
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	34.03	722.38	87.10	26.17	131.34	477.77
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	33.57	697.50	85.48	26.18	135.03	450.81
2042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	32.47	668.73	83.89	26.23	137.40	421.21
2043	0.00	0.00	0.35	0.00	0.00	0.00	0.35	49.34	32.04	641.94	82.32	26.33	140.36	392.93
2044	0.00	0.00	79.87	0.00	0.00	0.00	79.87	49.74	33.36	624.09	80.77	26.39	148.00	368.94
2045	0.00	0.00	109.08	0.00	9.06	0.00	118.14	50.33	32.96	616.95	79.54	25.07	156.37	355.96
2046	0.00	0.00	16.55	0.00	0.00	0.00	16.55	50.42	39.43	593.58	77.67	44.03	156.66	315.22
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	35.30	576.98	76.22	47.69	163.11	289.96
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	34.07	563.10	74.88	50.34	170.23	267.65
2049	0.00	0.00	0.00	0.00	10.59	0.37	10.96	50.42	36.60	577.89	76.26	47.36	163.33	290.94
2050	0.00	0.00	0.00	0.00	10.24	1.59	11.83	50.42	33.37	577.89	76.26	47.36	163.33	290.94
2051	0.00	0.00	0.00	0.00	24.77	20.62	45.39	50.42	34.77	577.89	76.26	47.36	163.33	290.94
2052	0.00	0.00	0.00	0.00	28.78	29.64	58.41	50.42	34.45	577.89	76.26	47.36	163.33	290.94
2053	0.00	0.00	0.00	0.00	20.48	14.01	34.49	50.42	34.14	577.89	76.26	47.36	163.33	290.94
2054	0.00	0.00	0.00	0.00	16.71	23.35	40.06	50.42	33.84	577.89	76.26	47.36	163.33	290.94
2055	0.00	0.00	0.00	0.00	0.87	23.52	24.39	50.42	33.55	577.89	76.26	47.36	163.33	290.94
2056	0.00	0.00	0.00	0.00	0.87	0.35	1.22	50.42	49.87	577.89	76.26	47.36	163.33	290.94
2057	0.00	0.00	0.00	0.00	10.43	0.00	10.44	50.42	31.27	577.89	76.26	47.36	163.33	290.94
2058	0.00	0.00	0.00	0.00	5.22	0.00	5.22	50.42	46.45	577.89	76.26	47.36	163.33	290.94
2059	0.00	0.00	0.00	0.00	8.69	0.00	8.69	50.42	33.64	577.89	76.26	47.36	163.33	290.94
2060	0.00	0.00	0.00	0.00	14.78	0.00	14.78	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2061	0.00	0.00	0.00	0.00	20.87	0.00	20.87	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2062	0.00	0.00	0.00	0.00	27.92	1.10	29.02	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2063	0.00	0.00	0.00	0.00	1.86	0.05	1.91	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2064	0.00	0.00	0.00	0.00	18.85	17.45	36.31	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2065	0.00	0.00	0.00	0.00	8.62	1.98	10.60	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2066	0.00	0.00	0.00	0.00	1.04	7.37	8.40	50.42	46.16	577.89	76.26	47.36	163.33	290.94
2067	0.00	0.00	0.00	0.00	8.99	63.09	72.08	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2068	0.00	0.00	0.00	0.00	19.22	32.22	51.44	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2069	0.00	0.00	0.00	0.00	30.33	22.86	53.18	50.42	46.16	577.89	76.26	47.36	163.33	290.94
2070	0.00	0.00	0.00	0.00	2.66	13.13	15.79	50.42	29.56	577.89	76.26	47.36	163.33	290.94
2071	0.00	0.00	0.00	0.00	2.65	0.05	2.70	50.42	45.01	577.89	76.26	47.36	163.33	290.94
2072	0.00	0.00	0.00	0.00	32.34	0.00	32.34	50.42	29.56	577.89	76.26	47.36	163.33	290.94
2073	0.00	0.00	0.00	0.00	16.97	0.00	16.97	50.42	44.14	577.89	76.26	47.36	163.33	290.94
2074	0.00	0.00	79.87	0.00	28.64	0.00	108.51	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2075	0.00	0.00	109.08	0.00	49.86	0.00	158.94	50.42	43.27	577.89	76.26	47.36	163.33	290.94
2076	0.00	0.00	16.55	0.00	65.74	0.00	82.29	50.42	30.72	577.89	76.26	47.36	163.33	290.94
2077	0.00	0.00	0.00	0.00	76.86	0.00	76.86	50.42	45.01	577.89	76.26	47.36	163.33	290.94
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	29.56	577.89	76.26	47.36	163.33	290.94
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	47.89	577.89	76.26	47.36	163.33	290.94
2080	0.00	0.00	0.00	0.00	9.06	0.00	9.06	50.42	29.56	577.89	76.26	47.36	163.33	290.94
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	45.01	577.89	76.26	47.36	163.33	290.94
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2084	0.00	0.00	0.00	0.00	10.59	0.37	10.96	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2085	0.00	0.00	0.00	0.00	10.24	1.59	11.83	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2086	0.00	0.00	0.00	0.00	24.77	20.62	45.39	50.42	30.72	577.89	76.26	47.36	163.33	290.94
2087	0.00	0.00	0.00	0.00	28.78	29.64	58.41	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2088	0.00	0.00	0.00	0.00	20.48	14.01	34.49	50.42	27.83	577.89	76.26	47.36	163.33	290.94
2089	0.00	0.00	0.00	0.00	16.71	23.35	40.06	50.42	30.72	577.89	76.26	47.36	163.33	290.94
2090	0.00	0.00	0.00	0.00	0.00	23.52	23.52	50.42	30.72	577.89	76.26	47.36	163.33	290.94
2091	0.00	0.00	0.00	0.00	0.00	0.35	0.35	50.42	30.72	577.89	76.26	47.36	163.33	290.94
Salvage Value	1.73	0.00	1.79	0.00	6.75	4.07	14.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	3734.85	2765.11	47.66	0.00	403.25	332.24	7283.11	688.31	561.05	12198.33	1712.43	526.14	2443.86	7515.89

Net Present Value 1-1027

K19/C26/750MW (WPS Sale & Inv) –4x DSM

TABLE 439
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.74	188.05	0.00	0.00	21.09	18.82	258.70	1.29	0.00	0.00	0.00	0.00	0.00	0.00
2015	39.39	472.34	0.00	0.00	18.86	4.74	535.33	3.97	0.00	362.40	101.49	23.90	99.73	137.28
2016	86.94	637.34	0.00	0.00	25.81	28.48	778.57	7.86	0.00	405.73	99.56	25.74	104.89	175.53
2017	181.68	772.68	0.00	0.00	37.77	92.73	1084.86	13.29	0.00	457.09	97.69	28.00	109.30	222.11
2018	211.37	544.83	0.00	0.00	39.70	72.72	868.63	17.63	0.00	473.24	95.19	29.57	113.03	235.46
2019	254.07	389.68	0.00	0.00	47.03	55.64	746.42	21.36	12.97	506.14	95.06	27.04	112.51	271.53
2020	260.17	159.12	0.00	0.00	3.53	108.96	531.78	24.02	44.30	752.22	102.77	20.14	119.31	510.00
2021	717.14	55.22	0.00	0.00	3.52	0.40	776.28	27.90	42.52	838.67	103.27	20.98	127.61	586.81
2022	1151.28	0.00	0.00	0.00	42.77	0.00	1194.05	33.87	41.21	848.15	101.65	21.57	130.75	594.18
2023	1033.67	0.00	0.00	0.00	22.19	0.00	1055.85	39.15	39.39	843.77	99.65	21.09	135.08	587.96
2024	738.15	0.00	0.00	0.00	37.33	0.00	775.48	43.03	37.84	820.79	96.65	25.11	144.72	554.32
2025	511.21	0.00	0.00	0.00	64.64	0.00	575.85	45.91	36.24	748.16	94.67	23.72	138.24	491.52
2026	335.78	0.00	0.00	0.00	86.61	0.00	422.39	48.02	48.77	894.03	98.94	29.41	132.54	633.14
2027	123.67	0.00	0.00	0.00	102.07	0.00	225.74	49.15	47.75	1091.91	107.50	23.96	114.75	845.70
2028	39.03	0.00	0.00	0.00	0.00	0.00	39.03	49.34	46.44	1144.46	107.89	24.50	122.05	890.02
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	48.13	1125.66	105.82	24.60	125.11	870.13
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	42.86	1102.68	104.35	23.19	120.73	854.41
2031	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	41.68	1098.90	102.58	24.04	125.24	847.04
2032	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	40.42	1082.44	100.66	24.31	128.65	828.81
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	39.00	1059.33	98.82	24.75	132.58	803.18
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	38.04	1037.61	97.06	25.43	135.11	780.02
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	36.72	1001.90	95.33	25.36	130.04	751.17
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	38.89	924.96	93.65	26.60	107.92	696.79
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	35.49	891.97	91.98	26.73	108.20	665.06
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	34.98	864.42	90.31	26.81	111.00	636.29
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	37.39	834.63	88.64	26.85	120.93	598.21
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	34.03	808.96	87.01	26.98	124.21	570.77
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	33.57	781.30	85.39	27.08	127.84	541.00
2042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	32.47	749.97	83.82	27.11	130.14	508.90
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	32.04	724.56	82.27	27.14	133.03	482.13
2044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.34	33.36	696.94	80.73	27.15	135.45	453.62
2045	0.00	0.00	0.35	0.00	0.00	0.00	0.35	49.34	32.96	668.96	79.23	27.17	138.24	424.32
2046	0.00	0.00	35.48	0.00	0.00	0.00	35.48	49.52	35.45	639.99	77.75	27.04	140.91	394.29
2047	0.00	0.00	48.46	0.00	9.06	0.00	57.52	49.81	31.32	622.95	76.31	26.75	149.34	370.55
2048	0.00	0.00	7.35	0.00	0.00	0.00	7.35	49.85	31.43	606.16	74.86	31.41	155.42	344.47
2049	0.00	0.00	0.00	0.00	10.59	0.37	10.96	49.85	33.96	623.03	76.31	28.40	148.56	369.77
2050	0.00	0.00	0.00	0.00	10.24	1.59	11.83	49.85	30.73	623.03	76.31	28.40	148.56	369.77
2051	0.00	0.00	0.00	0.00	24.77	20.62	45.39	49.85	32.13	623.03	76.31	28.40	148.56	369.77
2052	0.00	0.00	0.00	0.00	28.78	29.64	58.41	49.85	31.81	623.03	76.31	28.40	148.56	369.77
2053	0.00	0.00	0.00	0.00	20.48	14.01	34.49	49.85	31.50	623.03	76.31	28.40	148.56	369.77
2054	0.00	0.00	0.00	0.00	16.71	23.35	40.06	49.85	31.20	623.03	76.31	28.40	148.56	369.77
2055	0.00	0.00	0.00	0.00	0.87	23.52	24.39	49.85	30.91	623.03	76.31	28.40	148.56	369.77
2056	0.00	0.00	0.00	0.00	0.87	0.35	1.22	49.85	47.23	623.03	76.31	28.40	148.56	369.77
2057	0.00	0.00	0.00	0.00	10.43	0.00	10.44	49.85	28.62	623.03	76.31	28.40	148.56	369.77
2058	0.00	0.00	0.00	0.00	5.22	0.00	5.22	49.85	43.81	623.03	76.31	28.40	148.56	369.77
2059	0.00	0.00	0.00	0.00	8.69	0.00	8.69	49.85	31.00	623.03	76.31	28.40	148.56	369.77
2060	0.00	0.00	0.00	0.00	14.78	0.00	14.78	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2061	0.00	0.00	0.00	0.00	20.87	0.00	20.87	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2062	0.00	0.00	0.00	0.00	27.92	1.10	29.02	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2063	0.00	0.00	0.00	0.00	1.86	0.05	1.91	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2064	0.00	0.00	0.00	0.00	18.85	17.45	36.31	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2065	0.00	0.00	0.00	0.00	8.62	1.98	10.60	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2066	0.00	0.00	0.00	0.00	1.04	7.37	8.40	49.85	43.52	623.03	76.31	28.40	148.56	369.77
2067	0.00	0.00	0.00	0.00	8.99	63.09	72.08	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2068	0.00	0.00	0.00	0.00	19.22	32.22	51.44	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2069	0.00	0.00	0.00	0.00	30.33	22.86	53.18	49.85	43.52	623.03	76.31	28.40	148.56	369.77
2070	0.00	0.00	0.00	0.00	2.66	13.13	15.79	49.85	26.92	623.03	76.31	28.40	148.56	369.77
2071	0.00	0.00	0.00	0.00	2.65	0.05	2.70	49.85	42.36	623.03	76.31	28.40	148.56	369.77
2072	0.00	0.00	0.00	0.00	32.34	0.00	32.34	49.85	26.92	623.03	76.31	28.40	148.56	369.77
2073	0.00	0.00	0.00	0.00	16.97	0.00	16.97	49.85	41.50	623.03	76.31	28.40	148.56	369.77
2074	0.00	0.00	0.00	0.00	28.64	0.00	28.64	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2075	0.00	0.00	0.00	0.00	49.86	0.00	49.86	49.85	40.63	623.03	76.31	28.40	148.56	369.77
2076	0.00	0.00	35.48	0.00	65.74	0.00	101.23	49.85	28.07	623.03	76.31	28.40	148.56	369.77
2077	0.00	0.00	48.46	0.00	76.86	0.00	125.32	49.85	42.36	623.03	76.31	28.40	148.56	369.77
2078	0.00	0.00	7.35	0.00	0.00	0.00	7.35	49.85	26.92	623.03	76.31	28.40	148.56	369.77
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.85	45.25	623.03	76.31	28.40	148.56	369.77
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.85	26.92	623.03	76.31	28.40	148.56	369.77
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.85	42.36	623.03	76.31	28.40	148.56	369.77
2082	0.00	0.00	0.00	0.00	9.06	0.00	9.06	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2084	0.00	0.00	0.00	0.00	10.59	0.37	10.96	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2085	0.00	0.00	0.00	0.00	10.24	1.59	11.83	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2086	0.00	0.00	0.00	0.00	24.77	20.62	45.39	49.85	28.07	623.03	76.31	28.40	148.56	369.77
2087	0.00	0.00	0.00	0.00	28.78	29.64	58.41	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2088	0.00	0.00	0.00	0.00	20.48	14.01	34.49	49.85	25.19	623.03	76.31	28.40	148.56	369.77
2089	0.00	0.00	0.00	0.00	16.71	23.35	40.06	49.85	28.07	623.03	76.31	28.40	148.56	369.77
2090	0.00	0.00	0.00	0.00	0.00	23.52	23.52	49.85	28.07	623.03	76.31	28.40	148.56	369.77
2091	0.00	0.00	0.00	0.00	0.00	0.35	0.35	49.85	28.07	623.03	76.31	28.40	148.56	369.77
Salvage Value	1.73	0.00	0.91	0.00	6.76	4.07	13.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	3734.85	2765.11	18.91	0.00	403.03	332.24	7254.14	686.08	551.84	13587.75	1710.02	466.88	2302.03	9108.82

Net Present Value 11078

K19/C30/750MW – 4x DSM

TABLE 440
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	30.74	188.05	0.00	0.00	21.09	18.82	258.70	1.29	0.00	0.00	0.00	0.00	0.00	0.00
2015	38.87	472.34	0.00	0.00	18.86	4.74	534.82	3.97	0.00	362.40	101.49	23.90	99.73	137.28
2016	10.52	637.34	0.00	0.00	25.81	28.48	702.15	7.48	0.00	405.73	99.56	25.74	104.89	175.53
2017	10.58	772.68	0.00	0.00	37.77	92.73	913.76	12.05	0.00	457.08	97.69	28.01	109.30	222.09
2018	14.08	544.83	0.00	0.00	39.70	72.72	671.33	15.40	0.00	473.71	95.18	29.56	113.00	235.98
2019	14.16	389.68	0.00	0.00	47.03	55.64	506.51	17.94	12.97	506.91	95.06	27.04	112.47	272.35
2020	16.02	159.12	0.00	0.00	0.01	108.96	284.11	19.36	44.30	753.17	102.76	20.14	119.26	511.01
2021	160.03	55.22	0.00	0.00	0.00	0.40	215.66	20.44	42.52	840.33	103.26	21.02	127.56	588.49
2022	253.87	0.00	0.00	0.00	0.00	0.00	253.87	21.70	41.21	850.44	101.65	21.62	130.64	596.53
2023	275.72	0.00	0.00	0.00	0.00	0.00	275.72	23.08	39.39	845.90	99.66	21.04	134.84	590.36
2024	283.65	0.00	0.00	0.00	3.52	0.00	287.17	24.52	37.84	827.68	97.03	23.95	142.33	564.38
2025	742.22	0.00	0.00	0.00	3.52	0.00	745.74	28.25	36.24	756.67	95.08	22.55	134.85	504.19
2026	1178.63	0.00	0.00	0.00	42.77	0.00	1221.40	34.35	34.51	788.22	94.53	22.67	140.91	530.11
2027	1058.23	0.00	0.00	0.00	22.19	0.00	1080.41	39.76	33.27	763.26	92.37	21.19	140.79	508.90
2028	755.69	0.00	0.00	0.00	37.33	0.00	793.02	43.72	32.08	733.88	89.96	24.50	149.24	470.19
2029	523.36	0.00	0.00	0.00	64.64	0.00	588.00	46.66	33.56	711.02	88.37	25.58	155.03	442.05
2030	343.76	0.00	0.00	0.00	86.61	0.00	430.37	48.81	42.72	825.00	93.39	24.06	123.26	584.28
2031	126.61	0.00	0.00	0.00	102.07	0.00	228.68	49.96	41.81	1036.62	100.69	24.62	118.28	793.03
2032	39.95	0.00	0.00	0.00	0.00	0.00	39.95	50.16	40.58	1085.09	100.75	24.59	128.88	830.87
2033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	39.73	1061.54	98.88	24.95	132.81	804.89
2034	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	38.53	1036.84	97.09	25.31	134.69	779.75
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	37.05	1002.03	95.35	25.35	130.00	751.34
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	36.35	925.39	93.66	26.63	107.97	697.13
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	35.47	891.97	91.99	26.70	108.18	665.10
2038	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	35.04	864.30	90.30	26.80	111.00	636.20
2039	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	37.56	834.72	88.64	26.88	120.95	598.25
2040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	36.91	808.96	87.01	26.97	124.21	570.78
2041	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	33.57	781.30	85.39	27.08	127.84	541.00
2042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	33.13	749.97	83.82	27.11	130.14	508.90
2043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	32.70	724.56	82.27	27.14	133.03	482.13
2044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.16	34.02	696.94	80.73	27.15	135.45	453.62
2045	0.00	0.00	0.35	0.00	0.00	0.00	0.35	50.16	33.61	668.96	79.23	27.17	138.24	424.32
2046	0.00	0.00	35.48	0.00	0.00	0.00	35.48	50.33	32.57	639.99	77.75	27.04	140.91	394.29
2047	0.00	0.00	48.46	0.00	9.06	0.00	57.52	50.62	31.32	622.95	76.31	26.75	149.34	370.55
2048	0.00	0.00	7.35	0.00	0.00	0.00	7.35	50.66	31.43	606.16	74.86	31.41	155.42	344.47
2049	0.00	0.00	0.00	0.00	10.59	0.37	10.96	50.66	33.96	623.03	76.31	28.40	148.56	369.77
2050	0.00	0.00	0.00	0.00	10.24	1.59	11.83	50.66	33.62	623.03	76.31	28.40	148.56	369.77
2051	0.00	0.00	0.00	0.00	24.77	20.62	45.39	50.66	30.40	623.03	76.31	28.40	148.56	369.77
2052	0.00	0.00	0.00	0.00	28.78	29.64	58.41	50.66	30.08	623.03	76.31	28.40	148.56	369.77
2053	0.00	0.00	0.00	0.00	20.48	14.01	34.49	50.66	29.77	623.03	76.31	28.40	148.56	369.77
2054	0.00	0.00	0.00	0.00	16.71	23.35	40.06	50.66	29.47	623.03	76.31	28.40	148.56	369.77
2055	0.00	0.00	0.00	0.00	0.00	23.52	23.52	50.66	30.91	623.03	76.31	28.40	148.56	369.77
2056	0.00	0.00	0.00	0.00	0.00	0.35	0.35	50.66	46.07	623.03	76.31	28.40	148.56	369.77
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.66	30.36	623.03	76.31	28.40	148.56	369.77
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.66	45.54	623.03	76.31	28.40	148.56	369.77
2059	0.00	0.00	0.00	0.00	0.87	0.00	0.87	50.66	32.73	623.03	76.31	28.40	148.56	369.77
2060	0.00	0.00	0.00	0.00	0.87	0.00	0.87	50.66	43.52	623.03	76.31	28.40	148.56	369.77
2061	0.00	0.00	0.00	0.00	10.43	0.00	10.43	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2062	0.00	0.00	0.00	0.00	7.92	1.10	9.02	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2063	0.00	0.00	0.00	0.00	10.56	0.05	10.61	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2064	0.00	0.00	0.00	0.00	33.63	17.45	51.09	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2065	0.00	0.00	0.00	0.00	29.49	1.98	31.47	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2066	0.00	0.00	0.00	0.00	26.25	7.37	33.62	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2067	0.00	0.00	0.00	0.00	8.99	63.09	72.08	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2068	0.00	0.00	0.00	0.00	19.22	32.22	51.44	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2069	0.00	0.00	0.00	0.00	30.33	22.86	53.18	50.66	43.52	623.03	76.31	28.40	148.56	369.77
2070	0.00	0.00	0.00	0.00	0.01	13.13	13.14	50.66	29.81	623.03	76.31	28.40	148.56	369.77
2071	0.00	0.00	0.00	0.00	0.00	0.05	0.05	50.66	42.36	623.03	76.31	28.40	148.56	369.77
2072	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.66	26.92	623.03	76.31	28.40	148.56	369.77
2073	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.66	41.50	623.03	76.31	28.40	148.56	369.77
2074	0.00	0.00	0.00	0.00	2.65	0.00	2.65	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2075	0.00	0.00	0.00	0.00	2.65	0.00	2.65	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2076	0.00	0.00	35.48	0.00	32.34	0.00	67.82	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2077	0.00	0.00	48.46	0.00	16.97	0.00	65.43	50.66	40.63	623.03	76.31	28.40	148.56	369.77
2078	0.00	0.00	7.35	0.00	28.64	0.00	35.99	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2079	0.00	0.00	0.00	0.00	49.86	0.00	49.86	50.66	43.52	623.03	76.31	28.40	148.56	369.77
2080	0.00	0.00	0.00	0.00	65.74	0.00	65.74	50.66	28.07	623.03	76.31	28.40	148.56	369.77
2081	0.00	0.00	0.00	0.00	76.86	0.00	76.86	50.66	42.36	623.03	76.31	28.40	148.56	369.77
2082	0.00	0.00	0.00	0.00	9.06	0.00	9.06	50.66	26.92	623.03	76.31	28.40	148.56	369.77
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.66	42.36	623.03	76.31	28.40	148.56	369.77
2084	0.00	0.00	0.00	0.00	10.59	0.37	10.96	50.66	26.92	623.03	76.31	28.40	148.56	369.77
2085	0.00	0.00	0.00	0.00	10.24	1.59	11.83	50.66	42.36	623.03	76.31	28.40	148.56	369.77
2086	0.00	0.00	0.00	0.00	24.77	20.62	45.39	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2087	0.00	0.00	0.00	0.00	28.78	29.64	58.41	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2088	0.00	0.00	0.00	0.00	20.48	14.01	34.49	50.66	25.19	623.03	76.31	28.40	148.56	369.77
2089	0.00	0.00	0.00	0.00	16.71	23.35	40.06	50.66	28.07	623.03	76.31	28.40	148.56	369.77
2090	0.00	0.00	0.00	0.00	0.00	23.52	23.52	50.66	30.96	623.03	76.31	28.40	148.56	369.77
2091	0.00	0.00	0.00	0.00	0.00	0.35	0.35	50.66	28.07	623.03	76.31	28.40	148.56	369.77
Salvage Value	8.96	0.00	0.91	0.00	7.38	4.07	21.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	3120.46	2765.11	18.91	0.00	360.37	332.24	6597.08	622.81	522.66	12851.61	1678.54	461.77	2340.85	8370.44

Net Present Value 1103.9

K19/Gas30/250 MW – 1.5x DSM

TABLE 441
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	188.05	0.00	0.00	21.09	3.96	213.10	1.07	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	472.34	0.00	0.00	18.86	2.71	493.91	3.54	0.00	337.99	101.66	23.62	100.64	112.08
2016	0.00	637.34	0.00	0.00	25.81	3.95	667.09	6.87	0.00	370.94	99.74	25.44	106.45	139.31
2017	0.00	772.68	0.00	0.00	37.77	5.92	816.37	10.95	0.00	410.24	97.81	27.91	111.40	173.13
2018	0.00	544.83	0.00	0.00	39.70	17.76	602.29	13.96	0.00	413.90	95.26	29.57	115.88	173.18
2019	0.00	389.68	0.00	0.00	47.03	17.76	454.48	16.24	12.97	439.36	95.13	27.08	116.39	200.76
2020	0.00	159.12	0.00	0.00	0.01	18.42	177.55	17.12	13.22	642.08	102.83	22.38	114.53	402.35
2021	0.00	55.22	0.00	0.00	0.00	0.00	55.22	17.40	12.98	704.07	103.28	22.53	120.17	458.10
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	13.19	702.38	101.56	22.88	122.90	455.04
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	13.02	694.44	99.77	22.50	126.52	445.65
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.99	673.72	97.53	24.05	130.37	421.78
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.79	605.40	95.50	22.05	126.49	361.36
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.40	602.97	94.34	22.86	129.29	356.48
2027	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.40	12.44	566.55	92.39	21.63	127.58	324.94
2028	0.00	0.00	73.74	0.00	0.00	0.00	73.74	17.77	12.50	545.22	90.71	22.41	130.59	301.51
2029	0.00	0.00	100.76	0.00	9.06	0.00	109.82	18.32	15.19	538.64	90.22	18.51	130.45	299.46
2030	0.00	0.00	89.76	0.00	0.00	0.00	89.76	18.77	15.25	524.15	89.07	24.41	126.00	284.67
2031	0.00	0.00	101.73	0.00	71.35	0.00	173.08	19.63	15.25	519.68	87.81	25.98	128.83	277.07
2032	0.00	0.00	90.66	0.00	0.00	0.00	90.66	20.09	19.24	505.83	85.88	38.84	130.78	250.33
2033	0.00	0.00	102.75	0.00	0.00	0.00	102.75	20.60	19.24	499.46	84.49	42.97	138.94	233.05
2034	0.00	0.00	15.59	0.00	0.00	0.00	15.59	20.68	23.22	489.78	82.51	62.14	146.27	198.85
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.68	22.56	426.34	80.83	56.83	137.71	150.97
2036	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.68	22.57	386.68	78.23	67.84	146.85	93.77
2037	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.68	22.57	395.39	78.08	64.78	146.96	105.58
2038	0.00	0.00	77.51	0.00	0.00	0.00	77.51	21.06	22.58	367.34	75.89	76.21	155.91	59.33
2039	0.00	0.00	105.87	0.00	60.02	0.00	165.89	21.89	25.47	353.99	74.33	92.07	170.97	16.61
2040	0.00	0.00	177.45	0.00	0.00	0.00	177.45	22.78	26.58	351.25	73.27	106.87	174.23	-3.12
2041	0.00	0.00	233.16	0.00	0.00	0.00	233.16	23.95	26.58	337.37	71.93	118.93	178.93	-32.41
2042	0.00	0.00	104.43	0.00	9.06	0.00	113.49	24.51	26.58	335.33	71.04	133.47	182.23	-51.40
2043	0.00	0.00	7.68	0.00	0.00	0.00	7.68	24.55	33.68	369.93	69.53	184.87	172.86	-57.33
2044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.55	35.42	352.79	68.04	199.40	178.38	-93.03
2045	0.00	0.00	80.27	0.00	0.00	0.00	80.27	24.95	35.43	338.61	66.74	213.57	182.67	-124.37
2046	0.00	0.00	109.63	0.00	0.00	0.00	109.63	25.50	35.44	328.64	65.63	227.91	185.34	-150.25
2047	0.00	0.00	16.63	0.00	0.00	0.00	16.63	25.59	38.55	331.67	65.02	241.64	183.91	-158.90
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	37.69	306.74	63.18	266.59	190.38	-213.41
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
2050	0.00	0.00	0.00	0.00	10.24	0.33	10.57	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2051	0.00	0.00	0.00	0.00	24.77	0.98	25.75	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2052	0.00	0.00	0.00	0.00	28.78	1.46	30.24	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2053	0.00	0.00	0.00	0.00	20.48	4.39	24.87	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2054	0.00	0.00	0.00	0.00	16.71	4.39	21.10	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2055	0.00	0.00	0.00	0.00	0.00	4.55	4.55	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2058	0.00	0.00	73.74	0.00	0.00	0.00	73.74	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2059	0.00	0.00	100.72	0.00	0.00	0.00	100.72	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
2060	0.00	0.00	89.76	0.00	0.00	0.00	89.76	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2061	0.00	0.00	101.73	0.00	0.00	0.00	101.73	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2062	0.00	0.00	90.66	0.00	2.70	0.00	93.36	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2063	0.00	0.00	102.75	0.00	1.86	0.00	104.61	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2064	0.00	0.00	15.59	0.00	27.91	0.50	43.99	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2065	0.00	0.00	0.00	0.00	8.62	0.99	9.61	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2066	0.00	0.00	0.00	0.00	54.55	2.97	57.52	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2067	0.00	0.00	0.00	0.00	8.99	4.46	13.45	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2068	0.00	0.00	77.51	0.00	19.22	13.38	110.11	25.59	53.13	322.35	64.61	245.38	186.54	-174.19
2069	0.00	0.00	105.87	0.00	30.33	13.38	149.57	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
2070	0.00	0.00	177.45	0.00	0.01	13.87	191.33	25.59	39.42	322.35	64.61	245.38	186.54	-174.19
2071	0.00	0.00	233.16	0.00	0.00	0.00	233.16	25.59	39.42	322.35	64.61	245.38	186.54	-174.19
2072	0.00	0.00	104.43	0.00	0.00	0.00	104.43	25.59	39.42	322.35	64.61	245.38	186.54	-174.19
2073	0.00	0.00	7.68	0.00	0.00	0.00	7.68	25.59	38.55	322.35	64.61	245.38	186.54	-174.19
2074	0.00	0.00	0.00	0.00	45.02	0.00	45.02	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2075	0.00	0.00	80.27	0.00	0.00	0.00	80.27	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2076	0.00	0.00	109.63	0.00	0.00	0.00	109.63	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2077	0.00	0.00	16.63	0.00	9.06	0.00	25.69	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2081	0.00	0.00	0.00	0.00	17.84	0.00	17.84	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2084	0.00	0.00	0.00	0.00	10.59	0.16	10.75	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2085	0.00	0.00	0.00	0.00	10.24	0.33	10.57	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2086	0.00	0.00	0.00	0.00	24.77	0.98	25.75	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2087	0.00	0.00	0.00	0.00	28.78	1.46	30.24	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2088	0.00	0.00	73.74	0.00	20.48	4.39	98.61	25.59	37.69	322.35	64.61	245.38	186.54	-174.19
2089	0.00	0.00	100.72	0.00	31.71	4.39	136.82	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
2090	0.00	0.00	15.28	0.00	0.00	4.55	19.83	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
2091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.59	40.57	322.35	64.61	245.38	186.54	-174.19
Salvage Value	0.00	0.00	10.09	0.00	3.93	0.88	14.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	2765.11	544.47	0.00	241.06	60.94	3611.58	332.58	331.42	8480.04	1579.61	1443.42	2540.63	2916.39

Net Present Value 1139.20

K19/Gas34/250 MW – 4x DSM

TABLE 442
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	188.05	0.00	0.00	21.09	3.96	213.10	1.07	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	472.34	0.00	0.00	18.86	2.71	493.91	3.54	0.00	362.15	101.49	23.85	99.71	137.11
2016	0.00	637.34	0.00	0.00	25.81	3.95	667.09	6.87	0.00	407.33	99.58	25.77	104.96	177.02
2017	0.00	772.68	0.00	0.00	37.77	5.92	816.37	10.95	0.00	459.25	97.67	27.97	109.12	224.50
2018	0.00	544.83	0.00	0.00	39.70	17.76	602.29	13.96	0.00	477.99	95.19	29.55	112.77	240.48
2019	0.00	389.68	0.00	0.00	47.03	17.76	454.48	16.24	12.97	510.88	95.06	27.13	112.09	276.60
2020	0.00	159.12	0.00	0.00	0.01	18.42	177.55	17.12	13.22	720.42	102.73	22.24	109.45	486.00
2021	0.00	55.22	0.00	0.00	0.00	0.00	55.22	17.40	12.98	788.82	103.06	22.32	114.13	549.31
2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	13.19	794.51	101.33	22.74	116.40	554.03
2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	13.02	794.64	99.55	22.45	119.42	553.22
2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.99	777.81	97.26	24.36	123.02	533.18
2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.79	712.16	95.23	22.11	118.12	476.70
2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.40	717.65	94.23	23.21	120.16	480.05
2027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.44	683.77	92.22	22.00	118.49	451.05
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	12.50	660.25	90.38	23.67	121.86	424.34
2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	15.19	638.05	88.67	25.01	125.42	398.95
2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.40	11.27	619.78	87.91	21.85	120.38	389.64
2031	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.40	11.27	599.66	86.36	22.10	122.20	369.01
2032	0.00	0.00	75.23	0.00	0.00	0.00	75.23	17.78	11.27	572.36	84.82	22.00	121.90	343.64
2033	0.00	0.00	102.75	0.00	9.06	0.00	111.81	18.34	11.27	573.92	85.28	13.74	117.84	357.07
2034	0.00	0.00	15.59	0.00	0.00	0.00	15.59	18.41	15.25	538.00	82.49	27.57	126.02	301.92
2035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.41	14.59	469.20	80.36	27.67	119.98	241.18
2036	0.00	0.00	0.04	0.00	0.00	0.00	0.04	18.41	14.59	437.15	78.41	32.83	125.93	199.98
2037	0.00	0.00	77.13	0.00	0.00	0.00	77.13	18.80	14.59	419.57	76.83	38.21	134.10	170.43
2038	0.00	0.00	105.34	0.00	71.35	0.00	176.69	19.68	14.59	421.27	76.56	36.66	136.28	171.78
2039	0.00	0.00	93.88	0.00	0.00	0.00	93.88	20.15	21.47	410.79	75.21	51.01	150.04	134.54
2040	0.00	0.00	106.40	0.00	0.00	0.00	106.40	20.68	18.58	396.10	73.98	55.84	156.85	109.43
2041	0.00	0.00	94.82	0.00	0.00	0.00	94.82	21.16	22.56	379.46	72.31	74.14	164.23	68.78
2042	0.00	0.00	107.46	0.00	60.02	0.00	167.49	22.00	22.56	367.46	71.08	86.03	172.22	38.12
2043	0.00	0.00	180.13	0.00	0.00	0.00	180.13	22.90	26.56	350.85	69.34	109.24	178.00	-5.73
2044	0.00	0.00	236.68	0.00	0.00	0.00	236.68	24.08	28.30	335.33	68.00	121.85	182.87	-37.39
2045	0.00	0.00	106.00	0.00	9.06	0.00	115.06	24.65	28.30	319.05	66.41	147.46	187.97	-82.79
2046	0.00	0.00	7.80	0.00	0.00	0.00	7.80	24.69	35.42	365.49	65.60	189.57	175.13	-64.82
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	34.56	363.52	65.01	196.00	174.27	-71.76
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.70	337.08	63.14	218.34	181.88	-126.28
2049	0.00	0.00	0.00	0.00	10.59	0.16	10.75	24.69	36.59	355.37	64.58	201.30	177.10	-87.62
2050	0.00	0.00	0.00	0.00	10.24	0.33	10.57	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2051	0.00	0.00	0.00	0.00	24.77	0.98	25.75	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2052	0.00	0.00	0.00	0.00	28.78	1.46	30.24	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2053	0.00	0.00	0.00	0.00	20.48	4.39	24.87	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2054	0.00	0.00	0.00	0.00	16.71	4.39	21.10	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2055	0.00	0.00	0.00	0.00	0.00	4.55	4.55	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	36.60	355.37	64.58	201.30	177.10	-87.62
2060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2061	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2062	0.00	0.00	75.23	0.00	2.70	0.00	77.93	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2063	0.00	0.00	102.75	0.00	1.86	0.00	104.61	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2064	0.00	0.00	15.59	0.00	18.85	0.50	34.93	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2065	0.00	0.00	0.00	0.00	8.62	0.99	9.61	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2066	0.00	0.00	0.00	0.00	1.04	2.97	4.01	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2067	0.00	0.00	77.13	0.00	8.99	4.46	90.57	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2068	0.00	0.00	105.34	0.00	28.28	13.38	147.00	24.69	49.16	355.37	64.58	201.30	177.10	-87.62
2069	0.00	0.00	93.88	0.00	30.33	13.38	137.59	24.69	36.60	355.37	64.58	201.30	177.10	-87.62
2070	0.00	0.00	106.40	0.00	0.01	13.87	120.28	24.69	35.44	355.37	64.58	201.30	177.10	-87.62
2071	0.00	0.00	94.82	0.00	0.00	0.00	94.82	24.69	35.44	355.37	64.58	201.30	177.10	-87.62
2072	0.00	0.00	107.46	0.00	0.00	0.00	107.46	24.69	35.44	355.37	64.58	201.30	177.10	-87.62
2073	0.00	0.00	180.13	0.00	53.51	0.00	233.64	24.69	34.58	355.37	64.58	201.30	177.10	-87.62
2074	0.00	0.00	236.68	0.00	0.00	0.00	236.68	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2075	0.00	0.00	106.00	0.00	0.00	0.00	106.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2076	0.00	0.00	7.80	0.00	0.00	0.00	7.80	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2077	0.00	0.00	0.00	0.00	45.02	0.00	45.02	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	36.60	355.37	64.58	201.30	177.10	-87.62
2080	0.00	0.00	0.00	0.00	9.06	0.00	9.06	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2084	0.00	0.00	0.00	0.00	10.59	0.16	10.75	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2085	0.00	0.00	0.00	0.00	10.24	0.33	10.57	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2086	0.00	0.00	0.00	0.00	24.77	0.98	25.75	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2087	0.00	0.00	0.00	0.00	28.78	1.46	30.24	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2088	0.00	0.00	0.00	0.00	38.32	4.39	42.71	24.69	33.71	355.37	64.58	201.30	177.10	-87.62
2089	0.00	0.00	0.00	0.00	16.71	4.39	21.10	24.69	36.60	355.37	64.58	201.30	177.10	-87.62
2090	0.00	0.00	0.00	0.00	0.00	4.55	4.55	24.69	36.60	355.37	64.58	201.30	177.10	-87.62
2091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	36.60	355.37	64.58	201.30	177.10	-87.62
Salvage Value	0.00	0.00	8.29	0.00	4.01	0.88	13.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	2765.11	396.54	0.00	226.58	60.94	3449.17	319.85	287.64	9603.34	1576.05	1139.25	2399.82	4488.23

Net Present Value 1102.41

K24/Gas - 1.5x DSM

TABLE 443
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	188.05	0.00	0.00	21.09	0.00	209.14	1.05	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	3.77	0.00	0.00	18.86	0.00	22.63	1.16	0.00	339.36	101.65	23.62	100.63	113.47
2016	0.00	5.17	0.00	0.00	9.83	0.00	15.00	1.23	0.00	372.88	99.74	25.45	106.37	141.33
2017	0.00	5.23	0.00	0.00	9.83	0.00	15.07	1.31	0.00	414.54	97.97	27.49	110.70	178.37
2018	0.00	5.27	0.00	0.00	0.00	0.00	5.27	1.34	0.00	416.24	95.20	29.74	115.92	175.38
2019	0.00	5.30	0.00	0.00	1.33	0.00	6.62	1.37	0.00	404.70	93.24	26.54	119.20	165.72
2020	0.00	461.22	0.00	0.00	2.35	0.00	463.56	3.69	0.00	424.24	92.72	22.18	124.31	185.02
2021	0.00	656.36	0.00	0.00	12.30	0.00	668.66	7.03	0.00	454.77	90.69	22.21	127.26	214.61
2022	0.00	795.70	0.00	0.00	27.93	0.00	823.63	11.15	0.00	450.83	89.03	23.26	132.10	206.43
2023	0.00	561.06	0.00	0.00	39.70	0.00	600.76	14.15	0.00	455.80	87.72	23.96	140.47	203.65
2024	0.00	401.28	0.00	0.00	47.03	0.00	448.32	16.39	12.97	454.11	86.62	25.83	140.49	201.16
2025	0.00	163.86	0.00	0.00	0.01	0.00	163.87	17.21	13.22	516.53	92.78	22.84	117.18	283.73
2026	0.00	56.86	0.00	0.00	0.00	0.00	56.86	17.50	12.93	554.70	94.21	23.10	117.28	320.10
2027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.50	13.15	519.61	92.06	21.91	117.25	288.39
2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.50	12.97	490.51	89.87	23.83	119.91	256.91
2029	0.00	0.00	0.35	0.00	0.00	0.00	0.35	17.50	12.94	467.69	88.01	25.89	122.88	230.91
2030	0.00	0.00	74.48	0.00	0.00	0.00	74.48	17.87	12.72	457.70	87.84	20.53	115.13	234.21
2031	0.00	0.00	101.73	0.00	9.06	0.00	110.79	18.42	12.31	444.58	87.08	16.04	112.55	228.91
2032	0.00	0.00	15.48	0.00	0.00	0.00	15.48	18.50	16.30	407.65	84.49	27.16	113.82	182.18
2033	0.00	0.00	75.61	0.00	0.00	0.00	75.61	18.88	16.35	392.98	82.86	30.38	119.95	159.78
2034	0.00	0.00	103.26	0.00	71.35	0.00	174.61	19.75	19.03	390.60	81.98	30.68	122.68	155.26
2035	0.00	0.00	92.03	0.00	0.00	0.00	92.03	20.21	19.10	382.19	80.44	43.78	125.90	132.07
2036	0.00	0.00	104.29	0.00	0.00	0.00	104.29	20.73	19.10	364.28	78.93	48.56	129.49	107.30
2037	0.00	0.00	15.82	0.00	0.00	0.00	15.82	20.81	23.08	342.65	76.79	66.83	136.82	62.22
2038	0.00	0.00	77.51	0.00	0.00	0.00	77.51	21.20	23.08	324.85	75.22	74.16	143.13	32.34
2039	0.00	0.00	105.87	0.00	60.02	0.00	165.89	22.03	23.09	313.27	74.07	82.51	153.84	2.86
2040	0.00	0.00	177.45	0.00	0.00	0.00	177.45	22.92	26.43	294.29	72.27	103.61	159.09	-40.68
2041	0.00	0.00	233.16	0.00	0.00	0.00	233.16	24.08	26.43	276.98	70.86	115.19	163.96	-73.04
2042	0.00	0.00	104.43	0.00	9.06	0.00	113.49	24.65	26.44	265.70	69.41	137.43	171.61	-112.75
2043	0.00	0.00	7.68	0.00	0.00	0.00	7.68	24.69	33.55	300.10	68.55	173.60	158.77	-100.82
2044	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.69	36.44	288.69	67.23	187.04	165.16	-130.74
2045	0.00	0.00	80.27	0.00	0.00	0.00	80.27	25.09	33.56	278.45	66.02	200.97	170.32	-158.85
2046	0.00	0.00	109.63	0.00	0.00	0.00	109.63	25.64	33.57	271.28	65.02	214.87	173.07	-181.68
2047	0.00	0.00	16.63	0.00	0.00	0.00	16.63	25.72	37.55	274.75	64.46	228.32	171.68	-189.72
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	256.99	62.76	254.12	179.60	-239.49
2049	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	39.28	267.67	64.08	232.44	174.78	-203.63
2050	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	39.28	267.67	64.08	232.44	174.78	-203.63
2051	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	39.28	267.67	64.08	232.44	174.78	-203.63
2052	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	38.42	267.67	64.08	232.44	174.78	-203.63
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2054	0.00	0.00	0.00	0.00	0.76	0.00	0.76	25.72	40.44	267.67	64.08	232.44	174.78	-203.63
2055	0.00	0.00	0.00	0.00	0.41	0.00	0.41	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2056	0.00	0.00	0.00	0.00	14.94	0.00	14.94	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2057	0.00	0.00	0.00	0.00	18.94	0.00	18.94	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2058	0.00	0.00	0.00	0.00	20.48	0.00	20.48	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2059	0.00	0.00	0.00	0.00	16.71	0.00	16.71	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2060	0.00	0.00	74.48	0.00	0.00	0.00	74.48	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2061	0.00	0.00	101.73	0.00	0.00	0.00	101.73	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2062	0.00	0.00	15.43	0.00	0.00	0.00	15.43	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2063	0.00	0.00	75.61	0.00	0.00	0.00	75.61	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2064	0.00	0.00	103.26	0.00	0.00	0.00	103.26	25.72	40.44	267.67	64.08	232.44	174.78	-203.63
2065	0.00	0.00	92.03	0.00	0.00	0.00	92.03	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2066	0.00	0.00	104.29	0.00	9.06	0.00	113.35	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2067	0.00	0.00	15.82	0.00	2.70	0.00	18.52	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2068	0.00	0.00	77.51	0.00	1.86	0.00	79.38	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2069	0.00	0.00	105.87	0.00	72.36	0.00	178.23	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2070	0.00	0.00	177.45	0.00	8.62	0.00	186.07	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2071	0.00	0.00	233.16	0.00	1.04	0.00	234.20	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2072	0.00	0.00	104.43	0.00	8.99	0.00	113.42	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2073	0.00	0.00	7.68	0.00	19.22	0.00	26.90	25.72	53.00	267.67	64.08	232.44	174.78	-203.63
2074	0.00	0.00	0.00	0.00	75.35	0.00	75.35	25.72	40.44	267.67	64.08	232.44	174.78	-203.63
2075	0.00	0.00	80.27	0.00	0.01	0.00	80.28	25.72	39.28	267.67	64.08	232.44	174.78	-203.63
2076	0.00	0.00	109.63	0.00	0.00	0.00	109.63	25.72	39.28	267.67	64.08	232.44	174.78	-203.63
2077	0.00	0.00	16.63	0.00	9.06	0.00	25.69	25.72	39.28	267.67	64.08	232.44	174.78	-203.63
2078	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	38.42	267.67	64.08	232.44	174.78	-203.63
2079	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2080	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2081	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2084	0.00	0.00	0.00	0.00	27.67	0.00	27.67	25.72	40.44	267.67	64.08	232.44	174.78	-203.63
2085	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2086	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2087	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2089	0.00	0.00	0.00	0.00	15.01	0.00	15.01	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
2091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.72	37.55	267.67	64.08	232.44	174.78	-203.63
Salvage Value	0.00	0.00	7.51	0.00	3.10	0.00	10.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	2230.92	509.25	0.00	207.07	0.00	2947.24	269.28	274.75	7031.66	1530.93	1359.51	2438.76	1702.46

Net Present Value 1-17942

K30/Gas – 4x DSM

TABLE 444
ECONOMIC SUMMARY
NFAT 2013

Energy Price Reference
Discount Rate Reference
Capital Cost Reference

	Capital and Related Costs (Millions of 2014$)									Net Average Flow Related Revenue (Millions of 2014$)				
	Conawapa	Keeyask	Thermal	Wind	Transmission		Total	Capital	Fixed	Gross	Water	Thermal	Power	Net
FYB	GS	GS	GS	GS	GOT	US T/L	Capital	Taxes	O&M	Revenue	Rental	Burn	Purchases	Revenue
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	188.05	0.00	0.00	21.09	0.00	209.14	1.05	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	3.77	0.00	0.00	18.86	0.00	22.63	1.16	0.00	363.33	101.47	23.85	99.65	138.36
2016	0.00	5.17	0.00	0.00	9.83	0.00	15.00	1.23	0.00	409.09	99.54	25.79	104.88	178.87
2017	0.00	5.23	0.00	0.00	9.83	0.00	15.07	1.31	0.00	463.75	97.87	27.51	108.34	230.03
2018	0.00	5.27	0.00	0.00	0.00	0.00	5.27	1.34	0.00	481.11	95.10	29.68	112.85	243.48
2019	0.00	5.30	0.00	0.00	0.00	0.00	5.30	1.36	0.00	478.84	93.13	26.90	115.71	243.11
2020	0.00	5.33	0.00	0.00	0.00	0.00	5.33	1.39	0.00	509.50	92.59	22.69	120.46	273.76
2021	0.00	5.36	0.00	0.00	0.00	0.00	5.36	1.42	0.00	486.56	90.80	21.89	123.87	250.00
2022	0.00	5.39	0.00	0.00	0.00	0.00	5.39	1.44	0.00	478.35	89.17	22.68	126.76	239.74
2023	0.00	5.42	0.00	0.00	0.00	0.00	5.42	1.47	0.00	475.44	87.63	23.03	131.08	233.70
2024	0.00	5.45	0.00	0.00	0.00	0.00	5.45	1.50	0.00	454.60	85.65	24.17	135.22	209.55
2025	0.00	5.49	0.00	0.00	1.33	0.00	6.81	1.53	0.00	388.62	83.87	21.13	132.13	151.49
2026	0.00	444.64	0.00	0.00	2.35	0.00	446.98	3.77	0.00	385.78	82.87	21.96	134.49	146.46
2027	0.00	679.89	0.00	0.00	12.30	0.00	692.19	7.23	0.00	389.12	81.07	20.39	131.48	156.18
2028	0.00	824.23	0.00	0.00	27.93	0.00	852.16	11.49	0.00	361.10	79.02	23.70	134.86	123.51
2029	0.00	581.18	0.00	0.00	39.70	0.00	620.88	14.59	0.00	332.62	77.37	26.17	138.75	90.32
2030	0.00	415.67	0.00	0.00	47.03	0.00	462.71	16.91	12.97	345.90	78.24	21.59	126.41	119.66
2031	0.00	169.74	0.00	0.00	0.01	0.00	169.74	17.75	13.22	503.15	83.66	22.23	109.11	288.14
2032	0.00	58.90	0.00	0.00	0.00	0.00	58.90	18.05	12.93	507.88	83.65	22.08	108.01	294.14
2033	0.00	0.00	0.35	0.00	0.00	0.00	0.35	18.05	13.15	479.15	82.03	22.94	111.12	263.06
2034	0.00	0.00	75.98	0.00	0.00	0.00	75.98	18.43	12.97	447.27	80.45	22.93	112.98	230.91
2035	0.00	0.00	103.78	0.00	9.06	0.00	112.84	18.99	12.94	426.47	79.72	19.12	111.22	216.41
2036	0.00	0.00	15.79	0.00	0.00	0.00	15.79	19.07	16.70	392.50	77.38	32.82	116.91	165.38
2037	0.00	0.00	77.13	0.00	0.00	0.00	77.13	19.46	16.28	370.81	75.81	37.50	123.61	133.89
2038	0.00	0.00	105.34	0.00	71.35	0.00	176.69	20.34	16.30	358.07	74.96	38.58	126.35	118.18
2039	0.00	0.00	93.88	0.00	0.00	0.00	93.88	20.81	20.34	341.50	73.54	52.61	137.99	77.37
2040	0.00	0.00	106.40	0.00	0.00	0.00	106.40	21.34	23.02	323.08	72.23	59.10	144.55	47.19
2041	0.00	0.00	94.82	0.00	0.00	0.00	94.82	21.82	23.08	309.87	70.87	77.85	148.92	12.23
2042	0.00	0.00	107.46	0.00	0.00	0.00	107.46	22.35	23.08	301.97	69.88	86.36	155.71	-9.97
2043	0.00	0.00	180.13	0.00	0.00	0.00	180.13	23.25	27.06	289.85	68.28	107.98	162.47	-48.88
2044	0.00	0.00	236.68	0.00	0.00	0.00	236.68	24.44	27.07	277.18	67.00	118.87	168.83	-77.51
2045	0.00	0.00	106.00	0.00	9.06	0.00	115.06	25.01	27.08	275.61	66.24	131.95	169.84	-92.42
2046	0.00	0.00	7.80	0.00	0.00	0.00	7.80	25.05	33.53	301.06	64.91	177.52	159.52	-100.88
2047	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	290.99	63.75	191.42	164.77	-128.94
2048	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	278.98	62.51	206.90	169.53	-159.96
2049	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2050	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	36.42	290.35	63.72	191.95	164.61	-129.93
2051	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2052	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2053	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2054	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2055	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	35.27	290.35	63.72	191.95	164.61	-129.93
2056	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	35.27	290.35	63.72	191.95	164.61	-129.93
2057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	35.27	290.35	63.72	191.95	164.61	-129.93
2058	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	34.40	290.35	63.72	191.95	164.61	-129.93
2059	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2060	0.00	0.00	0.00	0.00	0.76	0.00	0.76	25.05	36.42	290.35	63.72	191.95	164.61	-129.93
2061	0.00	0.00	0.00	0.00	0.41	0.00	0.41	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2062	0.00	0.00	0.00	0.00	14.94	0.00	14.94	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2063	0.00	0.00	0.00	0.00	18.94	0.00	18.94	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2064	0.00	0.00	75.98	0.00	20.48	0.00	96.46	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2065	0.00	0.00	103.78	0.00	16.71	0.00	120.48	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2066	0.00	0.00	15.74	0.00	0.00	0.00	15.74	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2067	0.00	0.00	77.13	0.00	0.00	0.00	77.13	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2068	0.00	0.00	105.34	0.00	0.00	0.00	105.34	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2069	0.00	0.00	93.88	0.00	0.00	0.00	93.88	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2070	0.00	0.00	106.40	0.00	9.06	0.00	115.46	25.05	36.42	290.35	63.72	191.95	164.61	-129.93
2071	0.00	0.00	94.82	0.00	0.00	0.00	94.82	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2072	0.00	0.00	107.46	0.00	0.00	0.00	107.46	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2073	0.00	0.00	180.13	0.00	56.22	0.00	236.34	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2074	0.00	0.00	236.68	0.00	1.86	0.00	238.54	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2075	0.00	0.00	106.00	0.00	18.85	0.00	124.86	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2076	0.00	0.00	7.80	0.00	8.62	0.00	16.41	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2077	0.00	0.00	0.00	0.00	1.04	0.00	1.04	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2078	0.00	0.00	0.00	0.00	8.99	0.00	8.99	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2079	0.00	0.00	0.00	0.00	19.22	0.00	19.22	25.05	48.98	290.35	63.72	191.95	164.61	-129.93
2080	0.00	0.00	0.00	0.00	39.39	0.00	39.39	25.05	36.42	290.35	63.72	191.95	164.61	-129.93
2081	0.00	0.00	0.00	0.00	0.01	0.00	0.01	25.05	35.27	290.35	63.72	191.95	164.61	-129.93
2082	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	35.27	290.35	63.72	191.95	164.61	-129.93
2083	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	35.27	290.35	63.72	191.95	164.61	-129.93
2084	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	34.40	290.35	63.72	191.95	164.61	-129.93
2085	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2086	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2087	0.00	0.00	0.00	0.00	9.83	0.00	9.83	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2088	0.00	0.00	0.00	0.00	17.84	0.00	17.84	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2089	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
2090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	36.42	290.35	63.72	191.95	164.61	-129.93
2091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.05	33.53	290.35	63.72	191.95	164.61	-129.93
Salvage Value	0.00	4.98	8.53	0.00	3.22	0.00	16.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PV @ 5.40%	0.00	1734.87	388.34	0.00	156.67	0.00	2279.88	207.57	200.96	7211.11	1494.10	1104.18	2380.38	2232.44

Net Present Value 1196

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REPORT ON EXPORT PRICES AND REVENUES
RELATING TO
THE NEED FOR AND ALTERNATIVES TO (NFAT)
MANITOBA HYDRO'S PREFERRED DEVELOPMENT PLAN

Report by:

Potomac Economics, Ltd.
Independent Expert Consultant

POTOMAC ECONOMICS

January 15, 2014

PUBLIC VERSION
COMMERCIALLY-SENSITIVE INFORMATION REDACTED

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Executive Summary

A. Overview

Manitoba Hydro is seeking government approval of its preferred development plan for investments in generation and transmission capacity in order to support domestic load growth and expand opportunities in export markets.

The Manitoba Public Utilities Board ("PUB") was asked by the Government of Manitoba to conduct a Needs For and Alternatives To ("NFAT") review of the Manitoba Hydro development plan. A panel of PUB members ("the NFAT Panel") was selected by the PUB Chair to conduct the review. In order to proceed with its review, the NFAT Panel will use evidence presented by Manitoba Hydro, interveners, and independent experts provided by PUB. Potomac Economics is one of the PUB independent experts and our report addresses expected export market conditions in the markets administered by the Mid-Continent Independent System Operator ("MISO"). The MISO markets are the primary source of export revenues for the preferred development plan.

Potomac Economics is the Independent Market Monitor for the MISO. In this role, we closely monitor prices, investments, market structure, and market outcomes. We are also the Independent Market Monitor for ISO-New England, the New York ISO, and ERCOT (Texas). We rely on this broad experience with the development and performance of wholesale electricity markets to conduct this study.

Manitoba Hydro's preferred development plan establishes generation capacity which exceeds the projected domestic load requirements for a significant period of time. The excess capacity, along with other investments in the plan to expand transmission ties to the US, would support export sales. According to the plan, by building larger plants and using the excess capacity to support export sales, the cost of meeting the growing domestic load in Manitoba is lower than if capacity was built to meet load growth alone. The preferred development plan is expected to deliver the expected benefits if actual conditions meet certain critical projections. Among these critical projections is the revenue that can be earned from sales of energy and capacity to the MISO markets in the US. These revenues are based on export price forecasts from six consultants

retained by Manitoba Hydro. Our report assesses the price forecasts and other associated issues that form the basis for Manitoba Hydro's projected MISO export revenues.

In order to assess Manitoba Hydro's price forecasts, we developed our own price forecast based on a method and approach that we find to be a reasonable and transparent. Our method is based on forecasts of key drivers of MISO market prices. These key drivers are fuel prices, load growth, generation retirement and additions, new-build generation capital and operating costs, environmental regulations, and congestion.

Manitoba Hydro's six consultants based their forecasts on essentially the same key drivers. However, we believe certain assumptions made by the consultants tended to overstate the level of future prices. Due to limits on the availability of the underlying data from the consultants' models, we were not able to perform a detailed review of the consultants' models nor could we adjust the specific assumptions in the consultants' forecasts to address differences. As result, we provide an alternative forecast and recommend that these forecasts be used to assess revenues projected under the development plans.

B. Summary of Results

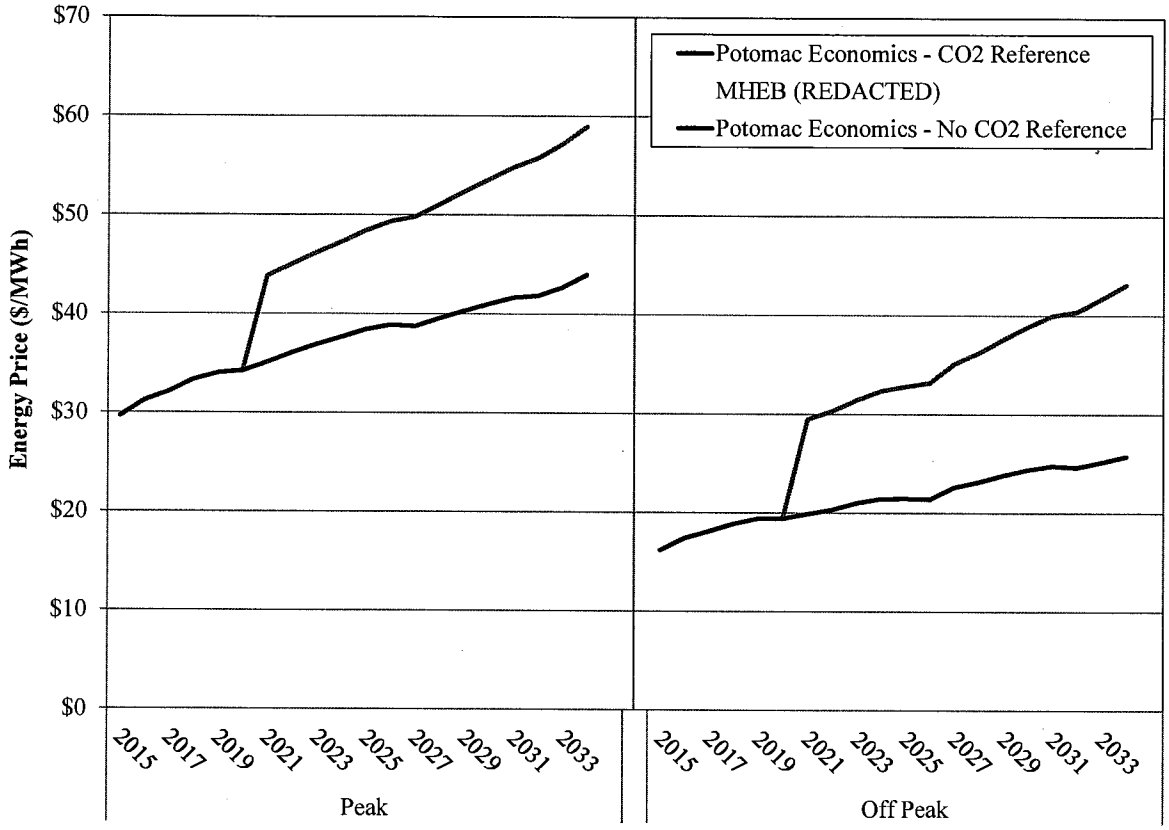
Our forecast is based on MISO supply and demand characteristics and recent market outcomes. Changes in these characteristics and outcomes are forecasted for future years based on assumptions regarding the evolution of key drivers noted above.

Our results generally forecast lower prices than Manitoba Hydro's consultants due to assumptions on key inputs. In particular, our models generally rely on lower natural gas price forecasts, lower growth rates of demand, and lower quantities of coal plant retirements. As explained herein, our point-of-view on these key assumptions is based on the reference case used by the US Energy Information Agency (EIA) in its 2013 Annual Energy Outlook.

Figure 1 shows our two reference case forecasts for on-peak energy and off-peak energy prices compared to the Manitoba Hydro reference price forecasts. Manitoba Hydro's reference price forecast is the composite of its six consultants' forecasts. We produce two reference case forecast in order to reflect two CO2 price scenarios – one scenario is based on the reference

forecast of Mr. Craig Sabine of MNP, and the other is a reference case with no CO2 costs. We explain these various cases in Section II.

Figure 1: MH and Potomac Economics Reference Case Energy Forecasts

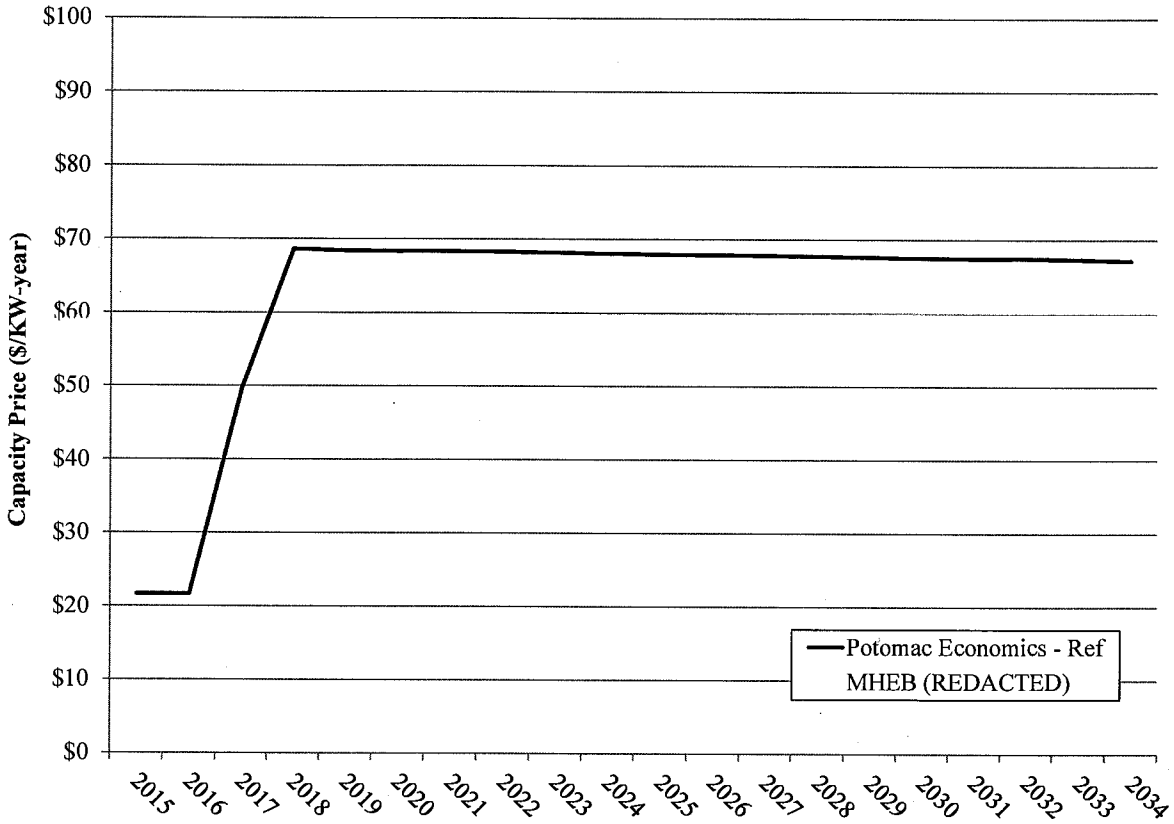


As the figure shows, the Manitoba Hydro forecasts [redacted] for both on-peak and off-peak energy prices, although our reference forecas[redacted] [redacted] forecast period for on-peak energy. In this report, we will explain how we developed our price series and why they are different from the Manitoba Hydro prices.

We also forecast capacity prices, which are based on our estimate of the net cost of new entry ("net CONE"). We assume that when surplus capacity dissipates, the capacity price will rise to the level necessary to incent the construction of new resources. As we explain herein, this capacity price is at most the net CONE of a new peaking resource, which is equal to the resource's cost of new entry less the variable profit it would earn in the MISO's energy and ancillary services markets. However, in the short-run, we do not expect the market to support

the net CONE. Figure 2 shows the comparison of our reference case capacity price forecast and Manitoba Hydro's forecast.

Figure 2: MH and Potomac Economics Reference Case Capacity Forecasts



As the figure shows, our price [redacted] estimates by Manitoba Hydro. The main reason for this is our assumptions regarding the cost of new entry. Our assumptions regarding the costs to build an advanced combustion turbine [redacted] that assumed by Manitoba Hydro consultants. We note that the capacity prices that we forecast [redacted] han that which Manitoba Hydro can actually achieve, due to regulatory and other constraints, discussed herein.

We present forecasts for energy and capacity prices under four scenarios that examine alternative assumptions. In addition to our two reference cases, we examine alternative assumptions concerning natural gas prices and economic growth. Changes in these assumptions can substantially affect Manitoba Hydro's forecasted revenues.

C. Organization of Report

We were asked by the PUB to provide an Independent Expert Report on MISO market conditions that Manitoba Hydro will face under its proposed development plan. Because the critical factor in the MISO markets is prices, the main part of our report is in the following three sections:

Section I discusses the price forecasts used by Manitoba Hydro;

Section II presents our own forecasts for energy prices; and

Section III presents our own forecasts for capacity prices.

In addition to assessing the price forecasts, we also assess issues associated with other expected market conditions that affect future export prospects. These other issues include: (2) developments in neighboring regions; and (3) export volumes and pricing. These other issues are discussed in Section IV.

I. THE CONSULTANTS' PRICE FORECASTS

Manitoba Hydro used six external consultants to produce price forecasts for its financial model. These six forecasts are used on an equal-weight basis to establish a single consolidated forecast. In this section, we review and discuss the six forecasts.

A. Products

The company expects to sell an on-peak energy product, an off-peak energy product, and a long-term "dependable" product. The on- and off-peak products are assumed to be priced based on the consultants' on- and off-peak price forecasts. The long-term dependable product is assumed to include a capacity component. Accordingly, Manitoba Hydro asked the consultants for 20-year forecasts for the period 2015-2034 for on-peak energy, off-peak energy, and capacity prices.

B. Summary of Consultants' Forecasts

The six consultants use variations on a common approach to forecast energy prices. The approach uses a so-called "fundamentals" model that basically attempts to simulate the energy dispatch of the electrical system to determine which units are on margin during each hour of the year. The hourly prices simulated for on-peak periods are the basis for the on-peak prices and the hourly prices simulated in the off-peak periods are the basis for the off-peak prices.

The consultants generally use the forecasted energy prices and the estimated cost of new entry for a new peaking resource to forecast capacity prices. In particular, the forecasted capacity price in each year is generally equal to the annual fixed cost of new entry less the anticipated "net revenues" earned by a peaking unit. Net revenues are the revenues a unit would earn in MISO's energy and ancillary services market in excess of its variable production costs. This net revenue approach is a reasonable way to forecast the capacity price. It is important to recognize that the MISO does not currently have a well-functioning capacity market that would establish prices consistent with this net revenue methodology. Nonetheless, one may assume that Manitoba Hydro may be able to sign bilateral contracts to sell capacity at these price levels to load-serving entities in MISO that would otherwise be short of capacity. There is some uncertainty about this assumption which is discussed in Section III.

The following is the list of consultants and the summary of the results of their analysis and our discussion of their process and results. The consultants each provided forecasts of off- and on-peak energy prices and annual capacity prices. The consultants provided a "reference case" and most consultants provided a "low" and "high" case. Our discussion of the consultants' models is confined to the on-peak energy price and the capacity prices associated with the "reference case." The issues identified with the reference case also tend to adversely affect the consultants "high"- and "low" cases in comparable ways. Similarly, the problems we see with the on-peak energy price estimates, also affect the off-peak estimates in the same manner. Therefore, we focus on the areas of concern associated with the reference case for on-peak energy and capacity.

At the outset, we note that detailed information regarding each of the consultants' models, assumptions, and output was limited. We generally only received high-level representations of the models and inputs. This limited our ability to critically review the consultants' results and ultimately compelled us to produce our own forecast. Nonetheless, we briefly summarize each of the six consultants' forecasts in the following subsections.

1. The Brattle Group

The Brattle Group forecasts reference case on-peak energy prices in the near term just under $40/MWh until about 2020, then increase to over $60/MWh by the end of the 20-year forecast period. As indicated above, the forecast is based on a simulated dispatch of the system using a variety of assumptions. Given our limited information regarding the model and assumptions, it is not straightforward to determine exactly what drives the price forecast. However, we note three key assumptions used by the consultant (and which generally are the key assumptions used by all of the consultants). The first is the assumed introduction of carbon taxes in 2020. This starts at $15/ton and grows until 2034 to about $24/ton. The second key assumption is the increase in the price of input fuel -- natural gas prices increase by 60 percent over the 20-year period. This has an impact on the on-peak price directly, but is also interconnected with the third key assumption, which is the retirement of coal plants. Lower coal capacity causes natural gas-fired units to be on the margin in more hours. Both the additional hours on the margin and the higher natural gas prices will cause energy prices to be higher. Brattle did not report MISO-wide retirements in its work papers. It reports MRO-West retirements because its forecast model focuses on the MRO West sub-region of MISO. However, a report by Brattle in 2013 indicates

between 11 and 16 GW of MISO coal plant retirements. This level of MISO coal plant retirements is substantially above the level we assume in our reference case. As explained below, we assume 6 GW of MISO-wide coal plant retirements. The emissions and fuel cost assumption along with the high level of coal plant retirements are likely to overstate energy prices.

Capacity prices are based on the least-cost capital investment needed to meet planning reserves over the 20-year horizon. The annual fixed cost of this investment (primarily capital carrying costs) net of revenues earned in the energy markets, establishes the capacity price for each year. This is affected primarily by the energy price forecast and the net retirement, but also capital costs of new facilities. As a noted above, this approach assumes Manitoba Hydro will sell capacity to utilities in MISO on a bilateral basis to meet the utilities' planning reserve requirements, rather than selling in the short-term capacity market presently existing in MISO.

Capacity prices estimated by Brattle are zero until 2019, reflecting an assumed capacity surplus in MISO until that time. After 2019, the price rises to over $70/kW-year. The Brattle work papers do not specify what type of unit is setting the capacity price in a given year. However, the capacity price is consistent with the capital cost identified by the consultant for both the natural gas-fired combustion turbine and the natural gas-fired combined cycle plant ($1200/kW net of modest energy market revenues). Both the CT and the CC are assumed to have capital cost of about $1200/kW, which is roughly $120/kW-year in carrying and fixed costs. The lower value of $70/kW-year could reasonably reflect variable profits in the energy markets.

[redacted]. In particular, the consultant assumes a cost of $1200/kW for a CT, whereas the EIA has identified an advanced CT as having a capital cost of approximately $700/kW. This would have a significant effect on the consultant's capacity prices. EIA's estimate of the advanced combined cycle plant ($1000) and the conventional combined cycle plant ($900/kWh) are also somewhat lower than the estimated cost used by the consultants.[1]

[1] See, EIA, "Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants", April 2013, http://www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf

We believe the emissions and fuel cost forecasts assumptions may overstate the expected cost profile of fossil-fuel fired resources and, thus, overstate energy prices. This may also understate capacity prices since net revenues would likely decline under a projection of lower energy prices. But this effect is confounded by the apparent overstatement of generator capital costs. Based on the information provide, we are not able to disentangle these countervailing effects and so we cannot recommend using the Brattle estimates as a basis of future prices.

2. [redacted]

[redacted]

3. [redacted]

[redacted]

[redacted]

C. Conclusions on Consultants' Price Forecast.

In general, the key assumptions used by the Consultants [redacted] This is particularly the case with respect to (1) natural gas prices, load growth, coal retirements, and cost of new entry. With respect to CO2 prices, our reference case assumptions tend to be [redacted] We explain our forecasting approach in the next section. In the Tables below, we compare our forecasts to the consultants.

The Table below shows a comparison among the six consultants along with our own forecasts of (1) on-peak energy; (2) off-peak energy; and (3) capacity.

Figure 3: Comparison of Reference Case On-Peak Energy Prices

REDACTED

Figure 4: Comparison of Reference Case Off-Peak Energy Prices

REDACTED

Figure 5: Comparison of Reference Case Capacity Prices

REDACTED

D. Composite Forecasts and Alternative Cases

Manitoba Hydro used the consultant's price forecast to create a single composite forecast, which is basically an average of the consultants' forecasts. The following three charts show the composite price forecasts for the three power products (1) on-peak energy; (2) off-peak energy; and (3) capacity. In each case, we show the Manitoba Hydro composite forecast the consultants' reference case as well as the composite "high" and "low" forecast cases. We also show our reference case and the "high" and "low" alternatives for each forecast.

The low and high case alternatives were produced by each consultant at the request of Manitoba Hydro. Manitoba Hydro required plausible scenarios that could represent the lower and upper limits of pricing trends. While we also produce two alternative cases, our cases are based on likely alternatives that together with the reference case, represent a large range of probable outcomes. In other words, we expect that future prices are very likely to fall within the bounds of our three forecast scenarios.

Figure 6: Manitoba Hydro On-Peak Energy Price Forecasts

REDACTED

Figure 7: Manitoba Hydro Off-Peak Energy Price Forecasts

REDACTED

Figure 8: Manitoba Hydro Capacity Price Forecasts

REDACTED

II. POTOMAC ECONOMICS ENERGY PRICE FORECAST

Because detailed information regarding the consultants' models, input data, and results was not available to Potomac Economics, we evaluated their reasonableness by comparing their forecasts to a range of forecasts we developed. This section of the report describes our methodology and provides a detailed discussion of the results.

A. Overview of Forecast Model

Our forecast is based on historical publicly-available market outcomes in the MISO markets for 2011 and 2012. Our approach uses these actual day-ahead market results and adjusts them to anticipated changes in future market conditions, such as fuel prices, capacity, carbon taxes, and load growth. The MISO market data we use includes hourly data on system load and capacity, system marginal price, and supply offers. The day-ahead supply offers specify offer price, offered quantity (MW), fuel, and whether the offer was accepted. By stacking the offers in accordance with energy offer price we establish an hourly supply curve. We adjust the hourly supply curves to account for changes in fuel costs, new capacity additions and retirements, and carbon taxes. Hence, we establish a supply curve for all future hours in the twenty-year forecast horizon (2015-2034). Using actual hourly generation demand and assumptions regarding the growth of load, we establish forecasted load in every hour of the forecast horizon. Based on the intersection the hourly supply curve and the hourly system load (along with some operational adjustments described below), we can establish a system marginal price for each hour of the twenty-year forecast period. These hourly prices are the basis for our on-peak and off-peak energy prices.

Locational Marginal Prices. The prices estimated using the hourly supply curves are the system marginal prices ("SMP"). They do not reflect the locational marginal prices (LMP) that would be received by a seller of power at various locations in MISO. Congestion and marginal losses will cause a locational price to be different from the SMP. Therefore, we compute a locational marginal price at the Manitoba interface with MISO by subtracting losses and congestion costs from the SMP. Congestion costs are estimated based on the historical relationship between congestion and factors that tend to explain their level, such as time of day, generation, load

levels, and exports from Manitoba Hydro to MISO. We use the historical average marginal losses as the estimate of future losses.

Capacity Prices. Capacity prices are estimated based on the net cost of new entry (net CONE). This net CONE is the annual carrying cost and other fixed cost of a new combustion turbine less the variable profits earned in the MISO energy and ancillary services markets. Based on the heat rate of a new combustion turbine (CT), any hour when the SMP is above the variable energy cost for the CT, the difference in marginal energy cost and the LMP is the net revenue for that hour. The resulting total net revenues are deducted from the annual fixed cost of the new unit to arrive at the estimated capacity price. The estimated price is the amount an investor would need to be paid to profitably enter the market with the prospect of earning MISO energy and ancillary services revenues. However, this price is relevant only if capacity is needed. In times of capacity surplus, the capacity price is likely to be less than this price and, indeed, sometimes close to zero. This presents a substantial risk for Manitoba Hydro that its capacity revenues may be much lower than expected.

B. Specifics of Forecast Model

1. Hourly Supply Curves and Demand

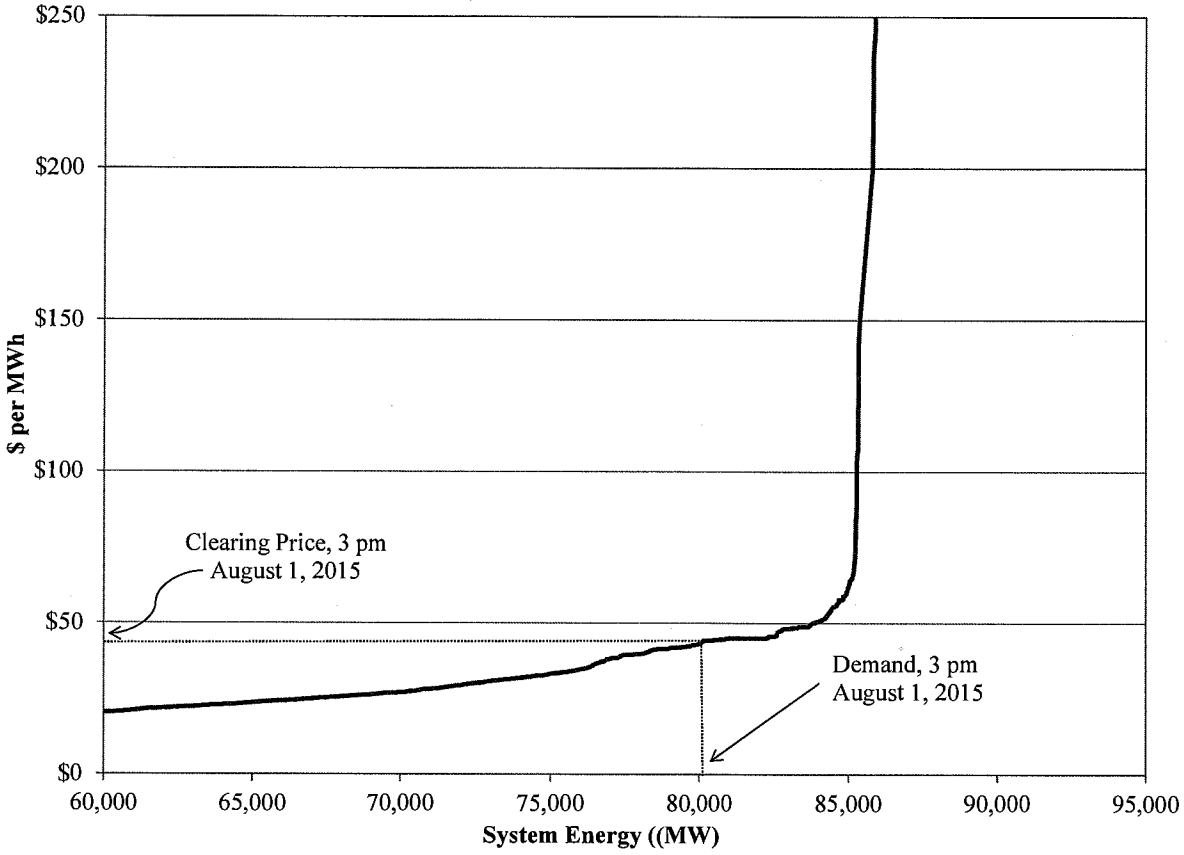
Our forecast model uses two years of historical MISO market data and creates two forecasts for each hour for the forecast period 2015-2034. There are two forecast for each hour, one based on 2011 hourly market data and the other on 2012 hourly market data. We average the two forecasts to get the forecast for each future hour.

For each historical hour, the day-ahead MISO data contains an offer curve for each resource that indicates the quantity, fuel type, and offer price (for start-up, energy, and ancillary services). We use these offers to establish an hourly supply curve for each historical hour, which is a simple stack of the MW offers in ascending order of offer price for each MW block.

We next use hourly generation demand to identify where system demand intersects the historical supply curve for each historical hour. Hourly system demand also is publicly available from MISO. It contains day-ahead system demand as well as net imports so that we can identify the hourly load that was served by the available supply in each historical hour. Comparing the

hourly load level to the supply curve identifies which unit would supply the last MW of load under the assumption that all units are dispatched fully.

Figure 9: Supply Curve for August 2015



Note: The "clearing price" shown is the basis of the forecast SMP. To arrive at the SMP, the clearing price is increased to reflect operational issues. This increase is derived from the historical clearing price and the historical SMP for each hour.

This marginal unit representing the direct intersection of the hourly supply curve and the hourly load is not likely to be the one that actually sets the system marginal price. This is because of operational constraints. Operational constraints occur as a result of constraints in the operation of generators. There are a number of operating constraints that may cause the strict stacking of units from low to high marginal cost not to match the actual dispatch. First, units may not be fully dispatched due to ramp limits in a given hour. In such a case, units may be dispatched at a higher or lower output level than would be indicated by running costs alone. A high cost unit may also be running because it is meeting a minimum run time. Such a unit may be more expensive than other units not fully running because the more expensive unit is needed in some

future hour and needs to be started in advance. Or the more expensive unit was needed in a recent hour and needs some time to turn down or turn off.

In each hour, MISO publishes the day-ahead SMP. With the SMP we can identify the unit that sets the marginal price on the historical hourly supply curves. Because this is rarely the unit that would clear in a "pure" sense from stacking the units against demand, in each historical hour we measure the movement up the supply curve that was necessary for MISO to undertake to dispatch the system in that hour given the operational restrictions it must accommodate. This value is expressed as a percentage increase in the energy "clearing" price. We retain this value, which we call the hourly "operational adjustment," because it is important for estimating the market clearing price for future periods.

2. Clearing the Hourly Forward Market in Future Hours

To clear the hourly market, and establish the forecast price for that hour, we adjust each historical hourly supply curve based on anticipated changes in key supply variables (fuel costs, etc.). We explain the evolution of the supply curve over the time horizon below. We also assume load grows at certain rates. Hence, in every future hour, we have (1) the estimated forecast hour supply curve; (2) the forecast hourly load; and (3) the "operational adjustment" (based on historical movement along the supply curve to clear the market, described above). Matching the estimated supply curve to the forecast demand for each hour, we identify the marginal unit in a "pure" market clearing. We then adjust the forecasted price by a percentage amount equal to the "operational adjustment," discussed above, to account for operating constraints. The resulting price is the forecast SMP for that hour.

3. Formation of Supply Curves

The process of clearing the hourly market described in the previous subsection is based on estimated supply and demand. The estimated supply curves for future hours evolve from the historical supply curves. If all key supply variables remained fixed, then the forecast of each future hour would be identical to the base historical hours from 2011-2012. However, of course, key variables change. In particular, we create new supply curves for each hour based on projections of (1) fuel prices; (2) additions and retirements of generating capacity; (3) load growth; and (4) carbon taxes. In addition, we make assumptions about the cost of new capacity

in order to estimate the cost of new entry to support the capacity price forecasts. We discuss the particular projections of these key assumptions in the next subsection. In this section, we describe how the supply curves change as a result of the key assumptions.

Fuel Prices. When fuel prices change, the marginal cost of producing energy from a resource using that fuel will change. In a competitive market, suppliers submit offers that are consistent with their marginal costs. Therefore, the offer prices of the unit will change as fuel prices change. Hence, each hourly supply curve in a given year will change based on the change in fuel prices for that year compared to the historical year.

CO2 Prices. CO2 prices are projected for potential changes in law regarding green-house-gas emissions.[2] CO2 prices are based on cost per ton of CO2 output. Coal and natural gas have specific CO2 content. According to the US EPA, Average CO2 output of a coal unit is 1.02 (metric)\tons/MWH and for a natural gas units about 0.516 tons/MWh.[3] This emissions rate is multiplied by the CO2 price forecast for each year to estimate the additional cost to be added to the unit's offer curve. For example, the CO2 price in 2021 is projected to be $13.14/(metric) ton. Therefore, offer curves for coal units have an increased incremental energy component of $13.14/ton x 1.02/tons/MWH = $13.40/MWh. For natural gas units, their incremental energy offers increase by $13.14/ton x 0.516/tons/MWh = $6.78/MWh.

Generating Resources. The historical supply curves for each hour are based on units that are in-service during that particular historical hour in the 2011-2012 historical years. In each subsequent year, the set of in-service units changes based on assumptions regarding *new* additions and retirements. This can result in a re-ordering of the capacity in the supply curve through "re-commitment" discussed in the next subsection. Our base assumptions regarding additions and retirements are based on the EIA Annual Energy Outlook assumptions.[4] We adjust these assumptions as needed to satisfy MISO's resource adequacy needs. When additional

2 We adopt the CO2 prices developed by Independent Expert Consultant Mr. Craig Sabine of MNP.

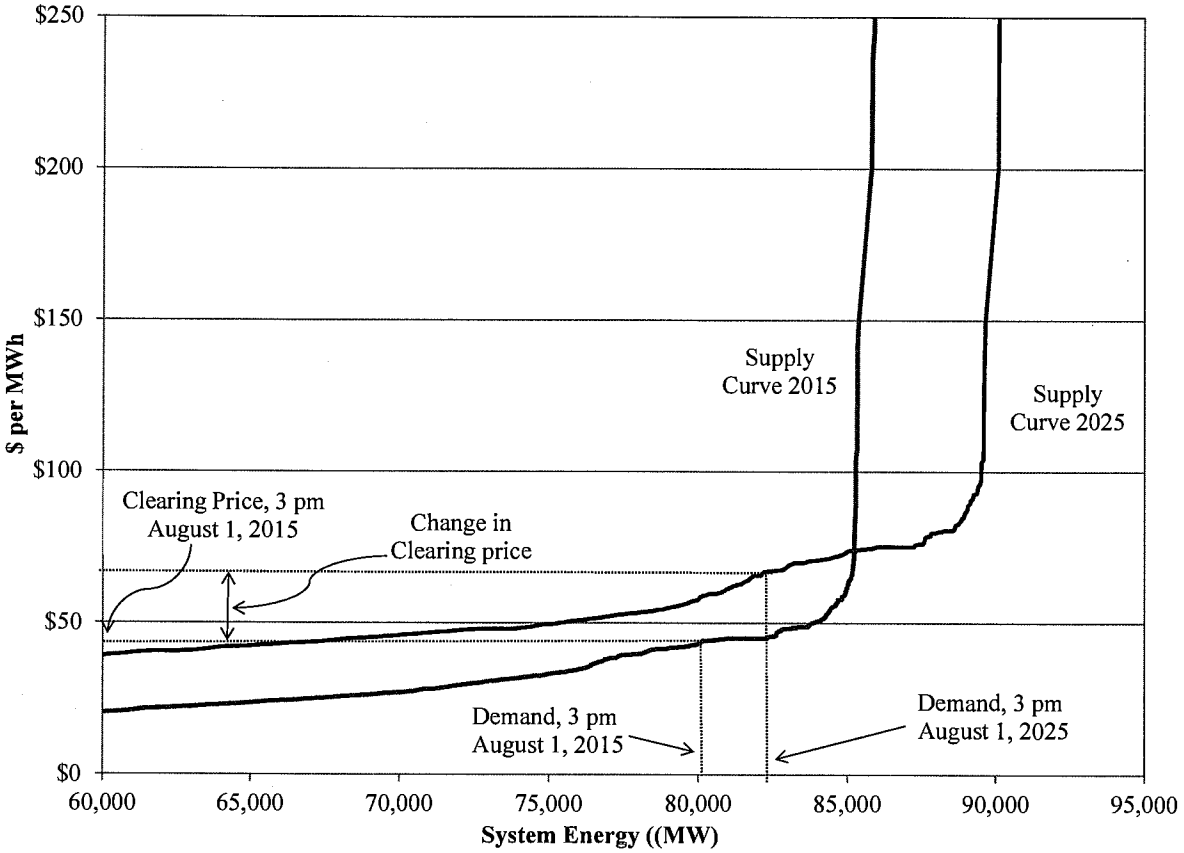
3 See EPA, http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html

4 See, http://www.eia.gov/forecasts/aeo/data.cfm

resources are needed, we assume one-half of the new resources are combined cycle natural gas units and one-half are natural gas combustion turbines.

When the EIA data indicates retirements of a unit type for a specific year (e.g., coal units), we choose units to retire based on units net revenue for the previous year. The least profitable are retired first.

Figure 10: Example of Change in Supply Curve



Note: The figure shows the change in forecast clearing price in our model resulting from changes in supply and demand between 2015 and 2025.

4. "Headroom" and Daily Recommitment

The supply curve for each future period also is adjusted to reflect the fact that future periods will have different supply and demand characteristics due to changes in key drivers, mainly load and the composition and quantity of available generating capacity. The supply curve for a historical hour is based on the historical load and the commitment of units in service at the time. When load changes in a future hour, it is not reasonable to simply move along the historical supply

curve to a new load level to clear the market for that future hour. Instead, at a new load level, some units that were not committed in the historical hour may be economic for commitment at a higher or lower load level and therefore be added to the supply curve. This type of recommitment may also be appropriate if new units are added or existing units retire - these new units may replace existing units in the stack or existing units not initially committed may replace retired units in the stack.

In order to recommit generation, we seek to ensure the system has adequate resources to meet forecasted load, ancillary services, and the market headroom requirement (the headroom requirement is the additional operating flexibility required by RTOs to meet ramp demands). Much like MISO's day-ahead market, our process for re-committing resources is performed on a daily basis. If headroom is inadequate in some hour, the daily commitment is revised to ensure that sufficient generating capacity is available for dispatch.

The revised commitments are is then used as the basis for the hourly supply curves for that day and the market is cleared in accordance with the process described above.

5. Reference Forecast Assumptions and Alternative Cases

We develop forecasts under three alternative scenarios. Each differs from the other according to different assumptions on key supply and demand inputs. As we discussed above, aside from the historical MISO data that form the base case supply curves, a price forecast depends on assumptions about (1) load growth; (2) fuels costs; (3) retirements and additions; (4) CO2 prices; and (5) cost of new generation (for capacity prices). Our three scenarios are as follows:

a. Reference Cases

We use two reference cases due to the significant uncertainty regarding the introduction of CO2 costs. We develop a first case, called simply, the "Reference Case," which includes positive CO2 costs. Our "Reference No Carbon" case is very similar to the reference Case except CO2 costs are zero, and the load growth is slightly higher.

Both the Reference Case and the Reference No Carbon case are based on the assumptions used by the EIA in its 2013 Annual Energy Outlook for its own reference case. The EIA reference

case assumes CO2 costs are zero. Therefore, the EIA reference case assumptions on load, capacity, and fuel prices are used in our Reference No carbon Case.

For our Reference Case (with Carbon), we depart from the EIA reference case in order to reflect CO2 prices. We introduce a CO2 price in 2021, consistent with the forecast of Mr. Craig Sabine of MNP who is the Independent Expert Consultant for the PUB in this NFAT on matters relating to CO2 pricing. According to Mr. Sabine's reference case, the CO2 price will be zero until 2021, at which point it will be $13.14/ton and increases by 5 percent per year thereafter. We reflect Mr. Sabine's forecast by adjusting offer curves for fossil fuel plants to account for the additional CO2 cost. The adjustment to offer curves to reflect this additional cost was described above.

We also slightly reduce the EIA Reference Case load growth starting in 2021 to reflect non-zero CO2 prices starting in year 2021. In particular, for the years 2015-2021, we use the compound average growth rate (CAGR) from the EIA reference case for those years. Starting in 2022, we adopt the load growth rates envisioned by EIA under a $10/ton CO2 price ("EIA GHG10"), wherein the EIA assumes a 2014 CO2 price of $10/ton. We use the CAGR from EIA GHG10 for the years 2015-2034 for our years 2022-2034 in our reference Case. We use the earlier years in the EIA GHG10 to match the growth rates that would be expected once the non-zero CO2 prices are realized (assumed to be realized in 2021 in our Reference Case).

For both of our reference cases, fuel prices were taken directly from the EIA reference case -- Henry Hub for natural gas prices and Wyoming Powder River Basin for coal. We assumed a further coal transportation cost into MISO of $1.7/MMBTU, a value typically used in the MISO to account for coal transportation. Natural gas transportation costs are assumed to be $0.75/MMBTU. Generation retirements and additions are taken directly from the EIA reference case. We began 2013 with a MISO capacity surplus of 6,200 MW.[5] When load growth together with net capacity retirements resulted in a year with a capacity deficit, some future EIA reference case additions were moved forward or additional natural gas capacity was added beyond that scheduled in the EIA reference series. These key input series are shown in Appendix A.

[5] See Potomac Economics, "2012 State of the Market Report for the MISO Electricity Markets", p. 18, figure 8. It shows a capacity market surplus for July 2012 of 6200 MW.

For each year, we simulate the SMP for all hours using the historical supply curves adjusted for the assumptions of this case. For the 16 peak hours of each (non-holiday) weekday, we calculate the average SMP to establish the on-peak SMP for that hour of that year. The average price for all other hours establishes the off-peak SMP for that hour of that year.

b. High Resource Production (Low Fuel Price) Case

We believe a credible case is one in which natural gas prices may show little change over the next 20 years. This is credible because of the additional natural gas supply that has been made available through hydraulic fracturing technology, which has already been shown to increase natural gas production in North America. Accordingly, we produce a price forecast using the assumptions associated with EIA's "High Oil and Gas Resource" case, which models the effect of high resource production on fuel prices and the secondary effects on electricity markets.

For load growth in the High Resource Case, we used the levelized growth rate of load for the 2015-2034 period used in EIA's High Resource case. We assume no CO2 costs for this case. Fuel prices were taken directly from the EIA High Resource case (the Henry Hub natural gas and Powder River Basin coal prices).

Generation retirement and addition assumptions are taken directly from the EIA High resource case, but adjusted to ensure that MISO's resource needs are satisfied. Like our reference case, we began 2013 with a MISO capacity surplus of 6,200 MW. When load growth together with net capacity retirement resulted in a year with a capacity deficit, some future EIA reference case additions were moved forward or additional natural gas capacity was added beyond that scheduled in EIA High Resource series. These key input series are shown in Appendix A.

c. High Economic Growth Case

We also believe there is a significant likelihood that economic growth may be higher than assumed in the EIA reference case. Accordingly, we produce a price forecast using the assumptions associated with EIA's "High Growth" case, which models the effect of higher macroeconomic growth on electricity markets. We assume CO2 cost in accordance with the reference case developed by Mr. Sabine (the same CO2 costs as in our reference case above), which start at REDACTED . For the

years 2022-2034, load grows more slowly than in the EIA High Growth case. We assume a lower growth rate in later years to reflect the effects of the CO2 costs. In particular, the growth rate is the average of (1) the levelized growth rate in the EIA High growth case for 2022-2034 and (2) the levelized growth rate in the EIA GHG10 case for the year 2015-2034.

Fuel prices were taken directly from the EIA High Growth case (Henry Hub natural gas and Powder River Basin coal).

The quantity and timing of generation retirements and additions are taken directly from the EIA High Growth case, adjusted as needed to satisfy MISO's resource needs. Like our Reference Case, we began 2013 with a MISO capacity surplus of 6,200 MW. When load growth together with net capacity retirement resulted in a year with a capacity deficiency, some future EIA High growth case additions were moved forward or additional natural gas capacity was added beyond that schedule in EIA High Growth series. These key input series are shown in Appendix A.

C. Estimates of Losses and Congestion

The previous section described the forecast of the MISO System Marginal Price, which is the underlying commodity price throughout MISO. This price does not include the effects of losses or transmission that can cause locational marginal prices ("LMPs") at a location to be higher or lower than the SMP. Manitoba hydro will settle its energy imports at the Manitoba interface location. Therefore, we forecast the losses and congestion that will be incurred at the Manitoba interface relative to the SMP. We use the historical relationships in the 2011 and 2012 data to forecast future losses and congestion.

1. Losses

For losses, we use the average observed marginal losses calculated by MISO over the two year period 2011-2012 as the marginal loss factor going forward. We do not believe there are any currently known changes to the system that would raise or lower losses significantly going forward. For on-peak hours, we assume an average marginal loss factor of 8.8 percent. For off-peak hours, we assume a marginal loss factor of 9.4 percent.

2. Congestion

Unlike losses, transmission congestion can change substantially as the dispatch of the system or the topology of the network changes. To forecast congestion, we develop an econometric model to estimate how key factors will affect congestion. We use standard linear regression techniques to develop this model. The estimated relationship is then used to forecast the future value of congestion based on projections of future key variables. The results of this estimated model, along with the standard statistical diagnostics, are provided in Appendix B.

We use the hourly data from 2011-2012 and hypothesize that congestion depends on a number of "explanatory" variables. These variables include:

System Marginal Price. The system marginal price is the price calculated by MISO that represents the marginal cost of meeting the next increment of load in MISO. We hypothesize that a higher SMP will result in higher congestion costs at the Manitoba interface with MISO. This hypothesis is based on the fact that at a high SMP, MISO is dispatching high-cost units to serve demand. These same units will be redispatched to manage congestion. All else equal, this should result in higher congestion costs.

Our regression analysis indicates a statistically significant estimate that congestion costs at the Manitoba border with MISO increase by $0.10/MWh for every $1/MWh change in the SMP.

Market Generation. Market generation is the level of generation dispatched within MISO to serve MISO demand. We hypothesize that the congestion cost at the Manitoba interface with MISO will be higher when market generation is higher. This hypothesis is based on the fact that at a higher dispatch, the transmission network is more fully utilized and congestion is more likely to arise.

Our regression analysis indicates a statistically significant estimate that congestion costs increase by $0.04/MWh for every 1,000 MW increase in system generation.

Ramp Requirements. Ramp requirements are the amount of capacity MISO expects to increase or decrease in a given hour to respond to anticipated increases or decrease in market demand or supply. In hours when demand is increasing or decreasing quickly (mid-morning and late

evening), MISO may be constrained in responding to congestion and be required to use expensive re-dispatch to manage flows over transmission facilities. We hypothesize that ramp requirements will cause higher congestion.

Our regression analysis indicates a statistically significant estimate that congestion costs increase by $0.21/MWh for every 1000 MW increase in ramp requirements.

Wind Share of Generation. Wind share of generation is the percentage share of dispatched generation that is from wind resources. When output of wind resources increases relative to the rest of the system, there tends to be higher congestion. This occurs because most wind resources are located in Western MISO so higher wind output raises west-to-east flows and congestion on the MISO system. The Manitoba interface is significantly affected because is it located in the western part of MISO. Therefore, we hypothesize that higher wind share will cause higher congestion costs for Manitoba Hydro.

Our regression analysis indicates a statistically significant estimate that congestion costs increase by $0.45/MWh for every one percentage point increase in the share of wind resources on the system.

Manitoba Hydro Exports to MISO. Manitoba Hydro export to MISO is the MW volume of exports from Manitoba Hydro to MISO. When Manitoba Hydro exports power, congestion costs are likely to increase because MISO must manage the additional west-to-east power flow in an area already affected by west-to east-congestion. We hypothesize that higher Manitoba Hydro exports to MISO will cause higher congestion costs for Manitoba Hydro.

Our regression analysis indicates a statistically significant estimate that congestion costs increase by $0.78/MWh for every 1000 MW increase in Manitoba Hydro exports to MISO.

Headroom West. Headroom West is the amount of capacity that is on line in the west (sum of the maximum output level for each unit) in excess of energy being produced from each resource. As discussed above, headroom is used to ensure operational requirements for MISO. When the MISO west headroom requirement increases, flexibility in managing west-to-east congestion decreases, because units have lower limits to which they can be dispatched in order to reduce west-to-east flows. This will tend to result in more expensive redispatch to address congestion.

Accordingly, we hypothesize that higher MISO west headroom will cause higher congestion costs for Manitoba Hydro.

Our regression analysis indicates a statistically significant estimate that congestion costs increase by $0.87/MWh for every 1,000 MW increase in MISO west headroom.

Natural Gas-Coal Price Spread. The ratio of natural gas prices to coal prices spread is used in the regression equation to account for a significant factor that affects redispatch costs. If natural gas prices increase relative to coal prices, the cost of displacing coal with gas to resolve congestion increases. We hypothesize that congestion costs will increase when the natural gas-coal price spread increases.

Our regression analysis indicates a statistically significant estimate that congestion costs increase by $1. 37/MWh for every $1/MMBTU increase in the spread between coal and natural gas prices.

Qualitative Variables. The variables described above are the "quantitative" variables used in the regression. These variables can take on a range of values, for example, natural gas prices can have a rather broad range. The regression measures the effect of changes in quantitative variable on the congestion costs. Qualitative variables measure a change in state. They generally reflect the presence or absence of a condition, for example, whether a particular observation is an on-peak hour or an off-peak hour. The following are our qualitative variables used in the regression.

Peak Hour Indicator. The peak hour indicator signals whether the observation is an on-peak hour or not. Peak hours are the 16 hours ending at 11PM on (non-holiday) weekdays. During these hours, load grows in the west and helps to alleviate the usual west-to-east flow that creates congestion. We hypothesize that congestion cost will decrease during on-peak hours.

Our regression analysis indicates a statistically significant estimate that congestion costs are $0.21/MWh lower during on-peak hours.

Winter Indicator. The winter indicator signals whether the hour is during December, January, or February. Like the peak hour indicator, we expect load in the west to grow relative to the rest

of MISO in these months and help alleviate the usual west-to-east flow that creates congestion. We hypothesize that congestion cost will decrease during winter months.

Our regression analysis indicates a statistically significant estimate that congestion costs are $1.86/MWh lower for hours in the winter.

Summer Indicator. The summer indicator signals whether the hour is in a summer month. For summer peak hours, we expect load in the rest of MISO grow relative to the west of MISO and aggravate the prevailing west-to-east flow that creates congestion. We hypothesize that congestion cost will increase in these hours.

Our regression analysis indicates a statistically significant estimate that congestion costs are $0.62/MWh higher in the summer peak hours.

The results of the regression equation are shown in Appendix B. The regression is an AR(1) model. For the ordinary least squares model, the Durbin-Watson statistic indicated that the data had a high degree of correlation between the hourly observations, which was not unexpected. Accordingly, we used an AR(1) model to account for this correlation. The results in Appendix B are the AR(1) results.

3. Effect of New Transmission Investment on Congestion.

The future congestion facing Manitoba Hydro in the western part of MISO should take into account two significant transmission expansion projects. The first is Manitoba Hydro's proposal to build additional capacity from the Manitoba Interface to Minnesota and Wisconsin as part of its preferred plan. The second is the investment that MISO initiated in 2011 to integrate wind capacity in western MISO. The regression equation used to forecast congestion is based on the state of the transmission network as it existed in 2011 and 2012. Hence, we adjust the congestion forecast to account for the prospect that congestion will be changing.

a. Wind Integration and MISO's Multi-Value Projects

MISO's planning process includes provisions to plan for and develop projects to facilitate the integration of resources to meet regulatory policies, for example, projects related to renewable energy requirements. MISO's process has resulted in substantial investments aimed at

integrating existing and future wind capacity in the western part of MISO. In fact, MISO has approved over $5 billion in projects since 2011. We believe many of these projects will be in service by 2015.

As a result of this new investment, we recognize that the congestion estimated in our forecast is likely to be overstated. In particular, the variable in our regression analysis associated with "Wind Share" measures the higher levels of congestion at the Manitoba Hydro interface when the share of wind in MISO increases. However, with the new investments in MISO aimed at integrating wind, we believe additional congestion from new wind resources is likely to be offset by the additional transmission capability. Therefore, in forecasting the congestion at the Manitoba Hydro interface, we assume changes in wind share above the level projected in 2015 will have no additional effects on congestion by capping the wind share in future years at the 2015 level. In other words, we assume the new MVP projects will completely offset the forecasted increases in output from new wind projects.

b. Manitoba Hydro Transmission Projects

As part of Manitoba Hydro's preferred development plan, Manitoba Hydro proposes to build new transmission into Minnesota and Wisconsin. These investments will help eliminate congestion into the Minnesota Hub caused by additional Manitoba Hydro exports. As our regression indicates, Manitoba Hydro export volumes into MISO create additional congestion costs at the rate of $0.78/MWh for each 1,000 MW of Manitoba Hydro exports. However, this is congestion as measured at the MISO SMP. Some of this is congestion is between Manitoba Hydro interface and the Minnesota Hub and some of it is congestion from the Minnesota Hub into the rest of MISO.

In order to separate the effects, we estimate the same regression model using the Minnesota Hub congestion cost as the dependent variable instead of the Manitoba Hydro interface congestion costs. This could identify the effect of congestion from MISO to the Minnesota Hub. We found this value to be $0.59/MWh for each 1,000 MW increase in Manitoba Hydro exports to MISO. The regression results are in Appendix B.

Therefore, the congestion caused by additional Manitoba Hydro exports is mostly between the Minnesota Hub and the rest of MISO. As a result, for additional exports into MISO after 2021 when the projects are proposed to be ready, we reduce the rate of additional congestion costs caused by imports to the coefficient estimated in the second regression model ($0.59/MWh for each 1000 MW of additional exports, instead of $0.78/MWh).

D. Full Price Forecasts

In this section we present the final results of our price forecasts: the System Margin Price combined with congestion costs and losses.

The following four figures show our estimated prices, including losses and congestion. The top line indicates the SMP. After removing congestion and losses, the bottom line indicates the LMP that Manitoba Hydro is forecasted to receive when exporting energy to MISO.

Figure 11: Potomac Economics Reference Case Energy Prices

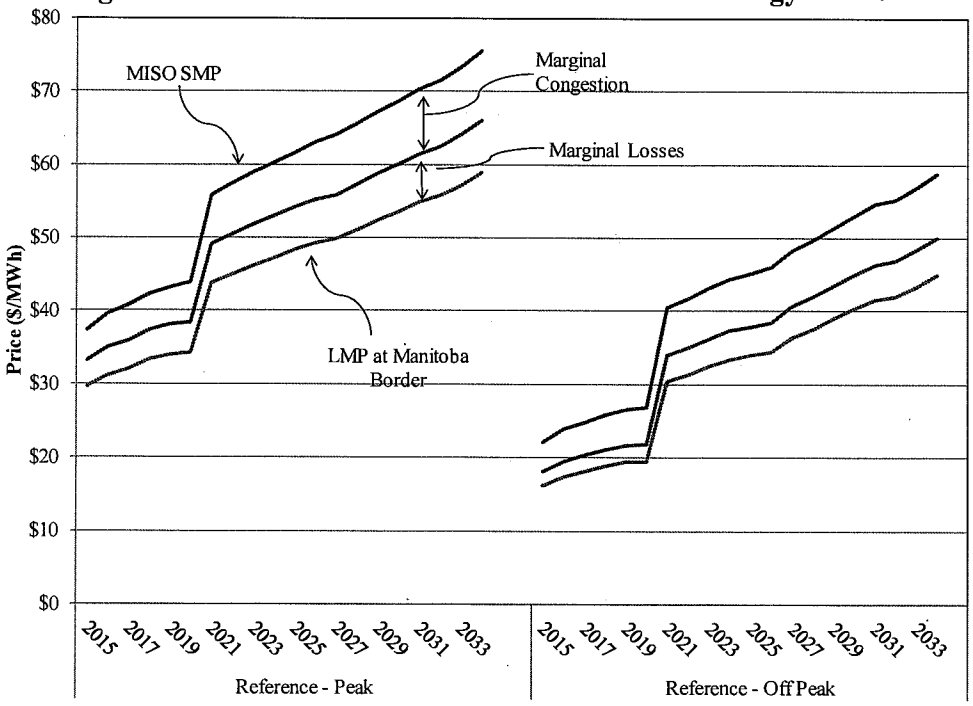


Figure 12: Potomac Economics Reference No Carbon Case Energy Prices

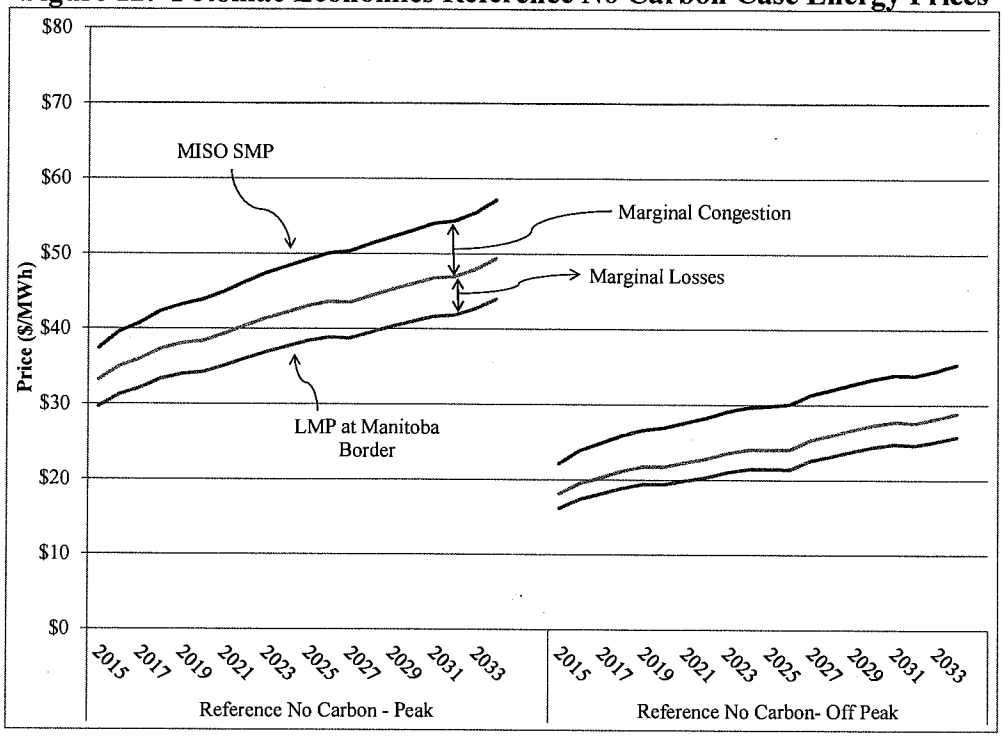


Figure 13: Potomac Economics High Resource Case Energy Prices

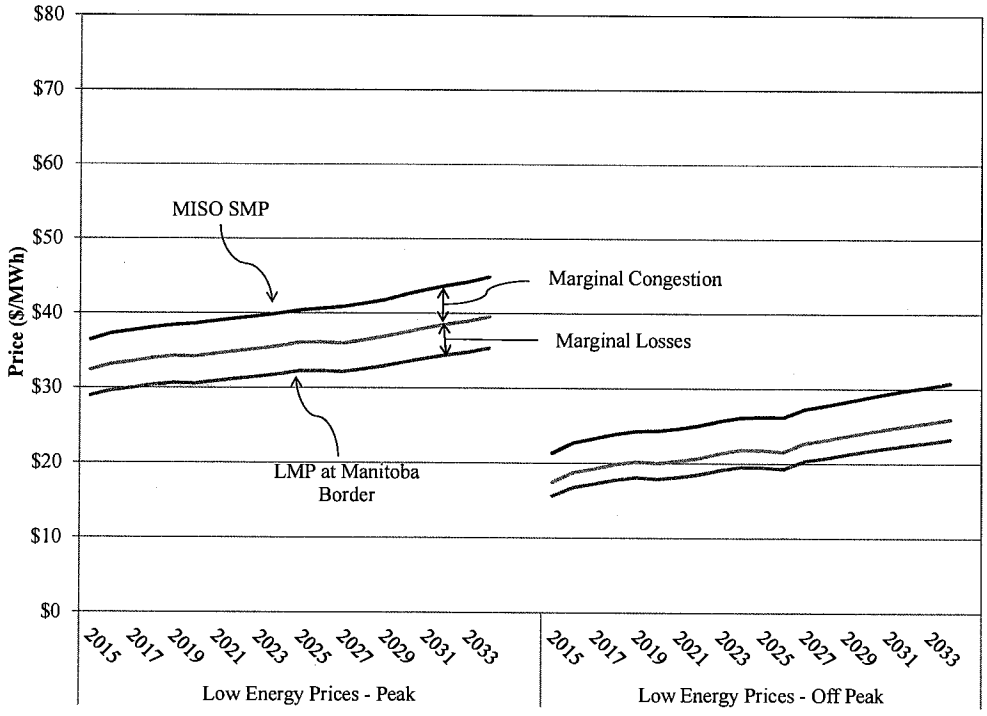
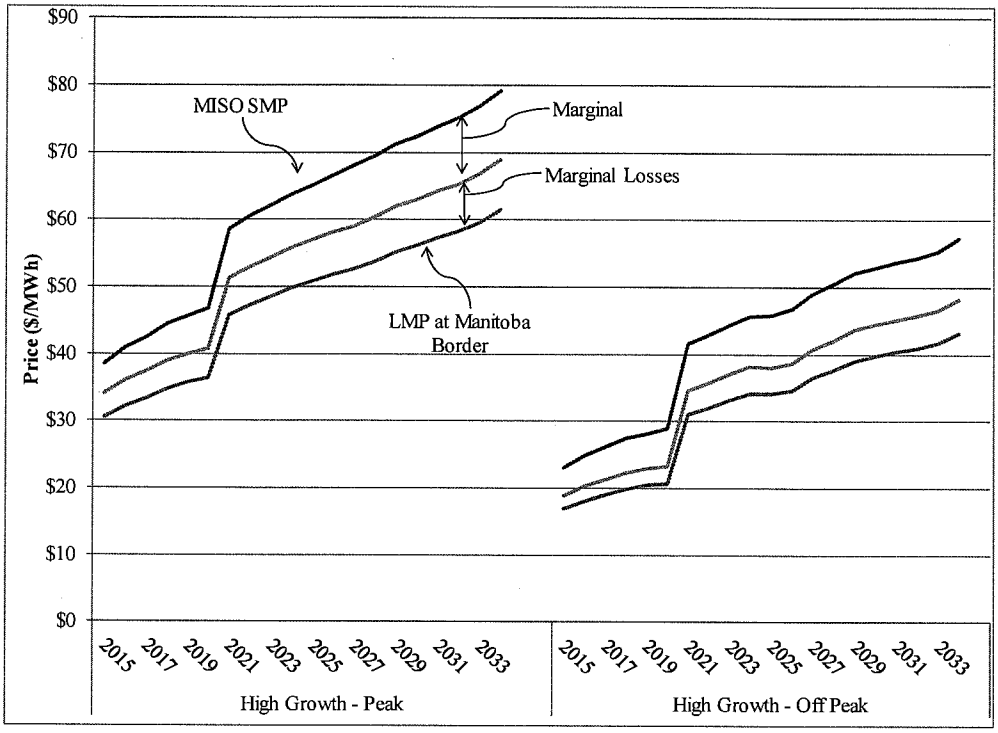


Figure 14: Potomac Economics High Growth Case Energy Prices



III. POTOMAC ECONOMICS CAPACITY PRICE FORECAST

Capacity prices in MISO's planning reserve auction have been close to zero since its introduction. This has been partly due to the prevailing capacity surplus in MISO and partly due to market design flaws that lead prices to be understated.[6] While these flaws tend to reduce the value of capacity in MISO, load serving entities will still procure capacity through bilateral contracts or build capacity when needed to meet their planning reserve requirements.

Therefore, we assume that when surplus capacity dissipates, the capacity price will rise to the level necessary to incent the construction of new resources. As a result, our capacity price forecast is based on our estimate of the net cost of new entry ("net CONE"). The net CONE of a resource is equal to the resource's annual fixed cost of new entry less the variable profit it would earn in the MISO's energy and ancillary services markets. Therefore, the estimation of the capacity price requires calculation of (1) the variable profit a new resource can earn in the MISO markets (which requires forecast of the energy and ancillary services prices); and (2) the annual fixed cost of entry for the resource.

We estimate the net CONE of an "advanced" CT, given the parameters published by EIA[7]. Given the typical price duration curve in the MISO market, a CT is generally the most economical way to meet capacity needs. While it conceivable that a CCGT, because it runs longer at lower costs, could overcome its higher capital cost relative to a CT, our analysis indicates that the forecasted energy prices always results in a CT being the most economical addition for capacity (i.e., having the lower net CONE).

A. Cost of New Entry

The cost of new entry is an annual number that reflects carrying cost of the fixed investment plus fixed operating costs (fixed O&M), as well as smaller fixed elements like taxes. We use a value that was published by MISO in support of the capacity auction prices in MISO South. Updating this value to 2013 dollars and incorporating updates in EIA's assumptions for an advanced CT,

6 See, Potomac Economics, "2012 State of the Market Report for the MISO Electricity Markets."
7 See, EIA, "Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants", April 2013, *supra.*

we estimate the CONE of a CT to be $89.95. The capacity price is estimated as this value less estimated net revenues, as described in the next subsection

B. Net Revenues

Net revenues for a new advanced CT are estimated using the variable production costs of the CT and the prices forecasted for each year. If in a given hour the price is greater than the variable cost of the CT, the unit is assumed to earn the difference in the variable cost and the price. This is part of the net revenue for that hour. We also assume a CT can earn ancillary services revenue by providing off-line supplemental reserves to MISO.[8] The annual net revenues are the annual sum over all hours of the hourly net revenues and the hourly ancillary services revenues.

In the long-run equilibrium, capacity prices together with net revenues from the energy and ancillary services markets must be sufficient to cover the cost of building new resources. This is the basis for our long-run forecast of capacity prices. However, MISO currently has a surplus of capacity and has been exporting capacity to PJM. Most recently, MISO suppliers exported more than 4 GW of capacity to PJM in its auction for 2016/2017. This capacity can be repurchased from PJM in subsequent actions if it is needed to meet MISO's planning reserve needs and its costs are lower than the costs of building new resources. Therefore, we must determine when the MISO capacity market is likely to transition from its current surplus condition (which will produce lower capacity prices) to a long-run equilibrium where capacity prices should cover the cost of building new resources.

Given the current surplus of more than 6 GW and our assumed coal retirements, MISO could experience a shortfall as soon as 2016. However, the ability to repurchase MISO capacity from PJM and fund environmental upgrades that would allow some existing capacity to remain in service will push this date out. Given these factors, we project that MISO will need to begin adding new resources in 2018. Because MISO does not currently have a functional centralized capacity market, we adopt the most recent price from the PJM RPM auction of $57.39/MW-Day as our forecast for 2015 and 2016, which translates to a price of $21.65/kW-Year. In 2017,

[8] The ancillary services revenue is earned at the rate of $1/MW when the unit is not operating to provide energy. Although the average operating reserve prices are slightly higher than this level, the $1/MW assumption accounts for (1) the generator being likely to incur some costs in order to be prepared to be deployed and (2) the generator likely to be providing energy in hours when the operating reserve prices are the highest.

MISO's repurchasing of capacity from PJM should increase capacity prices throughout the region to levels similar to those that prevailed prior to the increased sales to PJM. Therefore, we forecast a capacity price comparable to the PJM clearing price in the prior RPM auction of $160/MW-Day or $49.64/kW-Year.

In 2018 and beyond, we forecast that prices will rise to the long-run equilibrium level based on the net CONE of a new CT. Table 1 shows the net revenue for each year of the forecast period, along with the annual fixed cost, and the resulting estimated capacity price. We show this for all four of our cases.

Table 1: Summary of Capacity Price Estimates

Year	Reference Case			Reference Case No Carbon			High Resource (Low Fuel Price)			High Growth		
	Net revenue	Fixed Annual Cost	Capacity Price	Net revenue	Fixed Annual Cost	Capacity Price	Net revenue	Fixed Annual Cost	Capacity Price	Net revenue	Fixed Annual Cost	Capacity Price
	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW	$/kW
2015	$20.23	$89.95	$69.72	$20.23	$89.95	$69.72	$19.76	$89.95	$70.19	$20.97	$89.95	$68.98
2016	$20.51	$89.95	$69.44	$20.51	$89.95	$69.44	$20.56	$89.95	$69.39	$21.12	$89.95	$68.83
2017	$20.92	$89.95	$69.03	$20.93	$89.95	$69.02	$20.84	$89.95	$69.11	$21.53	$89.95	$68.42
2018	$21.32	$89.95	$68.63	$21.32	$89.95	$68.63	$21.10	$89.95	$68.85	$21.84	$89.95	$68.11
2019	$21.51	$89.95	$68.44	$21.51	$89.95	$68.44	$21.26	$89.95	$68.69	$22.12	$89.95	$67.83
2020	$21.61	$89.95	$68.34	$21.61	$89.95	$68.34	$21.37	$89.95	$68.58	$22.31	$89.95	$67.64
2021	$21.59	$89.95	$68.36	$21.78	$89.95	$68.17	$21.59	$89.95	$68.36	$22.15	$89.95	$67.80
2022	$21.66	$89.95	$68.29	$22.03	$89.95	$67.92	$21.81	$89.95	$68.14	$22.35	$89.95	$67.60
2023	$21.77	$89.95	$68.18	$22.24	$89.95	$67.71	$22.00	$89.95	$67.95	$22.52	$89.95	$67.43
2024	$21.85	$89.95	$68.10	$22.38	$89.95	$67.57	$22.24	$89.95	$67.71	$22.69	$89.95	$67.26
2025	$21.99	$89.95	$67.96	$22.50	$89.95	$67.45	$22.40	$89.95	$67.55	$22.70	$89.95	$67.25
2026	$22.05	$89.95	$67.90	$22.62	$89.95	$67.33	$22.60	$89.95	$67.35	$22.84	$89.95	$67.11
2027	$22.08	$89.95	$67.87	$22.72	$89.95	$67.23	$22.59	$89.95	$67.36	$22.94	$89.95	$67.01
2028	$22.19	$89.95	$67.76	$22.90	$89.95	$67.05	$22.63	$89.95	$67.32	$23.03	$89.95	$66.92
2029	$22.31	$89.95	$67.64	$23.04	$89.95	$66.91	$22.76	$89.95	$67.19	$23.24	$89.95	$66.71
2030	$22.42	$89.95	$67.53	$23.20	$89.95	$66.75	$22.46	$89.95	$67.49	$23.20	$89.95	$66.75
2031	$22.49	$89.95	$67.46	$23.34	$89.95	$66.61	$22.29	$89.95	$67.66	$23.29	$89.95	$66.66
2032	$22.47	$89.95	$67.48	$23.37	$89.95	$66.58	$22.25	$89.95	$67.70	$23.26	$89.95	$66.69
2033	$22.59	$89.95	$67.36	$23.56	$89.95	$66.39	$22.24	$89.95	$67.71	$23.35	$89.95	$66.60
2034	$22.79	$89.95	$67.16	$23.88	$89.95	$66.07	$22.19	$89.95	$67.76	$23.60	$89.95	$66.35

Note: The "Capacity Price" column for 2015-2017 shows the estimated net revenue based on a long-run equilibrium. As discussed in the text, this price is not likely to be attained in the short run. The capacity prices for those three years (and all cases) are 2015: $21.65/kW; 2016: $21.65/kW; and 2017: $49.64/kW.

As this table shows, the net revenues from the energy and ancillary services markets do not vary substantially over time or between the various energy price cases. This is expected because the primary changes over time and between cases are related to changes in fuel prices and CO2 prices. Changes in both natural gas prices and CO2 prices will directly increase the CT's

marginal costs and, therefore, its assumed offer prices. In most hours that a CT is running, a natural gas-fired unit with similar CO2 emission rates will be the marginal unit setting the price in the energy market. This causes energy prices to increase or decrease at substantially the same rate as the change in the CT's production costs, which in turn causes its net revenue to be relatively unresponsive to these changes.

Likewise, changes in the generator mix over time. as coal plants retire and are replaced by other units, generally changes energy prices at lower load and price levels when the CT would not be forecasted to be running. Therefore, these changes do not tend to affect the CT's net revenues substantially.

Lastly, we assume no real increase over time in the capital cost of building a CT (i.e., capital costs rise at the same rate of inflation). Therefore, the CONE of the CT is flat over time and, when combined with net revenues that are relatively flat as well, we forecast a long-run capacity price trend that is comparably flat.

C. Potomac Economics' Capacity Price Forecast v. Manitoba Hydro's Consultants

Figure 15 shows our reference capacity price forecast compared to the forecasts of Manitoba's consultants. The Potomac Economics forecast rises, as discussed in the prior section, from 2015 to 2017 before achieving a long-run equilibrium that prevails from 2018 to 2034.

Figure 15: Capacity Prices Reference Case Manitoba Hydro v. Potomac Economics

REDACTED

The figure shows that the consultants' forecasts are [redacted] the Potomac Economics forecast after 2020 when most of Manitoba Hydro's new capacity enters the MISO market. As we discussed in Section I, most of the consultants assume capital costs for new resources that [redacted] than the EIA forecast that we assume. Additionally, some of the consultants appear [redacted] that a new resource would earn in MISO's energy and ancillary services markets, without which the forecasted capacity price [redacted]

We were unable to obtain detailed information on the models and inputs used by Manitoba Hydro's consultants to forecast capacity prices. Given that they are [redacted] than the fundamental approach that we used, we do not find them to be credible and recommend that PUB evaluate the business case for the Manitoba Hydro development plans on the basis of Potomac Economics' forecast.

D. Uncertainties

Although the theory underlying our capacity price forecast is sound, there is significant risk associated with these Manitoba Hydro revenues. The capacity prices forecasted for the long run may not be readily attainable by Manitoba Hydro. This is true for at least three main reasons.

First, the capacity price is based on the amount of revenue a new entrant would need to be profitable. This assumes load serving entities are seeking capacity under relatively open and competitive market structures. However, the MISO capacity market is not currently structured to establish efficient capacity prices where capacity is cleared on a multi-lateral basis. Instead, capacity prices under the MISO planning reserve auction tend to be understated. They are likely to be close to zero during periods when even a small surplus of capacity exists. This can put downward pressure on bilateral capacity prices and result in lower revenues for Manitoba Hydro.

Because of this, Manitoba Hydro will likely participate in the bilateral market, as it has in the recent past. The risk that Manitoba Hydro faces in the bilateral market is that regulated utilities may have an incentive to engage in self-build projects when they need capacity rather than purchasing from Manitoba Hydro. We have not quantified this effect in the capacity price, but only cite it as a potential risk.

Second, given the relatively long timeframe of these forecasts, it is plausible that technological advances could reduce the cost or increase the efficiency of the marginal CT, or cause alternative technology to displace the CT. In both cases, the long-run capacity price could fall and reduce the forecast capacity revenues.

A third reason why the capacity price may overstate the revenue Manitoba Hydro may earn is that the capacity price is based on net revenues earned at the MISO system marginal price. If constrained areas emerge where energy prices are much higher than the SMP, the net CONE of units built in these areas will fall. This would potentially reduce the MISO capacity price because units in these areas may be the marginal economic entrant.

IV. OTHER EXPORT MARKET ISSUES

In this section we address other issues that could significantly impact the price forecasts and revenues expectations under Manitoba Hydro's development plans.

1. Regional Issues

MISO South. In December 2013, Entergy transitioned its operation to MISO and began participation in the MISO markets. The Entergy system along with several other nearby smaller systems are part of what is known as "MISO South". The rest of MISO is referred to as "MISO Midwest." MISO Midwest and MISO South are connected by way of a transmission path that is managed on a regional basis through the Operations Reliability Coordination Agreement ("ORCA"). ORCA is an agreement among MISO and other non-MISO regional utilities to coordinate certain operations that may be impacted by the joint dispatch of MISO Midwest and MISO South. Currently, among other things, the agreement limits transfers between MISO Classic and MISO South to 2000 MW in any given hour. In the future, this limit may increase.

While the integration of MISO Midwest and MISO South promises to better allocate resources between the two areas, we do not believe it will have a significant effect on the supply and demand conditions in the western part of MISO where Manitoba Hydro anticipates making sales.

Capacity Exports to PJM. Another regional issue is the current level of MISO capacity exports to PJM. MISO is currently in a capacity surplus and exports to PJM through the PJM capacity auctions. These exports are committed for up to three years in advance As we discussed above, as the MISO capacity surplus declines, capacity exports to PJM from MISO will likely decline and this capacity will be available to meet MISO requirements.

2. Export Volumes

Manitoba Hydro assumes all additional surplus electricity can be sold either as long-term "dependable" (firm) energy or as on- and off-peak opportunity sales. Projected export volumes of long-term dependable energy are based on the surplus dependable capacity that Manitoba Hydro calculates based on historical water conditions and forecast load and resources. Manitoba assumes 100 percent of available dependable energy can be sold as long-term firm.

Manitoba Hydro on-peak and off-peak energy volumes are estimated based on simulations of the Manitoba Hydro system using its "SPLASH" model. The SPLASH model uses anticipated hydro conditions, load, resources, and export prices. The model optimizes the use of the available water to determine the volumes of exports and imports. The reasonableness of the export volumes produced by the SPLASH model was evaluated by Independent Expert Consultant, La Capra Associates.

Our role was to examine whether Manitoba Hydro can actually sell the volumes into MISO. Overall, given the small volume of additional capacity and energy resulting from the development plans relative to the size of the MISO market, we conclude that Manitoba will likely be able to sell the volumes it assumes in its plans. Our price forecasts take into account the additional volumes in estimating the market clearing prices. We also take into account the additional volumes when estimating the congestion component of the location marginal price at the Manitoba Hydro border with MISO.

Aside from the risk associated with selling capacity in the MISO market described above, we have a minor concern that the assumed volumes of long-term dependable energy may be slightly high. Manitoba Hydro assumes all dependable capacity is sold under long-term firm contracts. We do not believe all dependable capacity should be assumed to be sold forward on a long-term basis. Instead, an historical ratio could be applied. Manitoba Hydro has provided an analysis that indicates the value is close approximately 91 percent in recent years. We recommend that nine percent of the Manitoba Hydro projected long term dependable energy be "re-priced" at peak opportunity sales levels. We understand that La Capra will be addressing the effect of this issue.

We also examined Manitoba Hydro's assumption that its [redacted] We found there is some justification for this [redacted]. However, this [redacted] is not always attained. [redacted]

[redacted] We recommend the Company provide additional analysis supporting [redacted] preferably one that estimates [redacted]

3. Longer-Term Price Forecasts

Manitoba Hydro's Consultants provide forecasts to 2034. However, Manitoba Hydro projects revenues until 2080. To calculate the forward revenues, Manitoba Hydro assumes a growth rate for the years 2035-2049 based on the compound average growth rate ("CAGR") for the years 2030-2034, but declining to a growth rate of zero by 2049. Basically, growth rates in prices are linearly interpolated between the value equal to the average CAGR for the years 2030-2034 and zero value for 2049. After 2049, growth rates in prices are assumed to be zero.

With regard to capacity prices, we find no basis for assuming the real price will increase after 2034. For reasons stated above, such prices may even decline. For energy prices, we find it difficult to recommend an approach that would be reliable given the long-term nature of this assumption. We recommend that alternative post 2034 growth rates be examined in order to understand the sensitivity of the results to alternative growth assumptions. At least one such sensitivity should be a zero real growth rate, which would effectively assume that fuel prices and CO2 prices escalate at the rate of inflation after 2034.

4. Probability of Potomac Economics Cases

In this subsection, we provide a discussion of the probability of realizing the various cases we developed. We believe our reference cases are the most likely to represent the future path of prices. We believe our Reference Case and our Reference No Carbon Case are equally likely but will ultimately depend on the direction of future policy in the U.S. Therefore, we assign a probability of 30 percent to each of these two reference cases

[9] Manitoba Hydro informed us that relatively high water levels in 2011 allowed them to sell large quantities during on-peak hours in the shoulder load months, bringing down the overall on-peak per-MW sales revenue for that year.

Our high growth case assumptions do not depart significantly from our reference case. Mainly load grows faster and natural gas prices are higher.

We believe our last case reflects on-going progress in developing shale gas, which has proved to substantially increase natural gas supply in the U.S. The high resource case also shows slower load growth, primarily because gas substitutes for electricity for heating and may also become a transportation fuel, lessening load growth in the transportation sector. The slower load growth can also be a proxy for overall slower macroeconomic activity, which is reflected in this case.

We believe the High Growth and the High Resource cases are also equally likely, but less likely than the reference cases. Therefore, we assign a probability of 20 percent each to these two cases.

Appendix A – Summary of Key Assumptions in Potomac Economics Forecasts[10]

Figure A-1: Natural Gas Prices

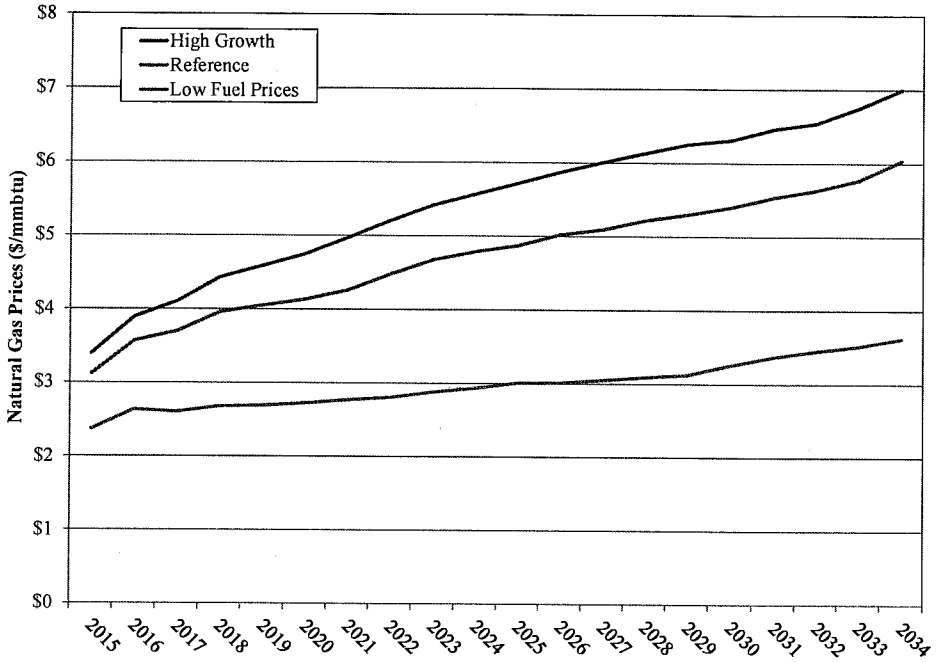
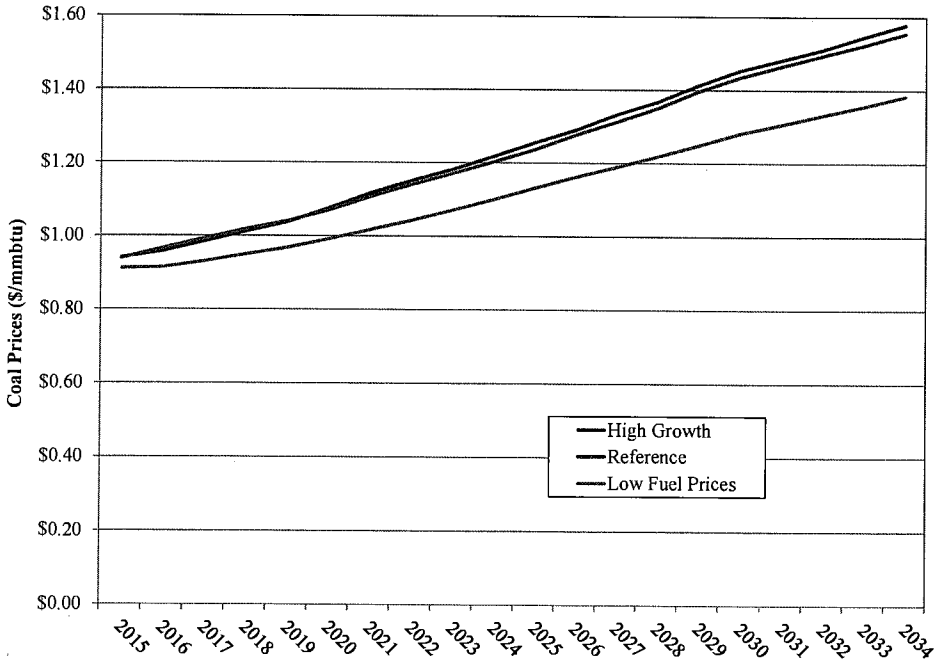


Figure A-2: Coal Prices



[10] Unless otherwise indicated, the Reference Case assumptions are also used in the Reference No Carbon Case.

Figure A-3: CO2 Prices

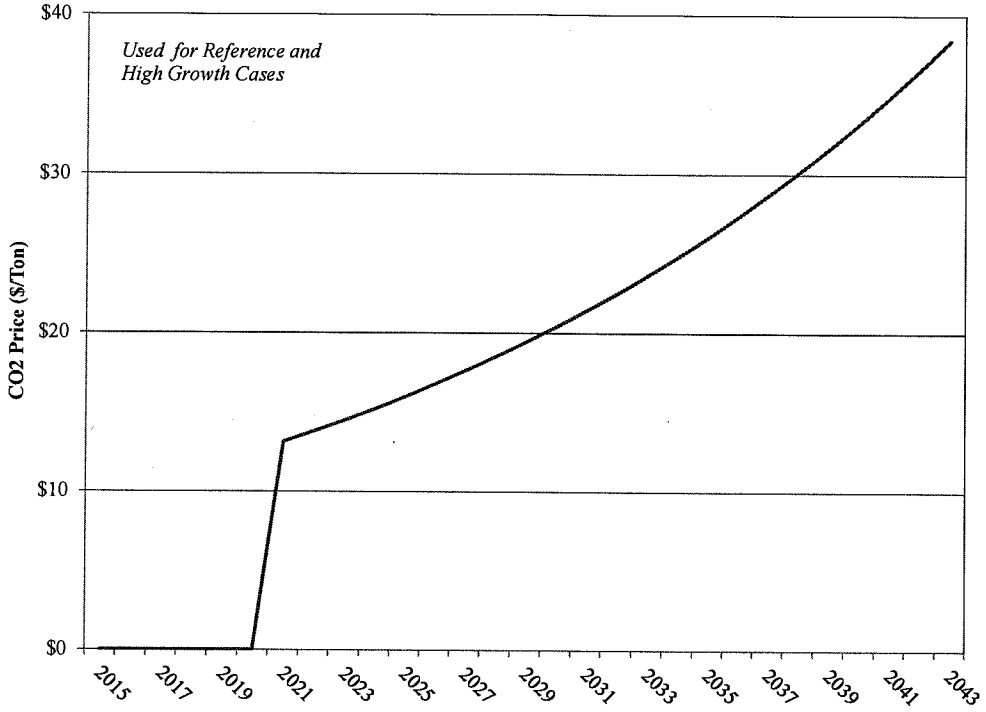


Figure A-4: Load Growth

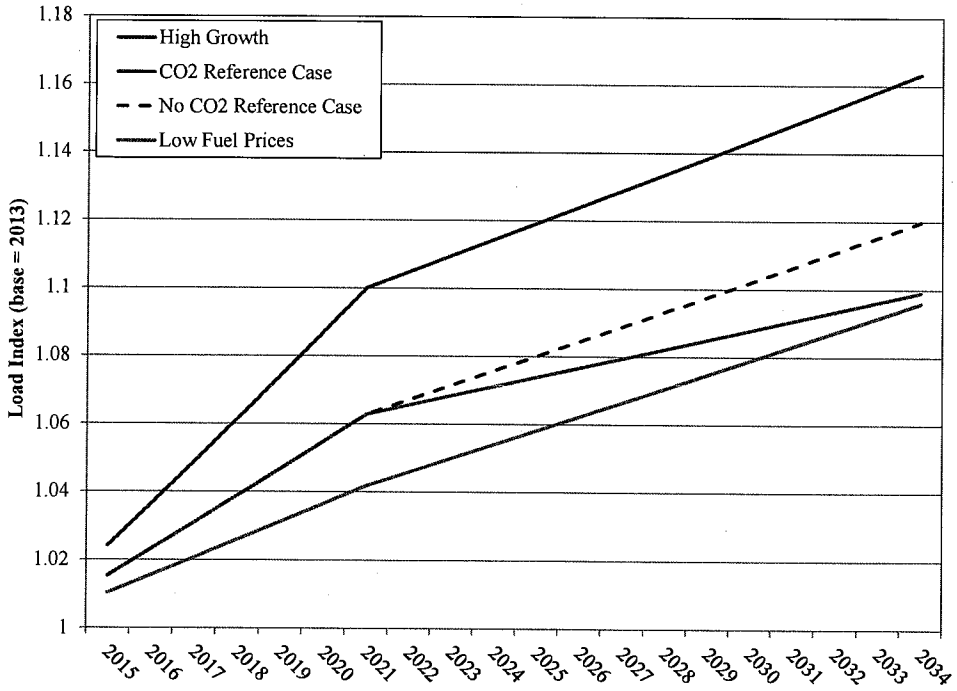
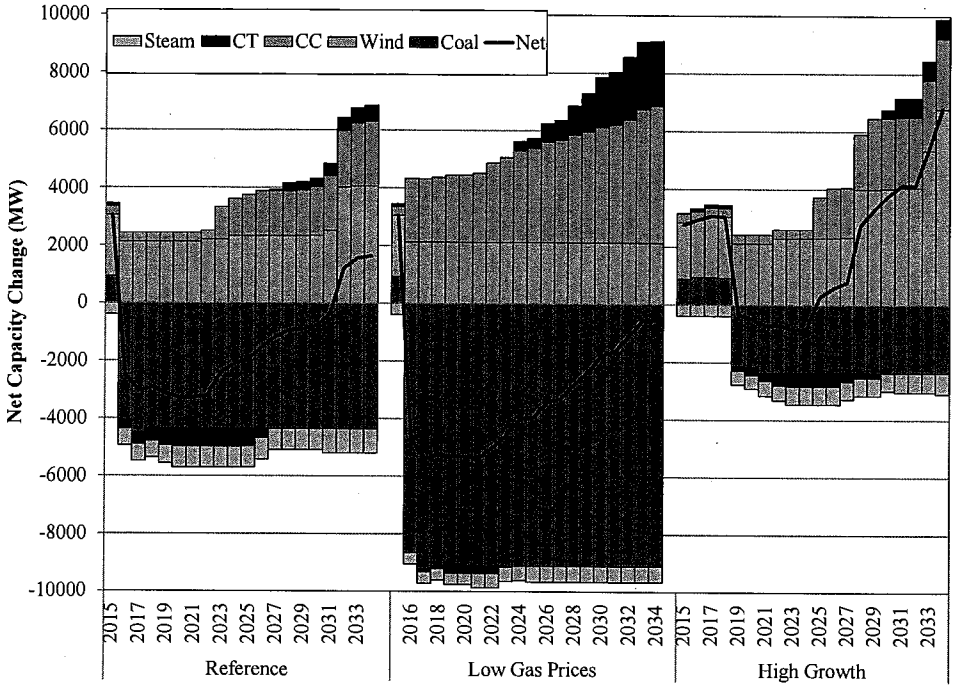


Figure A-5: Capacity Changes



Appendix B -- Regression Result Summaries

B-1: Regression Model used to Estimate the Determinants of Marginal Congestion at the Manitoba Hydro Interface with MISO

Estimates of Autoregressive Parameters

Lag	Coefficient	Std Error	t Value
1	-0.896657	0.003347	-267.88

Regress R-Square 0.1107 Total R-Square 0.8776

Yule-Walker Estimates

Parameter Estimates

Variable	Estimate	Std Error	t Value	Approx. Pr > |t|
Intercept	8.6284	1.0976	7.86	<.0001
MEC	-0.0971	0.005231	-18.56	<.0001
MARKET_GEN	-0.000042	0.0000117	-3.64	0.0003
RAMPDEMAND	-0.000206	9.0498E-6	-22.79	<.0001
WINDSHARE	-45.2384	3.2332	-13.99	<.0001
MHEB_EXPORT	-0.000778	0.0000857	-9.08	<.0001
PEAK	0.2125	0.0738	2.88	0.0040
SUMMER	-0.6233	0.3377	-1.85	0.0650
WINTER	1.8698	0.3580	5.22	<.0001
HEADROOM_WEST	-0.000873	0.0000495	-17.63	<.0001
SPARK	-1.3718	0.5028	-2.73	0.0064

B-2: Regression Model used to Estimate the Determinants of Marginal Congestion at the Minnesota Hub

Estimates of Autoregressive Parameters

Lag	Coefficient	Std Error	t Value
1	-0.872090	0.003700	-235.72

Yule-Walker Estimates

Regress R-Square	0.1123	Total R-Square	0.8513

Parameter Estimates

Variable	Estimate	Std Error	t Value	Approx Pr > |t|
Intercept	12.0768	0.9322	12.96	<.0001
MEC	-0.0288	0.005248	-5.49	<.0001
MARKET_GEN	-0.000031	0.0000112	-2.74	0.0062
RAMPDEMAND	-0.000235	9.1225E-6	-25.73	<.0001
WINDSHARE	-38.2088	3.0165	-12.67	<.0001
MHEB_EXPORT	-0.000590	0.0000860	-6.86	<.0001
PEAK	0.1562	0.0745	2.10	0.0361
SUMMER	-0.4452	0.2824	-1.58	0.1149
WINTER	0.9854	0.2979	3.31	0.0009
HEADROOM_WEST	-0.001047	0.0000487	-21.48	<.0001
SPARK	-3.8936	0.4190	-9.29	<.0001

Tab 113

MANITOBA	**Order No. 32/09**
THE PUBLIC UTILITIES BOARD ACT	
THE MANITOBA HYDRO ACT	
THE CROWN CORPORATIONS PUBLIC REVIEW AND ACCOUNTABILITY ACT	**March 30, 2009**

Before: Graham Lane CA, Chair
Robert Mayer Q.C., Vice-Chair
Susan Proven, P.H.Ec., Member

AN ORDER APPROVING APRIL 1, 2009 RATES FOR MANITOBA HYDRO

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5.0 IT IS THEREFORE ORDERED THAT: 47

Executive Summary

By Order 116/08, the Public Utilities Board (Board) provided an April 1, 2009 conditional general rate increase of 4% (excepting for Area and Roadway Lighting customers) for Manitoba Hydro (MH, the Corporation or the Utility), subject to the Board's further review.

After a thorough and intense consideration of the evidence, and considerable contemplation, the Board will approve rate increases as of April 1, 2009 but will vary the level of the increases to 2.9%, to apply to all classes excepting for the Area and Roadway Lighting class.

By so doing, the Board balances MH's evidence of recent improvements in the Utility's financial situation and the pressures on its customers due to the recession with the Board's ongoing concern respecting the many risks faced by MH. Notwithstanding several years of contemplating and evaluating the risks, assisted by reports filed by MH and the views of Interveners, MH's risks still have not been sufficiently detailed and quantified for the Board.

Accordingly, the Board expects MH's construction program and export plans, and risks, and the implications for consumer rates to be fully defined and reviewed by the Board prior to MH's finalization of pending export agreements, and ahead of any further rate increase consideration by the Board. The Board notes that MH's current plans would have the Utility's undepreciated plant in-service increase from $12 billion (2009) to over $37 billion by the end of 2028, with a concurrent increase in long-term debt from almost $7.2 billion in 2009 to over $19.4 billion. These are "large numbers" and affect the Utility's risk profile, providing further support for the Board's expectation of a thorough review prior to finalizing pending export commitments.

That said, the Board shares MH's concern that, over time, the loss of an April 1, 2009 rate increase would compound into a material reduction of retained earnings, and, potentially, be damaging to the Corporation's future financial position and customer rate

stability. Even with the April 1 rate increase, MH's rates will remain amongst the lowest in North America, for residential, institutional, commercial and industrial customers.

In approving rate increases for April 1, 2009, and based on the evidence to date, the Board agrees with MH's assertion that the Utility's projected rate increases over the next several years, including the increase now approved for April 1, are not based on "pre-funding" major capital construction projects so as to provide a benefit to future rather than current ratepayers, but rather to ensure MH's equity levels are adequate to protect consumers and the Utility should one or more of the Utility's major risks actually occur.

While MH's latest long-term financial forecast reports a relatively attractive future outlook, the Board remains concerned that on an overall basis MH's 20-year forecasts may seriously overstate likely export revenues, particularly with respect to:

- Annual energy sales -- by assuming total energy sales at 115% of long-term average annual hydraulic generation in every year.
- A built-in supply shortfall of 10-13% of export sales, presumably to be met through financial settlement of non-delivered exports.
- The downside potential of periodic droughts.
- Possible U.S./MISO market constraints.
- The timing and magnitude of Green House Gas (GHG) control measures.
- Current and pending export contract prices and other contract conditions, which are unknown to the Board to this date.

Because the Utility's latest 20-Year integrated financial forecasts (IFF) are integral to its plans for advancing new Generation and Transmission projects, and are to be funded largely by debt, the Board continues to express substantial concerns about the potential for higher than projected domestic rate increases in the event that export revenues are lower than now forecast. Toward this end, MH will be directed to prepare a series of 20-year alternative scenarios (IFF/Power Resource Plan/Capital Plan) that reflect a number of variations to the currently published scenarios.

Accordingly, the Board will direct MH to file by September 30, 2009, for Board approval, a conceptual outline for an in-depth and independent study of all the operational and business risks facing the corporation. As well, the Board directs MH to file a 20-year capital expenditure forecast, together with draft terms of reference and timeline for a regulatory review of MH's planned capital program and its impact on consumer rates; this on or before December 1, 2009.

As to low-income consumers, and while the Board is encouraged by the commitments undertaken by MH with respect to developing a broader low-income bill assistance program, and understands that the Utility undertakes significant efforts to work-out reasonable payment plans for customers experiencing economic distress, it will expect the Utility to provide a further report well ahead of the next heating season. The report is to address options considered, provide details on the options and of the assessment made, and recommend a specific course of action that can be implemented by October 31, 2009.

Finally, the Board expects to receive all outstanding responses to past Board Directives (including those in Order 150/08), in such time so as to permit the Board to conduct a complete review of MH at the General Rate Application MH is to file by October 1, 2009, for the 2010 and 2011 fiscal test years.

1.0 Background

MH filed a 2008/09 General Rate Application (GRA) with the Board in 2008 seeking increases in electricity rates.

Following a public hearing process, which included the orderly exchange of written evidence by MH and Interveners, the Board held an oral public hearing and, subsequently, issued Order 90/08 containing preliminary findings and directives.

Included in Order 90/08 was Board approval of a 5% increase for all consumer classes (except for Area and Roadway Lighting customers) effective July 1, 2008. As well, the Board then-indicated that a further 4% increase may be granted as of April 1, 2009, with the April 1, 2009 rate increases expressly subject to reconsideration following receipt and review of additional information that the Board was requesting.

Subsequently, on July 29, 2008 the Board issued Order 116/08, which contained additional and detailed rationale for the rate changes and further direction on a number of other significant matters.

By Order 116/08, the Board again indicated that the April 1, 2009 conditional, across all rate classes, general rate increase of 4% (excepting for Area and Roadway Lighting customers) was expressly subject to the Board's further review, that, depending on developments, could result in the Board increasing or decreasing the 4% increase that had been conditionally approved. As well, Order 116/08 contained a series of directives for MH to address in fiscal 2009.

Following the issuance of the orders, MH sought to "Review and Vary" certain of the directives, which resulted in a restatement of the Board's directives, as now found in Order 150/08. (A more detailed understanding of the Board's reasons and directives may be gained through a review of Orders 90/08, 116/08 and 150/08, all to be found on the Board's website www.pub.gov.mb.ca.)

On February 2, 2009, MH filed a "Status Report" responding to the directives in Order 116/08, as amended by Order 150/08. MH also indicated in its filing that the materials it

was filing in response to the Board's directives were also being filed in support of MH's request for Board approval of the 4% April 1, 2009 conditional rate increase.

To assist the Board in its review of the material filed by MH, the Board instituted a process whereby Interveners from the 2008/09 GRA Hearing could provide submissions on both the material filed by MH and respecting the 4% conditional rate increase.

2.0 Interveners' Submissions

2.1 City of Winnipeg

The City of Winnipeg is MH's major customer in the Area and Roadway Lighting customer class.

In Orders 90/08 and 116/08, the Board indicated that there would be no rate increases for the Area and Roadway Lighting class in 2008 or 2009, a decision based on the Board's determinations following MH's GRA.

The City of Winnipeg's submission emphasized that the basis for not increasing the rates charged to Area and Roadway Lighting Customers, that being that the current rate for the class was in excess of what was required, continues to exist following the GRA, and that the additional information contained in MH's Status Report continues to support the City's position that there should be no increase in April 2009 to Area and Roadway Lighting rates.

The City of Winnipeg concluded that the Board's rulings have been based on the revenue to cost coverage (RCC) ratios for the Area and Roadway Lighting class, where, historically, the RCC for the Area and Roadway Lighting class has consistently been above the upper limit of the "zone of reasonableness" (i.e. a revenue to cost ratio falling between 95% and 105%), as well as being higher than the revenue to cost coverage ratios of other customer classes.

The City of Winnipeg submitted that as the circumstances that resulted in the Board's GRA decisions continue to exist, there is no reason for the Board to vary its decision and grant MH April 1, 2009 rate increases for Area and Roadway Lighting customers.

In further support of its position, the City of Winnipeg, after having reviewed MH's Status Reports, suggested that MH's economic conditions had generally improved since the 2008/09 GRA.

The City also brought to the Board's attention MH's 20-year electricity financial forecast, which, with three minor exceptions, projects net income higher for each year of the 10-

year period from 2009 to 2018 than was projected in MH's previous longer-term forecast, the Integrated Financial Forecast (IFF) 07-1, which was reviewed at the GRA.

The City further noted that, unlike the projections of IFF 07-1, MH's key debt to equity ratio is now projected, by the Utility, to meet the targeted goal of no more than 75% of debt from 2009 through to 2013, this according to MH's most recent 20-year financial forecast.

The City held that given MH's reports and forecasts of financial improvement, as set out in the Utility's Status Report, and the prolonged history of the revenue cost coverage ratio for the Area and Roadway Lighting customers being above the upper limit of the accepted zone of reasonableness, no increase should occur to rates charged to customers in the Area and Roadway Lighting class.

2.2 Consumers' Association of Canada (Manitoba) Inc., Manitoba Society of Seniors and Winnipeg Harvest (Coalition)

From the Coalition's perspective, a 4% rate increase is not justifiable, given the intervener's perception of a material improvement in MH's financial position, the Utility's perceived failure to control day-to-day expenditures, and the sharp deterioration in the global, Canadian and Manitoba economies. The Coalition recommended that the conditional rate increase either be rejected in its entirety, or that the rate increase be set significantly lower than 4%.

Furthermore, the Coalition renewed its call for an urgent inquiry into the projected impact of future export-related capital expenditures on consumer rates. The Coalition noted that the economic climate has changed profoundly since the conclusion of the 2008/09 MH GRA hearing, and that a global credit market crisis has intersected with a dramatic chill in global demand and output to result in forecasts of negative economic growth in 2009 (economic growth in the Province of Manitoba has been projected to be less than 1%, as compared with the 2.7% assumed in the April 2008 provincial budget).

While economic conditions for individuals and businesses have deteriorated, the Coalition noted that the financial circumstances of MH have, based on the Corporation's

published results and recent forecasts, shown marked improvement since the GRA. By way of example, Coalition noted that while MH was suggesting at the GRA that it wouldn't reach its debt to equity target until after 2018, its new projection has the Utility reaching the target in 2009.

Coalition also suggested that what it perceived as dramatic improvements in the revenue, net income and retained earnings perspective of the Utility have not been matched by progress in other areas, such as OM&A expenditures. Coalition noted that the OM&A costs for 2008/09 increased by 8%, and that the Corporation does not expect a decline in OM&A costs in 2009/10, notwithstanding the economic downturn.

The Coalition suggested that a compelling argument could be made that over the past four years MH has adopted an asymmetrical approach to improving its financial position, focussing on revenue improvements while neglecting expenditure control.

The Coalition opposed a rate increase that, if granted at 4%, would be "four times the expected rate of inflation", and would come at a time when consumers are hard-pressed by disproportionate increases in the cost of basic necessities. The Coalition also cited the global economic downturn, which has dissipated savings and made employment prospects uncertain.

The Coalition submitted that the Board should not approve a 4% increase, which is representative of $45 million in additional annual revenue for the Corporation, "out of the pockets of Manitoba consumers and businesses at this point in time", holding that such an increase would be counter-productive to local, national and international efforts to stimulate consumer spending and boost consumer and business confidence.

The Coalition recommended a rate increase no more than the projected rate of inflation, i.e. 1%, while preferring no increase. In the event the Board held an increase was required to better ensure the Corporation's financial targets are met, the Coalition suggested it be limited to 2%.

The Coalition held that MH's forecast revenue requirements going forward place increased pressure on consumer rates, and this pressure is due to planned future

capital development. The Coalition called for a separate regulatory process to consider the risks and rewards related to proposed and planned future generating station and transmission line developments, and that it be held no later than the winter of 2009/10.

2.3 Manitoba Industrial Power Users Group (MIPUG)

In its submission to the Board, MIPUG recommended:

(i) the Board should not approve a 4% rate increase as of April 1, 2009, and, at a minimum, the Board should reduce any rate increase to 2% or less; and

(ii) in considering any future rate increase applications, the Board should require MH to provide copies of current IFFs and/or 20-year financial forecasts that reflect (a) the impact of foregoing a rate increase and (b) adjusting sought-after and projected rate increases to no more than the general annual inflationary rate increase (i.e. 2%).

In its submission, MIPUG also indicated that, if the conditional 4% increase was granted, it would represent the third consecutive year of MH rate increases in excess of the Bank of Canada's annual inflation target of 2%, and would result in there having been rate increases in excess of the rate of general inflation in five of the last six years.

MIPUG included in its submissions references to Board Order 90/08, where the Board discussed the target of a debt to equity ratio of 75:25, and observed that the granting of a 4% rate increase would come during a time of a major economic downturn, which would exacerbate the impact of the rate increase on all consumers.

MIPUG Presenters at the December 2008 Energy Intensive Industry Rate Hearing indicated to the Board that MH's industrial customers are facing dire economic situations, with demand falling in local and world markets. MIPUG submitted that the current economic situation is unprecedented, and, noting the pace of recent electricity rate increases, suggested that the Board should very carefully consider the need for further rate increases at this time.

MIPUG's submission addressed the three primary reasons it perceived as being supportive of the Board awarding a higher rate increase than had been initially sought by the Utility in the GRA, those being;

- Support for the debt: equity ratio target of 75:25;
- MH's forecast capital expenditures, which could approximate $20 billion over the next 15 years, and
- Risks faced by the Utility, including the possibility of future below average water conditions, lower than expected export demand and prices, higher interest rates, further currency fluctuations, and the decisions required with the upcoming adoption of IFRS.

That said, MIPUG submitted that a higher than inflation rate increase, as sought by MH, would represent a "pre-funding" of capital projects anticipated to deliver benefits to future ratepayers. MIPUG noted that the future benefit element is reflected in the fact that MH's current forecast debt: equity ratio projects a quick decline in the ratio following the 2022/2023 projected in-service date of Conawapa

MIPUG questioned whether the 4% requested rate increase, taking into full consideration the current economic situation, represented a bid to unreasonably shift costs to current ratepayers for benefits expected for future ratepayers. MIPUG recommended the rate increase not exceed 2% on April1, 2009.

2.4 Resource Conservation Manitoba/Time to Respect Earth's Ecosystems (RCM/TREE)

RCM/TREE supported MH's application for a 4% rate increase, with observations pertaining to MH's revenue requirements, class allocations and rate design.

In examining MH's projected debt to equity ratio, estimated to be 74:26 in the current year, RCM/TREE recommended that the Board resist the temptation to reduce or eliminate the conditional 4% rate increase, rather the intervener recommended the Board proceed with and approve the 4% increase, this in recognition that the debt to

equity financial target is a long-run, not short-run, target. For RCM/TREE, with expected and considerable past annual variability in MH's revenues, the long term should remain the Board's focus. RCM/TREE noted that MH's forecast predict that after 2014 MH's projected debt to equity ratio will again fall below the long term target of 75:25.

RMC/TREE also reminded the Board that consumers pay bills not rates, and recommended that MH accelerate its DSM efforts to allow consumers to stabilize or lower their bills through reduced consumption. RCM/TREE also suggested that rate affordability measures for low-income consumers should be implemented as soon as possible, and prior to the next heating season.

RCM/TREE also recommended that the rate increase be structured so as to provide inclined rates for both residential and industrial customers; RCM/TREE considers the current second tier for residential customers as falling short of full marginal costs, and therefore a rate too low for presenting consumers with needed recognition of the full cost of electricity consumption.

Accordingly, RCM/TREE submitted that adjustments be made to the quantity of energy permitted in the first and lower-priced residential block, so that more residential customers will face second tier energy charges. RCM/TREE also prefers that the rates for the first and second tiers be designed on a revenue neutral basis.

3.0 MH's Response

In its response to Intervener submissions, MH held that there have been no material changes since the GRA that have either improved the long-term financial strength of the corporation or reduced its risks. Accordingly, MH submitted that fiscal prudence dictates that the conditional rate increase of 4%, effective April 1, 2009, be confirmed.

MH advised that attention should be paid to not only reaching but also maintaining the 75:25 debt:equity financial target, and that approval of the 4% rate increase effective April 1, 2009 will contribute towards that achievement. That said, MH submitted that even with a 4% rate increase as of April 1, 2009, long-term maintenance of the debt:equity target ratio may remain "elusive".

MH submitted that Coalition and MIPUG failed to recognize the role that the 4% rate increase would play in allowing MH to maintain its 75:25 debt:equity target. MH suggested that, over time, the loss of the April 1, 2009 4% rate increase would compound into a material reduction of retained earnings, and be highly damaging to its future financial position and customer rate stability.

MH advised that IFF-08 and the Utility's 20-year electricity financial forecast of January 2009 are based on expected or average conditions, and that the realization of certain significant risks, such as a prolonged drought, reduced export prices, or unforeseen infrastructure damage, could "derail" the corporation's planned build-up of equity.

MH disputed MIPUG's assertion that the Utility's projected rate increases over the next several years represent an attempt to "pre-fund" major capital construction projects (and provide a benefit to future rather than current ratepayers), and held that the need to build-up equity is not to pre-fund projects but to strengthen the Utility's ability to withstand risk.

In response to the critical submissions of the Coalition on the topic of OM&A costs, MH suggested that its OM&A cost levels are "proceeding exactly as represented" at the GRA (by MH), and reminded the Board of the Utility's evidence at the GRA that OM&A

costs were increasing due to various business factors that are in addition to the ongoing pressure of inflation, those being aging infrastructure, increasing maintenance, environmental monitoring requirements, increased staffing costs and domestic load growth.

MH submitted that the increases in OM&A costs should be understood in light of the GRA evidence, where the difficulty of attracting qualified professionals and trade personnel was outlined, and that there were, at that time, approximately 200 unfilled staff positions (the latter a major factor in OM&A costs being $16 million less in 2007/08 than forecast, costs that MH expected would ultimately be annually expended once staffing levels meet Utility needs).

MH acknowledged the uncertainty of present economic times, but held that there is no consensus regarding expectations as to the quantum and duration of currently lower inflationary pressures. While MH conceded that the downturn provides important context to the Board's evaluation of the April 1, 2009 conditional rate increase, the Utility also submitted there are other factors that the Board should consider, including MH's continuing position of having the lowest overall rates in Canada.

In response to RCM/TREE's submission, and while acknowledging that intervener's general support for the implementation of a 4% rate increase, MH submitted that RCM/TREE's inverted rate design suggestion is premature, and that the Utility is currently reviewing options for the long term direction of residential inverted rates, with a view to recognizing the benefits of efficiency-inducing price signals while acknowledging the lack of energy choice available to many electric heat customers.

MH suggested that a long-term plan to provide meaningful second tier rates requires stakeholder review, and that the process of developing such rates would best be furthered through a subsequent GRA.

In respect to the City of Winnipeg's submission, MH conceded that it is unaware of any changes in circumstances that would justify the Board varying its decision not to increase the Area Roadway and Lighting class rates at this time.

4.0 Board Findings

In reviewing MH's February 2, 2009 "Status Report" filings, the submissions of Interveners, and the response by MH to those submissions, there are several major, compelling and, sometimes contradictory factors that the Board concludes it must take into account in deciding on whether the April 1, 2009 conditional rate increase should be approved. These factors include MH's stated and forecast financial position, the state of the economy, and the number, nature and evolving risks faced by the Corporation,

After a thorough and intense consideration of the evidence, and considerable contemplation, the Board will approve rate increases as of April 1, though vary and reduce the level of the average rate increases to 2.9%, to apply to all classes excepting for the Area and Roadway Lighting class.

By so doing, the Board balances MH's short-term financial situation and risks with the Board's ongoing concern respecting the many risks still faced by MH. Those risks still have not been sufficiently detailed and quantified and, accordingly, the Board will require substantive elaboration of MH's construction program, export plans and risks.

The resulting implications for consumer rates should be fully defined and reviewed by the Board prior to MH's finalization of pending export agreements.

Operating Results and Financial Projections

The Board notes the reported improvement in MH's actual and forecast debt:equity ratio, and understands the improvement is largely attributable to two factors, rate increases approved by the Board and recent favourable river flows bringing additional export revenues.

MH's decision to file the 2008/09 GRA was based on IFF MH 06-4, a forecast which projected net income for fiscal 2007/08 to be $244 million, with a further forecast of $156 million of net income for fiscal 2008/09. MH subsequently filed an updated forecast IFF MH 07-1, and revised its net income forecast for 2007/08 to $264 million.

During the 2008/09 GRA, MH provided a further and oral update to IFF MH 07-1, projecting that net income for fiscal 2008 would be higher by at least $36 million, bringing the expected net income for the year to approximately $300 million. As it turns out, actual net income for 2007/08 was $340 million, an increase of approximately $96 million from that initially forecast in IFF MH 06-4, and $76 million higher than forecast in IFF MH 07-1.

Since the 2008/09 GRA, MH's actual and forecast financial performance has improved or is expected to improve significantly from that projected in IFF07-1, as reflected in the following schedule:

Statement of Operations & Retained Earnings ($ Millions)	**IFF07-1**	**Actual**	**IFF08-1**	
Fiscal Year	**2008**	**2008**	**2009**	**2010**
Revenue				
Domestic	1,078	1,098	1,125	1,204
Conditional Rate Increase		-	-	45
Export	582	625	619	546
Total Revenue	1,660	1,723	1,744	1,756
Expenses				
Finance	404	407	399	425
Depreciation	332	325	351	374
Operations & Administrative	351	335	349	358
Water Rentals	121	124	121	112
Capital & Other Taxes	57	57	65	71
Fuel & Power Purchased	132	134	150	199
Total Expense	1,397	1,382	1,436	1,539
Net income Actual/ Forecast	264	340	308	217

MH's projected net income in IFF MH 08-1 for the three-year period of 2007/08 to 2009/10 is now expected to be $774 million higher than that the Utility forecast in IFF

MH 03-1, $359 million higher than in IFF 06-4, and $341 million higher than that forecast in IFF 07-1.

The latter forecast was presented at the 2008/09 GRA, as reflected in the following schedule:

Electric Operations: ($millions)

For years ending March 31:	2008 (Actual)	2009 (Forecast)	2010 (Forecast)
Net Income			
Actual/IFF08-1	340	308	217
GRA Update	300	155	105
IFF07-1	264	155	105
IFF06-4	244	156	106
IFF06-2	174	127	122
IFF04-1	99	94	124
IFF03-1	17	29	45
Difference IFF08-1 Vs. IFF07-1	**76**	**153**	**112**
Difference IFF08-1 Vs. IFF06-4	**96**	**152**	**111**
Difference IFF08-1 Vs. IFF03-1	**323**	**279**	**172**

MH's reported retained earnings and debt:equity ratio were $1.8 billion and 75:25 respectively in 2007/08, and the Utility has since forecast further gains, with retained earnings to reach $2.1 billion in 2008/09 and $2.27 billion by the end of fiscal 2009/10, as reflected in the following schedule (to result in debt:equity ratios of 74:26, 75:25, respectively):

Electric Operations: ($millions)

For years ending March 31:	2008 (Actual)	2009 (Forecast)	2010 (Forecast)
Retained Earnings			
Actual/IFF08-1	1,795	2,102	2,270
GRA Update	1,771	1,927	2,032
IFF07-1	1,735	1,891	1,996
IFF06-4	1,651	1,807	1,914
IFF06-2	1,572	1,699	1,821
IFF04-1	1,271	1,365	1,489
IFF03-1	877	906	950
Difference IFF08-1 Vs. IFF07-1	**60**	**211**	**274**
Difference IFF08-1 Vs. IFF06-4	**144**	**295**	**356**
Difference IFF08-1 Vs. IFF03-1	**918**	**1,196**	**1,320**

Third Quarter Financial Report

During the week of February 23, 2009, MH released its 3rd Quarter 2008/09 Financial Report for the nine months ending December 31, 2009. MH's electricity operations were reported as having developed domestic revenues of $796 million and $532 million of export revenues. For domestic revenue, this represents an increase of $36 million (or 5%) from the same nine-month period of the prior year.

As noted by the Coalition, the expenses attributed to electricity operations were reported to have increased $70 million, or 7%, from the same period of the previous year, with $32 million attributable to increased power purchase costs and $23 million due to increased operating and administrative expenses. MH attributed the increase in operating and administrative expenses to higher maintenance requirements for its generation, transmission and distribution systems.

Despite continuing criticism by the Coalition and concerns expressed by the Board, MH has yet to demonstrate recognition that there is a need for implementing more control

over OM&A expense increases. As in past Orders, the Board continues to seek more concise and effective benchmarking of MH's OM&A expenses against those of other Crown owned Canadian hydro-electric based utilities. Overall, MH forecast that its net income for the last quarter of the fiscal year 2009/10 will be sufficient to, with the first three quarter results already known, generate 2008/09 net income in excess of $300 million, this to compare with the $346 million of net income reported for the 2008/09 fiscal year. Though there has been no indication from the Utility that this most recent forecast is unachievable, the Board notes recent SEP and NEB data suggest that despite a significant decline in the value of the Canadian dollar vis a vis the American dollar, there has been a softening of export prices.

Accordingly, and while not a determining factor in the Board's rate decision for April 1, the Board wonders whether the softening of export opportunity sale pricing may result net income for 2009/10 not reaching the $300 million forecast of the Utility.

Unrealized Foreign Exchange Loss

MH's results are tied in part to currency levels, with MH selling and buying power to and from American utilities and relying on almost $2 billion of debt denominated in American dollars (borrowed to fund previous capital expenditures). MH advances the view that because export sales to American utilities are priced in U.S. dollars, and that a significant amount of those sales are through long-term contracts, the Utility has a "natural hedge" against the currency risk associated with U.S. dollar denominated debt.

Accordingly, currency swings in the Canadian dollar value of U.S. denominated debt are not immediately reflected in the Utility's annual net income reports, rather the vast majority of such fluctuations are captured in a "balance sheet" account denoted as Accumulated Other Comprehensive Income (AOCI), with the amount to be recognized within MH's annual net income reports over lengthy periods of time.

For the nine months ended December 31, 2008, U.S. foreign exchange rates increased from $1.03 CAD/USD at March 31, 2008 to $1.22 CAD/USD at December 31, 2008. This major and unexpected currency shift, largely the result of the credit crisis, the

collapse in commodity prices and the world-wide recession, resulted in a $366 million unrealized foreign exchange loss on debt in cash flow hedges on the translation of approximately $1.9 billion of net U.S. denominated debt.

The $366 million of unrealized foreign exchange losses resulted in a reported deficit of $92 million at December 31, 2008, this compares to a $305 million surplus reported as at March 31, 2008 in AOCI. MH has further reported that, based on a February 28, 2009 revaluation, the unrealized foreign exchange loss on debt in cash flow hedges has increased to $456 million (based on an exchange rate of $1.27 CAD/USD). If the Canadian dollar has not increased in value in relation to the American dollar by March 31, 2009, a further increase in the AOCI deficit is likely.

MH has indicated that the recognition of hedged export revenues during 2008/09 will contribute an estimated $11.4 million foreign exchange gain (initially accumulated in AOCI) to 2008/09's reported net income. Changes in USD debt and U.S./Canada foreign exchange rates from February 28, 2009 to March 31, 2009 could alter this appreciably.

The recent currency reversal bringing about the large level of unrealized losses currently in AOCI will, if the Canadian dollar does not appreciate materially, eventually be recognized in net income in subsequent reporting periods, as U.S. export revenue in a designated hedging relationship is realized.

The Board is concerned that the higher Canadian dollar debt levels (American debt represented in Canadian dollars) and concurrently higher interest charges may not be offset by export price increases in a recession-driven export market. That said, given the state of the world economy and the startling and abrupt movements in currency values recently experienced the implications for the Utility's 2010 and beyond fiscal years cannot be confidently forecast. There is some potential that these losses will have to be recognized in net income in the next few years.

In addition, there is a further complication, that being the upcoming implementation of IFRS. MH will have to review its hedge accounting to ensure that its current hedge

relationships continue to remain effective upon transition to IFRS. The status of this accounting policy, among others, is of considerable interest to the Board, due to the potential and material financial impact upon reported and/or forecast finances of the corporation.

Economy

Given the risks and uncertainty now present, absent the economic downturn and its impact on all domestic consumers, (residential, commercial, industrial and institutional), the Board would not have varied the conditional increase and would have approved 4% for April 1.

The compelling factor in the Board's decision to vary its initial direction and reduce the April 1 increase to 2.9% is the slow-down in the economy, which to this point does not appear to have impacted the Manitoba economy to the degree it has elsewhere, excepting for the notable exception of the decline of worth in investment portfolios held by individuals, companies and pension plans.

These factors lie at the root of the Board's decision to reduce the conditional rate increase effective April 1, 2009, and recognize the reality of material changes since the GRA evidence. When the Board held MH's 2008/09 GRA Hearing in mid-2008, the pending deterioration of the general economy was unknown.

Subsequently, the Board heard from MIPUG Presenters at the December 2008 hearing in respect of the proposed Energy Intensive Industrial Rate, that the economic downturn was impacting Manitoba's industrial customers. While commercial enterprises have the ability to deduct energy costs from taxable income, a benefit not available to consumers and not-for-profit institutions and agencies, there needs to be net income before there is taxable income; in the absence of taxable income, the impact on private enterprise of higher energy costs is similar to that on households, a decrease in net worth.

In short, the negative economic situation facing innumerable consumers supports the Board's variance of the April 1, 2009 planned conditional rate increase.

As well, and of particular note, the Board, though pleased with the Utility's intentions and efforts made to-date with respect to assisting low-income consumers, is not satisfied with MH's progress to-date with specific respect to developing a low-income bill assistance plan.

Risks

While there are factors that speak to reducing the proposed 4% increase there remain other factors that support a continuation of building up the financial strength of MH to meet the business risks the corporation faces. In its decision the Board has not lost sight of the importance of reaching and maintaining the long-term financial targets for MH, and the risks the Utility faces.

In Orders 143/04, 20/07, 90/08 and 116/08 the Board had raised concerns on the many risks faced by MH. In Order 90/08, the Board noted that MH's plans for capital expenditures may involve $18 billion or more of capital expenditures over the next 15 years; expenditures predicated in part on what appears to the Board, based on the evidence available to-date to the Board, to be overly optimistic export prices.

In Order 90/08, the Board noted that the planned level of capital expenditures will result in significantly increased debt levels, export commitments and, as a result, increased general business risks. The Board then-questioned whether the export revenue stream from new generation and transmission projects will be sufficient to cover the financial obligations related to these projects, taking into account known inherent risks, both those now present and those that may lie ahead.

In Orders 116/08 and 150/08, the Board reaffirmed the aforementioned concerns, and continued to seek additional information so as to better inform itself. MH has yet to fully comply with the Board's directives related both to export pricing and capital expenditures. Compliance with the directives, and a subsequent Board review of the implications for consumers' rates, is, in the Board's view, needed prior to MH finalizing pending export agreements.

The Board has sought, and continues to seek, assurances from MH that new export contracts are priced such as to allow MH's forecasts of future revenues from exports to be realized. The Board's concerns have been exacerbated by recent average export price history and the slowing North American economy.

In Order 116/08, the Board further indicated that it had not been provided with MH's specific export contract prices and terms and expressed concerns because of recent average export price history. MH's forecasts assumed an USD/CDN exchange rate of 1.16 and in-place carbon dioxide emissions legislation working together to positively affect export pricing, so as to achieve the Utility's forecast of average export prices of 10¢/kW.h by 2018.

If that level of export pricing is not realized, MH could be faced with an extended period of time where average export prices will not cover incremental costs associated with Bipole III, Keeyask G.S., and Conawapa G.S. If this did occur, while it would drive up the debt component of the debt:equity ratio, and reduce net income, it would represent a similar situation to that of the early experience with Limestone G.S. (in-service in1992), where costs exceeded revenue from Limestone for several years following its in-service date. This is also the expected outcome for several years following Wuskwatim G.S. coming into service.

The Board has noted in previous orders that with high construction costs, ongoing inflation and the reasonable risk that, interest rates (now being at historic lows) will rise, particularly for government-backed debt, it is in the public interest to test and ascertain whether sufficient prices will be secured on the export market to meet costs and continue to assist in holding down domestic rates.

The Board still holds that any material shortfall from required export pricing and supply/demand may well have the effect of reducing future annual net income significantly after 2018, which would place further pressure on domestic rates, assuming the debt::equity target remains at 75:25.

At the 2008/09, GRA MH then-testified to a condition of hyper-inflation with respect to construction and commodity costs, which were then-having the effect of increasing MH's projected costs for new generation and transmission projects. MH had also then-indicated that this escalation in costs had lowered the Corporation's estimate of the return to be expected from its new generation projects (Wuskwatim), a project likely to be followed by further major construction projects such as Pointe de Bois, Bipole III, Keeyask and Conawapa.

MH's concern as to construction costs was reflected in the increased cost estimates for Keeyask, an estimate that escalated by $900 million while Conawapa's estimate increased by $1.3 billion since CEF08-1. Whether the current economic downturn, which has led to job losses in the oil sands and elsewhere in occupations highly sought-after by MH, will be prolonged and lead to a reduction in currently forecast construction costs is highly speculative.

Also, it is reasonably suggested that interest rates will likely increase at some point during MH's expansion phase, placing increased pressure on the cost of operation. It is difficult to imagine that government debt rates currently in vogue can be sustained in a recovered economy.

In addition, the Board has repeatedly raised concerns with respect to the risk of drought, noting that MH has benefited from 12 of the last 16 years being of above-median water flows. Statistically, poorer water conditions can be expected to occur at some point in the future and, if prolonged and/or significant, could well have a devastating impact on MH's financial situation, as was the case in fiscal 2003/04.

MH has suggested that a drought of 2003/04's severity can be expected to re-occur once every 15 years, on average. The Board noted in Order 116/08 that longer droughts of potentially greater consequence have occurred at least three times in MH's history, and that history is very short in climatic and historical terms.

While MH has defined the potential impacts of various drought events, it has not provided a frequency-based in-depth analysis; such an analysis is required to

demonstrate the full range of economic consequence of the risk. In Order 116/08 the Board directed MH to provide such an analysis.

The Board is interested in reviewing not just the "likely" favourable outcome of various year's results, but scenarios ranging from best case to worst-case. Over the next fifteen or so years, MH's investment in fixed assets may rise, in historical cost terms, three-fold; the implications of drought rise as the value at risk rises.

The Board has also noted and reiterated concerns with the continued high level of capitalization of OM&A expenditures, which has allowed for higher than would otherwise be net income levels, both actual and projected. The Board anticipates, as does MH, though to a lesser extent, that MH's current capitalization approach will change with the adoption of IFRS.

The Board has noted that the adoption of IFRS will likely result in a higher level of OM&A expense. Such a development would impact negatively on MH's now-forecast future profitability, and could well lead to a reduction of MH's net income forecasts going out to 2017/18 and beyond.

In Order 90/08, the Board indicated that in granting a 5% increase effective July 1, 2008 and a conditional 4% increase for April 1, 2009, that:

> *"MH is of great importance to the provincial economy, its residents and businesses, and clearly it is not in the public interest to allow MH's financial condition and service capabilities to decline. Given the plans for massive new generation and transmission capital expenditures, the possibility of future poorer water flow conditions, the risk of lower than forecast export prices and higher interest rates, and the upcoming adoption of IFRS, as well as the other risks identified by the Board in Order 143/04, MH will require additional revenues going forward."*

The Board further advised that it remained focused on the risks that lie ahead and was determined to ensure, as reasonably as possible, that MH has the financial strength to meet the risks. To better understand the risks faced by the Corporation, the Board in Order 116/08 directed MH to undertake:

> *"a thorough and quantified Risk Analysis, including probabilities of all identified operational and business risks. This report should consider the implications of planned capital spending taking into account revenue growth, variable interest rates, drought, inflation experience and risk, and potential currency fluctuation"*

The Board also directed:

> *"MH to file by September 30, 2008, for Board approval, a conceptual outline for an in-depth and independent study of all the operational and business risks facing the corporation …."*

In Order 150/08, which dealt with MH's request to review and vary Orders 90/08 and 116/08, the Board reconsidered its direction that MH file a conceptual outline for an in-depth and independent study of all the operational and business risks facing the corporation, and was advised that MH would file an updated Corporate Risk Management Report. MH then-indicated that the Report would identify and quantify all the major operational and business risks facing the corporation. In Order 150/08 the Board advised that it would reassess whether an independent risk study is still needed, based on its review of information to be filed in January 2009.

Current Risk Assessment

Despite requests/directives from the PUB since the 2003/04 drought, MH has yet to provide a post-mortem on the energy supply and demand scenarios that led to the reported $436 million net loss. Nor has MH provided a forward-looking quantification of the potential supply and demand events that the corporation faces as it embarks on preparing for major new demand commitments.

The high-risk components of the 20-year IFF appear to be:

- Overly optimistic export price forecasts, forecasts of prices higher than what MH's contract rates for firm 5x16 power have to date, been able to achieve.
- Overselling hydraulic generation on an annual basis. Since fiscal 2000, MH has typically sold about 115% of its actual hydraulic generation, and relied on above average hydraulic generation (high river flows) and economically

priced imports to meet demand requirements. MH's natural gas thermal generation have not (at least to-date) been price competitive with imports.

- A presumption that, nine years out of ten, a combination of higher than forecast hydraulic generation and low cost imports will allow MH to avoid a net loss situation; and that nine years of positive results will more than offset one "bad" year.
- The presumption that any additional export revenue is positive, even if the price is below the average (or blended) cost of Generation &Transmission, let alone the Marginal Cost (MC) of new Generation &Transmission.
- The presumption that domestic rates are available to absorb losses related to droughts, infrastructure failure and/or under-performing export markets.

The ability to store hydroelectric energy provides MH considerable scope to shape energy supply to meet domestic and export demand. While the storage ability is an undeniable strength of the Corporation, the approach appears to be viewed as an unlimited and almost free attribute of MH's hydraulic system. This ability to store energy supports 5x16 peak export contracts, provides shaping for the variably available wind energy, and allows for an enhanced value for Wuskwatim run-of-the-river energy for export. Yet, it is not readily apparent to the Board whether the major components of the hydraulic generation system are being optimized.

While MH's storage capability is generally adequate to shift energy seasonally, this is not always the case on a year-to-year basis. On an annual basis, excess flow must typically be utilized within a six-month period, and depleting storage risks subsequent energy shortages (e.g. 2003-04 and 2006-07).

The loss that was incurred in the 2003-04 drought was unprecedented, and it became apparent to the Board that export operations could result in substantially increased costs for ratepayers under certain negative circumstances.

In 2004, MH suggested that while the actual event was not fully anticipated, the consequence, that being the large loss that was recorded, was largely unavoidable.

Going forward, MH advised that it would look to measures to reduce the consequences of future similar or greater droughts.

Dependable hydraulic generation for the year 2003/04 was 18,500 GWh, that being a level significantly below the 21,000 GWh on which MH bases its potential for firm export contracts (after fulfilling the domestic requirement). Yet, MH has not lowered the dependable resource level to 18,500 GWh; rather MH now defines the dependable resource as a multi-year historical event (not a one-year event). This effectively means that once every fifteen years (the deemed frequency of the 2003/04 drought event), MH will be faced with dependable energy shortfalls comparable to 2003/04; though perhaps in an environment of much higher import prices. MH has not adequately demonstrated that the Corporation's mean energy forecast adequately reflects this self-imposed additional risk.

The 2003/04 drought highlighted the increased risk that arose out of MH's strategic decision to increase exports beyond the level of surplus hydraulic generation (after fulfilling domestic need). Conversion of the Selkirk coal thermal generation to natural gas exacerbated the price-supply situation when natural gas prices soared. With MH honouring its export commitments (to preserve future opportunities) and meeting domestic need, the total energy supplied equalled 140% of actual hydraulic generation (up from the 115% contemplated in the preceding IFF's).

Following the 2003/04 drought, it was anticipated that MH would either reduce total export sales relative to hydraulic generation or ensure favourably priced imports were arranged to backstop a larger portion of the additional sales. The experience during the drought conditions of the fall of 2006-07 raised doubts about whether either change had occurred.

The 20-year IFF 08-1 confirms that MH continues to project total sales at about 115% (even as high as 120% at times) of hydraulic generation. Import projections have been increased, but not enough to be able to cover a supply shortfall equal to about 10% of forecast export sales.

The supply shortfall could be lower if it reflects the re-sale of non-delivered contract energy (significant in 2006/07 and 2007/08). This shortfall has been projected to reach the 1,000 GWh± level by 2016-17, and the shortfall apparently is not backed up by either specific budgeted imports or natural gas generated energy; this represents a substantive and distinct risk, potentially realizable in low flow years.

Future Export Prices/Revenues

As referenced in Order 116/08, MH has presented future export price scenarios to support the Corporation's revenue forecasts, including:

- GHG premiums in the U.S. would significantly increase coal generation costs by about 2011/12, and the assumption is in that case that Mid-Continent Area Power Pool (MAPP) and Midwest Independent System Operator (MISO) electricity prices would then track natural gas prices.
- Unrestricted access into the MAPP/MISO region for MH during peak and off-peak periods; and that MH's surplus energy would largely achieve peak market prices equivalent to natural gas generated electricity.
- MH's clean energy would be afforded environmental price premiums in the export market.

MH still forecasts that same scenario, although the forecast realization of it has been moved back by four to five years. MH's longer-term forecasts have average electricity export prices doubling by 2019, when Keeyask G.S. is assumed to be fully on-line. With off-peak prices likely to be substantially lower than peak prices at any time, peak prices will have to be significantly higher than the average price that includes off-peak.

MH's longer-term price forecasts have a common theme, that being that MH's clean electricity will displace coal generation, and that new clean coal generation will be considerably more expensive when it comes on-line. However, the time horizon for the technology implementation with respect to "clean" coal, is, in the Board's view, illusive,

and the economic downturn, accompanied by forecasts of massive levels of U.S. and Canadian government deficits, may distract legislators from environmental matters.

Cap and trade proposals may delay the closure of older and "dirty" coal generation in the MISO market. Even with the assumption that substantial CO_2 charges will be applied to the average cost of all existing coal generation, the average cost of coal generation could remain considerably lower than MH's short-term and long-term price forecasts. This again raises questions about the Utility's long-term export price forecasts.

Without greater access to the MISO base load, the Board currently anticipates that MH will continue to primarily serve summer peak period loads with its exports, and play a backup role to state and federal mandated wind generation.

The Board understands most of MH's long-term export contracts (existing and pending) focus on 5x16 peak energy, and it would appear that these contracts command prices generally below peak market prices, and, also, do not involve off-peak sales at above market prices. The Board anticipates the risk that in high flow years MH may still end up selling off-peak energy at 2-3¢/kW.h. If this assumption proves out, MH will have difficulty achieving near peak prices on a long-term average basis.

MISO market demand is also variable; up during cold winters and hot summers; down during warm winters and cool summers. Energy demand tends to rise and fall with seasonal weather variations. Consequently, while MH is unlikely to always realize the benefit of above average flows, it is likely to always experience the disadvantages of below average flows.

In summary, the Board is concerned that on an overall basis, MH's 20-year IFF may be seriously overstating likely export revenues with respect to:

- Annual energy sales -- by assuming total energy sales at 115% of long-term average annual hydraulic generation in every year.
- A built-in supply shortfall of 10-13% of export sales, presumably met through financial settlement of non-deliveries.

- Downside potential of periodic droughts.
- Possible U.S./MISO market constraints.
- The timing and magnitude of GHG control measures.
- Current and pending export contract prices and other contract conditions, which are unknown to the Board to this date.

Because the 20-Year IFF is integral to the plans for advancing new Generation and Transmission projects, the Board has substantial concerns about the potential for higher than projected domestic rate increases in the event that export revenues are lower than those now forecast. Toward this end, MH will be directed to prepare a series of alternative 20-year scenarios (IFF/Power Resource Plan/Capital Plan).

These should reflect a number of variations to the currently published scenarios, which appear to reflect a best case or highly favourable outlook, and include:

a) A pessimistic view of export prices (one assuming minimal U.S. - CO_2 pricing levels).

b) A periodic one-year drought (e.g., of the magnitude experienced in 2003-04).

c) A periodic multi-year drought (e.g., of the magnitude of the multi-year droughts of the 1940's or 1980's).

d) Zero long-term contract commitments.

e) A strong movement to domestic electric heating.

f) Existing transmission tie-line constraints.

g) Potential carbon tax on imports and a doubling of water rental rates.

Having reviewed the information filed, the Board remains of the view that the Utility has yet to adequately address the Board's concerns as to the risks faced by the Corporation. The Board believes a more detailed and independent risk analysis is required to assess the need and magnitude for, and of, future rate increases.

Accordingly, the Board will direct MH to file by September 30, 2009, for Board approval, a conceptual outline for an in-depth and independent study of all the operational and business risks facing the corporation. The study is to be a thorough and quantified Risk Analysis, including probabilities of all identified operational and business risks. This report is to consider the implications of planned capital spending, taking into account export revenue growth, variable interest rates, drought, inflation experience and risk, and potential further and continuing currency fluctuation.

To facilitate the Board's review of MH's risks, and in addition to the above Report, MH is to file all internally and externally prepared reports, since the 2003-04 drought, that have addressed any of MH's energy supply and other risks.

Financial Targets

While MH's current financial forecast has MH meeting its debt:equity ratio target in the short term, a deterioration of that ratio is expected as the construction of new Generation and Transmission projects is undertaken.

Since borrowing is required for new construction to proceed and a reasonable debt:equity ratio has been a concern of rating agencies, and presumably lenders, there remains a concern for all Stakeholders that a 75:25 debt:equity capital structure target may not be sufficient in this "new world" of heightened credit risk awareness.

IFRS (International Financial Reporting Standards)

In IFF 08-1, MH projects for the years 2011/12 and onward, accounting policy changes related to the conversion to IFRS. To-date, MH anticipates additional period expenses in the amount of $25 million, less offsets due to the concurrent and corresponding reductions in depreciation and amortization expense

MH has projected a provision in IFF 08-1 of approximately $10 million annually for the expensing of research related expenditures associated with intangible assets. MH anticipates that such expenditures will no longer be eligible for deferral in accordance with Canadian Accounting Standards effective for MH April 1, 2009. This provision is at this point an estimate that needs finalization.

Additionally, MH provides approximately $15 million annually, in IFF 08-1, for additional general and administrative costs and amortization of rate-regulated assets that may no longer be eligible for deferral upon the conversion to IFRS. These general provisions are also under review by MH, with a final assessment of the implications of IFRS on forecast results not expected to be available until approximately January 2010.

Adjustments to Retained Earnings in 2010 and 2012

In addition, MH assumes retained earnings write-offs of intangible and rate regulated assets of $50 million in 2010. These write-offs would be related to research related expenditures associated with intangible assets. In addition, MH projects $59 million of further write-offs for 2012, related to rate regulated assets. The write off of rate-regulated assets is consistent with MH's initial assessment of the implications of IFRS provided by MH at the last GRA.

The Board is of the view, particularly given the Utility's recognition of write-offs within the 20-year forecast period, that financial conservatism should dictate that MH reflect known financial impacts through an early adoption of IFRS standards. This would better reflect the financial reality faced by the Corporation. If such policies were adopted earlier, the Board questions whether MH would still forecast a 75:25 debt: equity ratio as early as 2009.

Frankly, the Board is concerned that the adoption of IFRS will have a more significant financial and operational impact on MH than now quantified by the Corporation. For example, the Board understands that IFRS transition rules allow for the reset of any actuarial gains and losses on the Employee Pension Plan (EPP) against opening retained earnings. MH indicated at the 2008/09 GRA that the EPP had an unamortized balance of approximately $30 million that would likely be written off against retained earnings with the adoption of IFRS. Given the recent downturn in the stock markets, the Board is concerned that pension investments may have been negatively impacted, and that this may result in additional actuarial experience losses that will further impact MH's retained earnings when written off.

The Board notes that MH and its consultant are currently engaged in developing a detailed review of the potential differences between the corporation's current accounting policies and IFRS requirements. The review is expected to also provide an assessment of the impact of those differences on net income, customer rates, and key business and information technology processes.

MH has indicated that it is unable to quantify the impact of IFRS conversion at this time.

With the implementation of IFRS there is a wide range of possible accounting policy changes and transitional elections that could have a significant impact on the financial results and forecasts of MH.

The Board understands that a quantification of potential impacts and choices in accounting policies may be available in January 2010, and the Board expects to be apprised of IFRS developments.

Accordingly, the Board will direct MH to file with the Board by February 28, 2010 an IFRS status update detailing expected changes and support for changes in proposed accounting policies. The report should include the accounting policy options that were considered, transitional elections to be made, and the potential financial impact of such policies and elections on net income, customer rates, and key business and information technology processes.

The Board will also require an updated 20-year IFF, reflecting a projection of the financial impact of the proposed changes.

Finance Expense

Comparing IFF 07-1 to MH's 20-year forecast filed in January 2009, it is apparent that the projected higher net income and lower interest rates of the early years of the Utility's forecast, and a projected strengthening of the Canadian dollar, are expected to reduce finance expense. Yet, higher capital spending begins to offset the projected and earlier reductions to finance expense in the later years of the ten-year time period analyzed.

It appears that adjustments to its forecasts made by MH have finance expense for the ten-year comparative period of fiscal 2008/09 through 2017/18 declining by $260 million to $4.9 billion in MH08-1, from the $5.2 billion forecast in MH07-1. However, on closer analysis the reduction is the result of projected higher levels of capitalized interest. (Capitalized interest is interest that is incurred but which is not charged against net income, but deferred for later amortization, that to take place over the expected life-time of the related asset.)

Projected finance expense and the relative percentage capitalized in IFF08-1 are as follows:

Finance Expense ($ millions)	**IFF08-1 (20-Year Forecast- January 2009)**										
For the years ended March 31:	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**
Gross Finance Expense	$ 479	$ 544	$ 597	$ 638	$ 654	$ 667	$ 748	$ 840	$ 977	$ 1,067	$ 7,211
(Less) Capitalized Interest	(79)	(119)	(165)	(160)	(111)	(148)	(214)	(333)	(457)	(469)	(2,255)
Total Finance Expense	$ 400	$ 425	$ 432	$ 478	$ 543	$ 519	$ 534	$ 507	$ 520	$ 598	$ 4,956
% Capitalized	16%	22%	28%	25%	17%	22%	29%	40%	47%	44%	31%

This compares with that forecast in IFF07-1, as follows:

Finance Expense ($ millions)	IFF MH07-1										
For the years ended March 31:	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Gross Finance Expense	$ 515	$ 572	$ 609	$ 640	$ 657	$ 695	$ 756	$ 803	$ 864	$ 906	$ 7,017
(Less) Capitalized Interest	(89)	(126)	(158)	(141)	(104)	(152)	(209)	(247)	(285)	(290)	-$ 1,801
Total Finance Expense	$ 426	$ 446	$ 451	$ 499	$ 553	$ 543	$ 547	$ 556	$ 579	$ 616	$ 5,216
% Capitalized	17%	22%	26%	22%	16%	22%	28%	31%	33%	32%	26%

As reflected in the above schedules, the percentage of capitalized interest over the comparative 10-year forecast period has increased to 31% in IFF08-1, up from 26% in IFF07-1. A higher proportion of capitalized interest is forecast to begin in fiscal year 2011, with the increase over past capitalization levels becoming more pronounced from fiscal 2016.

Over the eleven-year period 2008/09 to 2018/19, MH is currently forecasting to capitalize $2.7 billion of interest, representing 37% of incurred interest costs. The projections of higher levels of capitalization of interest remains a concern of the Board, as the practice results in a forecast of a lower debt to equity ratio and, as well, of higher annual net income, but only as long as the period of deferral continues (in short, the cost burden is shifted from the present to the future).

Operating, Maintenance & Administrative Expense

In Order 116/08 MH's OM&A pressures were described as follows:

> *"MH indicated that over the last few years the Corporation has experienced cost and operating program pressures relating to: increased maintenance requirements (due to ageing infrastructure); wage and benefit settlements that exceed inflation; additional overtime and increased staffing levels (to meet extra-provincial requirements); the expansion of programs (to meet higher customer numbers) and needs; and the meeting of environmental and other stakeholder expectations. These pressures were reported to be continuing and being compounded by a looming shortage of skilled labour, manifesting itself in higher training and labour costs."*

In Order 116/08 the Board stated:

> *"The Board remains concerned with the growth of OM&A expenses, particularly the level and growth of these expenditures prior to deferrals, capitalization and allocations to subsidiaries."*

And, as stated in Order 101/04:

> *"The Board will expect MH to maintain vigilance over its costs, so that the additional revenues [from PUB approved rate increases] contribute as they are intended to move towards achieving the debt to equity target more quickly than suggested in MH's 2003 Integrated Financial Forecast."*

Expectations from past recommendations by the Board and/or interveners related to MH achieving a reduction of OM&A expenses have not been met. In support of, and despite the variance of the April 1, 2009 rate increase to 2.9% rather than 4%, the Board expects MH to lower actual OM&A expense levels below those now forecast to assist in the Utility meeting its financial targets.

The Board's concerns are magnified given the forecast escalation in capital spending and increasing debt levels, and the concurrent forecast of a weakening financial structure as MH moves forward on major Generation & Transmission projects.

In IFF MH08-1 and the 20-year forecast, MH has removed OM&A expenses related to subsidiaries which, until this time, were reflected in the Utility's forecast of consolidated operations. The Board remains concerned with the level of growth in OM&A expenditures, with OM&A forecast to increase to $349 million in fiscal 2009, that an increase from $323 million (excluding subsidiaries), and an increase of over $26 million or 8% from the prior year.

Annual OM&A expense is forecast to grow from $400 million in 2009 to over $785 million in 2028, representing a compounded annual growth rate (CAGR) of 2.5% over the 20-year forecast. This rate of forecasted growth is inconsistent with recent historical experience, as OM&A has grown by a CAGR of 3.3% for the years 2004 to 2008, with

the annual cost increasing from $283.4 million annually to $323 million (excluding subsidiaries), and with the level of further growth projected for fiscal 2009.

MH's justification of recent and forecast OM&A escalation does not necessarily stand as valid for years beyond the next 10 years. Completion of Keeyask G.S., Conawapa G.S. and other new infrastructure should lead to a reduction in maintenance requirements and other related costs. In the Board's view, MH's recently reduced long-term domestic load growth forecast (plus or minus 1%%) does not support a continuation of annual and compounding 2.5% OM&A growth.

Furthermore, MH has indicated that synergies will be realized from the move to the Utility's under-construction new corporate head office. The realization of such synergies will be tested after the move has occurred, and the Utility should, if at all possible, rein in the annual rate of growth in OM&A expenses.

Low Income Bill Assistance Program

In Order 116/08, the Board reported that the low-income, high-energy burden problem is extensive in Manitoba, with a significant percentage of households being low-income. To assist low-income consumers, MH has relied on its Power Smart programs (problems exist in that many low-income families are unable to meet the co-funding or pre-funding requirements) to allow energy efficiency to hold down bills, efforts to work out reasonable payment schedules for households experiencing financial distress, and a voluntary program, *Neighbours Helping Neighbours,* administered by the Salvation Army. Under this voluntary program, MH customers donate to a fund that assists low-income families and seniors who are unable to pay their natural gas and/or electricity bills, MH matches the private donations and advertises the program to all of its customers.

The Board noted that while the voluntary program is beneficial, the needs are such that the program as it now operates is not sufficient to meet the need. A low-income bill assistance program should assist in reducing the energy burden faced by low-income households, and could lead to significant non-energy benefits such as increased

comfort, reduced health costs, lower bad debt write-offs, etc. Manitoba's climate is such that heat is a necessity in at least nine of each twelve months.

The Board further stated that energy affordability for low-income families is very much an issue that requires immediate attention in Manitoba. In Order 116/08 and subsequently revised in Order 150/08 the Board directed:

> *"MH to propose for Board approval (by a date to be requested by MH in its November 30, 2008 update and approved by the Board) a low-income bill assistance program, where such a program would occur in conjunction with and complimentary to an expanded low-income DSM program*."

In Order 116/08 the Board further stated:

> "MH should address the issues of: how such a rate affordability assistance program should be funded, how eligibility criteria should be determined and how levels of assistance should be determined. Consultation with the Coalition and RCM/TREE may be of assistance to MH."

In response, MH filed a report on Low income bill assistance on March 4, 2009. In that report, MH discussed possible bill assistance program expansion, and indicated it will investigate the viability of potential program expansion. MH has cited many variables that will need to be investigated, including;

- Determining Program eligibility;
- Determining Program costs;
- Determining and Quantifying program benefits;
- Determination of program funding;
- Program cost allocation;
- Customer feedback;
- Administration and implementation of the program; and
- Evaluation criteria.

The Board accepts MH's indication that implementation of a specific low-income bill assistance program will require the addressing of issues that are complex and far reaching. The Board also accepts that MH has committed to looking at all options for

some form of bill assistance, and that the Utility may consider enhancements to existing programs. The Board is particularly pleased that MH has further indicated that it will consult with stakeholders and that, after these consultations, will put forward a recommendation to MH's Board with options, implications and a process on how and if to move forward, with a report to be made to the Public Utilities Board as to MH's plans.

While the Board is encouraged by the commitments and steps made and currently being undertaken by MH with respect to a low-income bill assistance program the Board expects MH to provide a report well ahead of the next heating season, and will direct MH to provide such a report by July 31, 2009.

The report list options, provide details and implications related to the options, assess the merits of each, and recommend a specific and implementable course of action that can be put in place no later than October 31, 2009.

In its research, the Board urges MH to look to programs in other jurisdictions, and assess their potential applicability in Manitoba.

Particularly, given the current economic downturn it is vitally important to put in place protection for low-income customers with an effective bill assistance program. MH is embarking on a capital program that is predicated on consistent future rate increases, while too often low-income families do not benefit from annual increases in household income. The Board is cognizant of the impact on low-income consumers of rate increases, and expects MH to put forward its preferred low-income bill assistance program with an indication as to how many households it expects may be assisted in the near future.

Capital Expenditures & Long Term Debt

At the last GRA the Board expressed concern with the level of increased capital spending and the risks such spending has on rates.

In Order 116/08 the Board stated:

> *"The Board recognizes its statutory jurisdiction does not extend to the approval of Capital expenditures. Yet, it is clear MH's anticipated capital spending and associated increased debt levels is and will place upward pressure on rates. The Board has, as interveners have noted, expressed concern with MH's debt growth in previous orders. In Order 143/04, the Board noted:*
>
> *"The Board continues to be concerned with the progressive substantial growth in capital expenditures and accompanying debt. The Board accepts that many of the capital expenditures are related to reliability and safety, and therefore are may [sic] be prudent to incur. The Board also recognizes that many of the forecast capital expenditures are related to or the equivalent of generation expansion, such as supply side enhancements, Wuskwatim, Gull, Conawapa, and may be justified individually when considering each project's purposes and forecast results over the long term. However, collectively these projects negatively impact MH's debt to equity ratio and net income in the initial years, placing increased strain on the financial stability of MH and adding additional risk for existing ratepayers. The Board is concerned that MH has not developed a threshold for capital expenditures and associated debt growth that considers all projects, together with the health and financial stability of the Company."*

The Board reiterates prior concerns, and notes that with planned major capital expansion, such concerns are now graver.

MH's forecast of future capital spending has increased significantly since Order 116/08, and the Board reiterates its perspective that MH's planned capital expenditures are of an unprecedented scale in the Utility's history, with implications for borrowing, staffing, exports, First Nation relationships, risks and, possibly, rates.

In a Status Update filing, MH included an updated integrated financial forecast IFF 08-1, and capital expenditure forecast CEF08-1 ; an update to that provided to the Board at the last GRA (which incorporated IFF 07-1 and CEF 07-1). For the next ten years MH is now forecasting to spend an additional $3.4 billion over what it had previously planned to expend over the ten-years 2008/09 and 2017/18, details as follows:

Capital Spending- Electric Operations: CEF08 Vs. CEF07 ($millions)

	2009	2010	2011	2012	2013	2014	2015-18	10 Year Total
CEF08	1,073	1,201	1,086	851	818	1,159	7,953	14,141
CEF07	1,120	1,010	933	818	805	1,212	4,797	10,898
Increase (Decrease)	(47)	191	153	33	13	(52)	3,156	3,447

The Capital Expenditure Forecast (CEF08-1) for electric operations for the ten-year period to 2017/18 totals $14. 1 billion, compared to $10.8 billion for the same ten-year period included in CEF07-1 provided at last years GRA, an increase of over $3.4 billion. MH is now forecasting to spend over $10.0 billion on major Generation and Transmission projects for the next ten-year period, an increase from the $7.1 billion forecast in CEF07-1.

MH's forecast increased Capital spending in CEF08-1 is primarily due to an updated forecast of $2.9 billion for Major Generation & Transmission projects, of which $2.7 billion relates to an update in the forecasted capital cost for the Keeyask generating station and a further $200 million for a new Dorsey to U.S. border transmission.

Major revisions have been made to the budget for the Keeyask G.S., which has now been forecast at $3.7 billion in CEF08-1. In addition, MH has included a general provision for anticipated capital cost escalations of $236 million. MH has also indicated that the January 2009 updated estimates are still under review, this due to "uncertain" economic conditions.

The updated CEF08-1 projects that from 2008/09 to 2018/19, the Corporation plans to spend $16.0 billion, of which $11.6 billion is for new major generation and transmission assets and $4.4 billion for other power supply requirements.

Capital Expenditure Forecast 2009 to 2028

Though requested to do so by the Board, MH did not provide a 20-year Capital Expenditure Forecast to 2028, but did provide some indication of anticipated increases in Capital spending to that date.

Based on the status update filings, the Statement of Cash Flow in MH's 20-year IFF forecasts over $455 million in additional planned capital spending over the 11-year period 2009 to 2019, from that forecast in CEF08-1.

In addition, given the 20-year IFF forecast provided through 2028, the Board is aware that to serve potential new long-term export contracts to Wisconsin and Minnesota, MH will require additional generation and transmission from Keeyask, by 2018, and Conawapa, by 2022.

MH indicated that capital spending on major Generation and Transmission projects had increased by an additional $3 billion from that forecast in CEF08, as follows:

Major Generation & Transmission 20 Year Forecast Update January 2009 ($ millions)	**20 Year Forecast**	**CEF08-1**	**Change**
Keeyask Generating Station	4,600	3,700	900
Conawapa Generating Station	6,300	4,978	1,322
Unidentified GS improvements and upgrade projects			-
Project 1: In service 2019/20	245	-	245
Project 2: In service 2022/23	281	-	281
North - south transmission requirement [In-service 2022/23]	344	-	344
	11,770	8,679	3,091

MH provided a further update on the in-service cost estimate for Keeyask G.S. of $4.6 billion, this is an increase of over $900 million from that forecast in CEF08-1. MH also

projected capital expenditures of $6.3 billion for Conawapa G.S., an increase of $1.3 billion from CEF08-1. MH indicated the current updated estimates remain under review.

In addition MH made a general provision for capital expenditures related to two unidentified generating station improvement and upgrade projects. One project is anticipated to be in service in 2019/20 at an approximate cost of $254 million, the second unidentified project represents provision of $281 million for in service in 2024/25. MH has also identified in additional north-south transmission requirement to be in service in 2022/23.

At the recent GRA, MH indicated that there may be a need for a natural gas fired generating station, which could be required to deal with any delays in bringing Keeyask and Conawapa online. Yet, it is not clear from the most recent filings whether such a requirement and plan has been contemplated in MH's updated forecast.

In addition to the major Generation and Transmission increases, MH's projection also includes an increase of 5% per year for escalation in base capital spending, and 2% escalation per year in DSM spending, both commencing in 2019/20.

Based on the most recent information filed by MH, it appears that the Utility presently plans to expend on capital projects, from 2009 through 2028, in the area of $26 billion, of which approximately $17 billion relates to major Generation and Transmission projects and $9 billion on other capital spending. The majority of future spending on major Generation and Transmission projects is expected by 2025.

Given this occurs as currently planned, MH's undepreciated plant in-service would increase from $12 billion (2009) to $37.3 billion by the end of 2028, and, concurrently, long term debt will increase from $7.2 billion in 2009 to over $19.4 billion by the same end date, representing an increase of $12.2 billion in the next 20 years. The forecast growth in long-term debt is quite substantial, particularly when compared to the current provincial debt of approximately $11 billion, which includes MH's current long-term debt.

Borrowings of this magnitude will involve very high interest costs, with annual payments likely to increase to in excess of $1 billion annually. If the forecast interest rates on new

debt are actualized and the anticipated export demand and pricing also occurs, this level of interest may prove manageable. Though, and presently, the Board does not share MH's optimistic view on future export prices.

The Board expects MH to file a full and revised 20-year capital expenditure forecast, and, as well, the terms of reference and timeline for a regulatory review of MH's planned capital program and the implications for consumer rates.

Pre-funding of Capital Expenditures

While MH has denied MIPUG's contention that recent and proposed rate increases in excess of inflation amount to pre-funding of Generation & Transmission system expansion for export, it is true that a stronger financial structure with a higher level of retained earnings do support the viability of these ventures.

MH has acknowledged that both Keeyask G.S. and Conawapa G.S. are being built earlier than required for domestic load. As such, they are to provide the dependable energy required to meet export requirements. The dependable output of Keeyask and Conawapa, estimated at about 7,500 GWh (2,000 MW), is only about 20% greater than the contractual export commitments for energy.

In the absence of any of the three pending export contracts, neither Keeyask G.S. nor Conawapa G.S. would be required until at least 2030-31. This suggests that the two Lower Nelson River plants are being advanced by 10-15 years to service these export contracts.

MH advises that Bipole III is being built for primarily domestic system reliability purposes, though in advance of meeting new export commitments. MH holds that there should be no new transmission costs attributable to the new generation facilities. This implies that there are no HVDC transmission reliability issues for the current export loads and suggests that exports are served from southern generation and Upper Nelson River generation, with only domestic load being served by Lower Nelson stations.

If the scenario were reversed, it could be argued that in the absence of export contracts MH might well look to addressing its domestic reliability concerns by adding natural gas generation and/or import purchase agreements. In the early 1990's, MH chose not to proceed with Bipole III when a 500 MW sale to Ontario was cancelled and related plans to build Conawapa G.S. were shelved. Apparently domestic reliability was not a sufficient justification at that time.

Capital projects such as Bipole III, Keeyask G.S. and Conawapa G.S. will generate considerable economic activity in Manitoba. The benefits of this level of economic activity will be realized in part by the current residents of the province, who are also rate payers who will be required to pay higher "real" energy bills if rates rise faster than inflation. And, new skilled labour may move into Manitoba expanding the tax base and customer base.

Some of the early costs of new Generation & Transmission relate to First Nations involvement. The immediate financial gains for these communities do benefit overall tax payers in the short-term, and a better trained workforce leads to long-term gains for Manitoba industry in the longer term.

MH's approach to the capitalization of all interest charges during the project construction period, defers project costs until in-service when there is a revenue stream (from exports) to cover the annual costs. As such, current ratepayers are not assessed the rate increases that would be required to hold to the financial targets if interest costs were expensed during the planning and construction phase of new capital projects. Because Generation & Transmission plants frequently operate at a loss in the early years, but with the real probability of large excess revenues 10 to 15 years in the future, there will always be some question of the balancing of benefits between customer generations, but hopefully, and taking into account the overall impact on the economy and ratepayers, all generations will benefit in the end.

As an example, Limestone G.S. did not generate a positive cash flow during the first six to eight years of operation, but has provided large excess annual revenue after 12

years. Current ratepayers are benefiting from the rate increases in the early years and from export revenues in the last five or six years. The expectation is that this experience will repeat itself with the new generation and transmission expenditures, and affect the Corporation's financial strength, thus risking significant domestic rate increases if a major risk such as a multi-year drought were to occur.

Intergenerational cost shifting is almost inevitable. In the context of protecting a power supply resource, a level of pre-funding as an offset to cost deferral would seem to have merit and in the Board's view be in the public interest.

Note: Board decisions may be appealed in accordance with the provisions of Section 58 of *The Public Utilities Board Act*, or reviewed in accordance with section 36 of the Board's Rules of Practice and Procedure. The Rules are available at www.pub.gov.mb.ca.

5.0 IT IS THEREFORE ORDERED THAT:

1. MH's Application for approval of a 4% rate increase, effective April 1, 2009 BE AND IS HEREBY VARIED.

2. MH is to immediately file, for Board approval, revised rate schedules, to take effect April 1, 2009 and demonstrate and recover a 2.9% increase in revenues derived from energy rates (consistent with the methodology as contained in Appendix 9, Attachment 'D' to the February 2, 2009 Status Report) from all customer classes, except for Area and Roadway Lighting.

3. MH to prepare a series of alternative 20-year scenarios (IFF/Power Resource Plan/Capital Plan), to reflect:

   a) A pessimistic view of export prices (minimal U.S. - CO_2 pricing levels).

   b) A periodic one-year drought (e.g. 2003-04).

   c) A periodic multi-year drought (e.g. 1940's or 1980's).

   d) Zero long-term contract commitments.

   e) A strong movement to domestic electric heating.

   f) Existing transmission tie-line constraints.

   g) Potential carbon tax on MH's imports and a doubling of water rental rates.

4. MH to file by September 30, 2009, for Board approval, a conceptual outline for an in-depth and independent study of all the operational and business risks facing the corporation. The study to be a thorough and quantified Risk Analysis, including probabilities of all identified operational and business risks. This report should consider the implications of planned capital spending taking into account export revenue growth, variable interest rates, drought, inflation experience and risk, and potential currency fluctuation.

5. In conjunction with the outline requested in Directive 4, MH is to file all internally and externally prepared reports, since the 2003-04 drought, that address any of and all of the energy supply and other risks faced by MH.

6. MH to file with the Board by February 28, 2010 an IFRS status update report detailing the support for changes in proposed accounting policies, including accounting policy options considered, transitional elections to be made, and the potential financial impact of such policies and elections on net income, retained earnings, customer rates, and key business and information technology processes as well as providing an updated 20-year IFF reflecting the financial impact of the proposed changes.

7. MH file, on or before December 1, 2009, a full 20-year capital expenditure forecast, together with draft terms of reference and timeline for a regulatory review of MH's planned capital program and its impact on consumer rates;

8. MH file, ahead of the 2009/10 heating season, an update of its plans for a low-income bill assistance program; and

9. MH file its next General Rate Application, including any rate adjustment requests for both 2010 and 2011, by October 1, 2009.

THE PUBLIC UTILITIES BOARD

"GRAHAM LANE, CA"
Chairman

"H. M. SINGH"
Acting Secretary

Certified a true copy of Order No. 32/09 issued by The Public Utilities Board

Acting Secretary

Tab 114

Tab 3

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May 12, 2017

MANITOBA HYDRO

2017/18 & 2018/19 GENERAL RATE APPLICATION

INTEGRATED FINANCIAL FORECAST

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MANITOBA HYDRO

2017/18 & 2018/19 GENERAL RATE APPLICATION

INTEGRATED FINANCIAL FORECAST

3.0 OVERVIEW

Tab 3 provides an overview of Manitoba Hydro's Integrated Financial Forecast, and Debt Management Strategy. Section 3.1 and Section 3.2 discuss Manitoba Hydro's 2016 Integrated Financial Forecast (IFF16) and Electric Operations Forecast (MH16). Section 3.3 discusses Manitoba Hydro's Debt Management Strategy.

3.1 INTEGRATED FINANCIAL FORECAST

The Integrated Financial Forecast (IFF) is Manitoba Hydro's primary planning document for projecting the future financial direction of the Corporation. IFF16 sets forth the projected financial results and financial position of Manitoba Hydro for the 10-year period to 2026/27. Its purpose is to provide an indication of the Corporation's long-term financial direction. The IFF serves as the primary forecast to determine the need for rate increases and the detailed forecasts in years two and three of the IFF form the basis of the revenue requirement portion of the Corporation's electric rate application.

The IFF is based on various component forecasts from across the Corporation including:

- Economic Outlook,
- Energy Price Outlook,
- Electricity Export Price Forecast,
- Power Smart Plan,
- Electric Load Forecast,
- Domestic Revenue Forecast,
- Resource Plan Assumptions and Analysis,
- Generation Cost & Interchange Revenue Forecast,
- Capital Expenditure Forecast, and
- Operating & Administrative Expense Forecast.

The events of the past year are noteworthy in the Corporation's preparation of IFF16. In May of 2016, a new Manitoba Hydro-Electric Board (MHEB) was appointed. The Province of Manitoba issued a mandate to the Minister of Crown Services to work with the MHEB to review the circumstances around the Bipole III Reliability Project, which also resulted in a review of the Keeyask Generating Station Project. It has been necessary for the MHEB to examine and consider an enormous amount of information on a broad array of topics and make its independent determination of how Manitoba Hydro should move forward. Therefore the preparation of the Corporation's financial forecast occurred later in the planning cycle that has normally occurred in the past.

IFF16 was approved on April 28, 2017 and can be found in Appendix 3.1. IFF16 includes segmented forecasts for electric operations (MH16), natural gas operations (CGM16), and corporate subsidiaries (CS16). In addition, in this Tab, the 2016 Economic Outlook and additional information with respect to the determination of Manitoba Hydro's interest rate forecast are provided in Appendix 3.2.

As outlined in Section 2.3 of Tab 2, past financial forecasts have reflected a deterioration in the equity ratio to below 15% during the current phase of debt funded capital investment as well as a 15 year time frame for restoring a 25% equity capitalization. Due to the changes in conditions, outlook and Corporate governance, Manitoba Hydro believes that the risk faced by the Corporation requires the mitigating actions necessary to improve the Corporation to 25% equity capitalization within 10 years.

Manitoba Hydro has prepared IFF16 to 2026/27 to focus on the financial forecast over the next 10 year period. However, recognizing that a 20-year outlook has been provided in past proceedings, the MH16 20-Year Outlook is provided for informational purposes in Appendix 3.3.

3.2 ELECTRIC OPERATIONS FORECAST (MH16)

The MH16 forecast contains the projected financial results for electric operations to 2026/27. Manitoba Hydro's financial targets have been set for consolidated operations; however as requested in past proceedings, Manitoba Hydro has also provided financial

ratio calculations for electric operations in Appendix 3.3. Given the dominant size of electric operations in relation to consolidated operations, these calculations usually differ only slightly from consolidated ratio calculations.

MHEB has approved a five-year rate strategy in IFF16, projecting 7.9% annual electric rate increases from 2017/18 to 2021/22 followed by inflationary 2.0% indicative rate increases thereafter.

This rate strategy essentially compresses the previously projected 3.95% annual rate increases which were planned until 2028/29, into the next five year period in order to achieve the following objectives:

- Offset the reductions to domestic load and electricity export price forecasts;
- Mitigate the upward pressure of borrowing requirements and costs on future revenue requirements;
- Mitigate the deterioration of Manitoba Hydro's financial position thereby reducing the likelihood of being an encumbrance on the Province of Manitoba's financial position;
- Provide financial insurance that minimizes the impact to customer rates under a significant risk event; and
- Enables a return to inflationary level rate increases much earlier than contemplated under previous forecasts.

While MH16 is underpinned with a series of proposed 7.9% annual rate increases from 2017/18 to 2021/22, Manitoba Hydro is seeking approval of the 2017/18 and 2018/19 rate increase at this time, in addition to confirmation of existing rates currently approved on an interim basis. Actual rate requests made in future applications will reflect the circumstances and outlook at that time and will be subject to the review and approval of the MHEB.

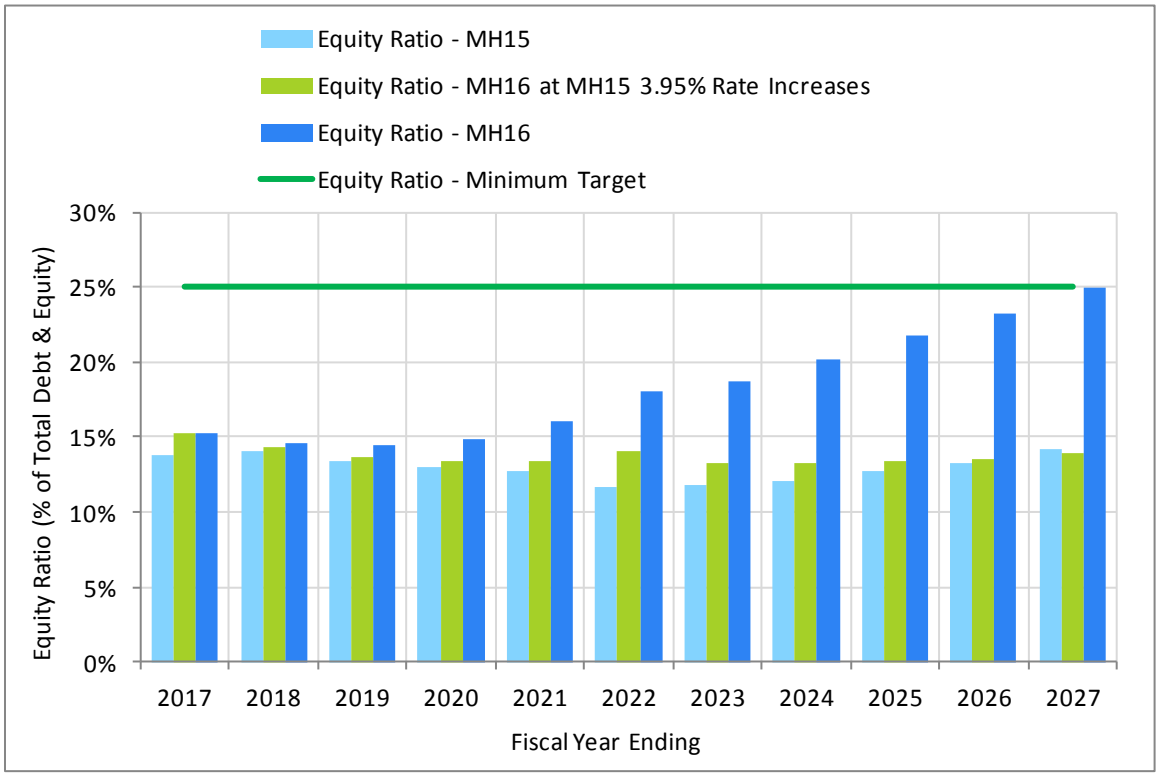
3.2.1 10-Year Electric Operations Financial Outlook

Comparison of Equity Ratios:

Figure 3.1 below compares the resulting equity ratios between MH16, MH16 at 3.95% rate increases (Appendix 3.4) and MH15. If Manitoba Hydro were to include the

previously forecast rate trajectory of 3.95% increases until 2028/29 in its current forecast, the MH16 equity ratio shown does not show signs of financial recovery within the 10 year forecast period. The return to a 25% equity target does not occur until 2035/36 which compares to 2031/32 under MH15. In Manitoba Hydro's view, a financial plan that returns the Corporation to a 25% equity level over almost 20 years is not credible as a commitment to being a self-supporting entity.

Figure 3.1 Comparison of Equity Ratios

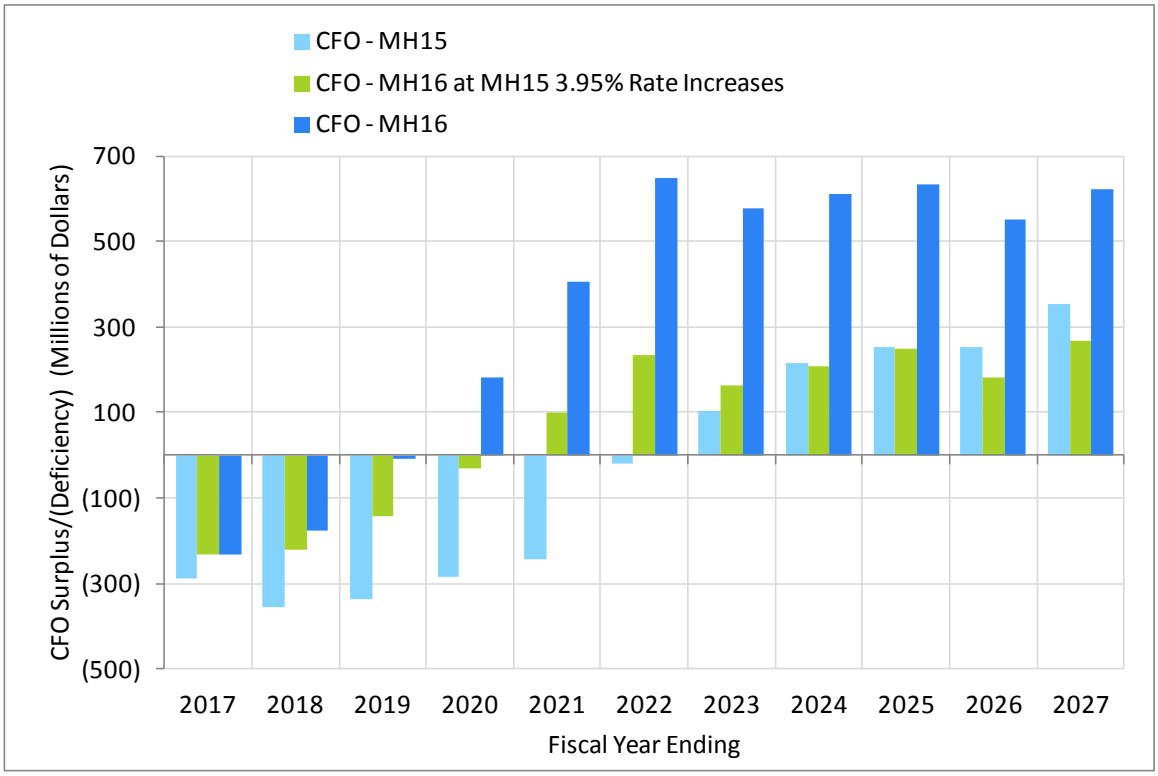


Comparison of Cash Flows:

The following **Figure 3.2** shows the annual cash flow surplus or deficiency after business operations capital expenditures under MH16, MH16 (at 3.95% rate increases) and MH15. As explained in Section 2.2 of Tab 2, this methodology better illustrates the cash flow impacts and the need for increased revenue, which in turn minimizes the need for incremental borrowing which carries a further increase in finance expense ultimately to be recovered from customers and adds to the financial risk of the Corporation.

Figure 3.2 shows the persistent cash flow deficiency in MH15 over the first 5 years of the forecast. Savings from Manitoba Hydro's accelerated cost reduction program, lower forecast interest rates, and favourable near term water flow conditions on their own are not enough to completely reduce the cash flow deficiency shown in MH16 (at 3.95% rate increases). Even with 7.9% rate increases in MH16, the cash flow deficiency is not eliminated until the 4th year of the forecast in 2019/20. Thereafter, forecast surplus cash flows are available for debt retirement which would further improve Manitoba Hydro's equity capitalization.

Figure 3.2 – Comparison of Cash Flow Surplus or Deficiency for MH15 and MH16



The advancement of rate increases into the first 5 years of the forecast mitigates future additional rate pressure on customers in the event the Corporation experiences adverse water flow conditions, higher interest rates, lower export prices or some other adverse risk event. Tab 4 Financial Targets and Uncertainty Analysis discusses the impact of such risks in greater detail.

Comparison of Net Income:

The following **Figure 3.3** compares MH16 net income first to MH16 (at 3.95% rate increases) and to the net income projected in MH15.

The MH15 annual net income level shown in **Figure 3.3** is approximately $55 million on average over the 10-year forecast period. Assuming the same 3.95% rate increases as MH15, MH16 shows on average approximately $85 million in net income annually. The improvement in net income in MH16 results from factors other than rate increases mainly due to the change in two non-cash income components:

- The inclusion of regulatory deferral accounts in MH16 for depreciation and overheads not eligible for capitalization established for rate setting purposes to address the PUB's findings in Order 73/15; and
- The additional interest capitalization on Keeyask over the 21 month delay period.

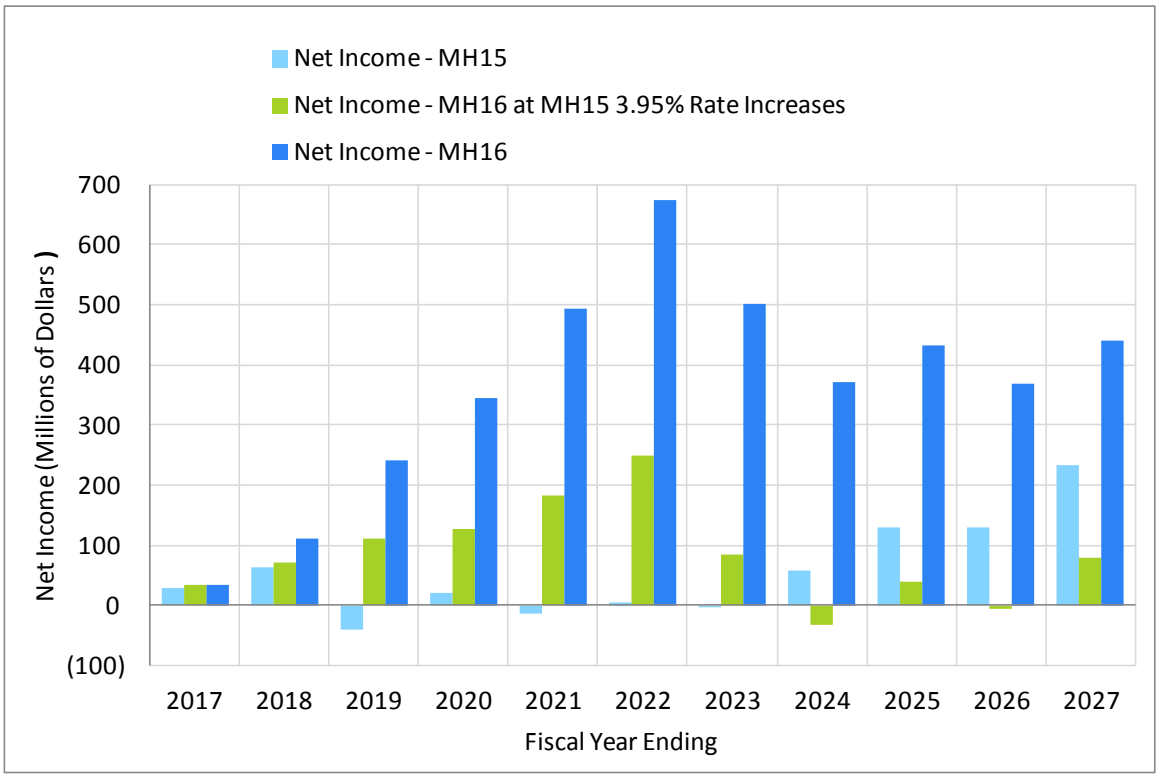
If not for these factors, MH16 net income (at 3.95% rate increases) over the 10 year forecast would be approximately the same as MH15 notwithstanding a significant forecast reduction in operating and administrative costs and interest rates.

MH16 is inclusive of significant workforce reduction, procurement and financing cost savings over the 10 year forecast period. These reductions, along with lower forecast interest rates compared to MH15, are necessary to mitigate the revenue impacts resulting from the reduction in the load forecast and export prices dominating this forecast.

It must be recognized that Manitoba Hydro's net plant in service increases over the 10-year period from approximately $12 billion to almost $27 billion in 2026/27. Even with cost reductions and the proposed rate increases, debt will peak at $23 billion in 2021/22. The appropriate amount of net income and positive cash flow Manitoba Hydro should generate should reflect the growing size of its balance sheet and the risks associated with the significant levels of debt required to fund this investment.

The levels of net income and cash flow proposed in MH16 are a significant change from MH15. The previous forecast projected only a modest $600 million growth in equity by 2026/27. Levels of earnings for a Corporation with $12 billion of assets in service must be scaled up significantly to reasonably address the risks associated with operating $27 billion worth of assets. Increased levels of net income will consequently result in improvements to the levels of retained earnings and steady progress towards the minimum equity target of 25% in the 10 years of the forecast.

Figure 3.3 Comparison of Electric Operations Net Income



<u>Comparison of Revenues and Expenses:</u>

Figure 3.4 below summarizes the changes in the revenue and expense components of net income between MH16 and MH15.

In comparing MH16 and MH15, MH16 rate increases are first held constant with the 3.95% rate increases projected in MH15 in order to isolate the financial impacts of other key factors changed from MH15. The financial impacts of the incremental rate increases

from 3.95% to 7.9% are then summarized at the bottom of **Figure 3.4** to show the projected net income including 7.9% annual rate increases from 2017/18 to 2021/22.

Figure 3.4 Comparison of Electric Operations Revenues and Expenses

Increase/(Decrease)
(millions of $)

	2017-2019			2017-2027		
	MH16	MH15	Variance	MH16	MH15	Variance
Domestic Revenues (at MH15 Rate Increases)*	4,615	4,881	(266)	21,115	22,265	(1,150)
Extraprovincial	1,354	1,329	25	6,961	8,402	(1,441)
Other*	88	86	2	358	344	14
Total Revenues	6,056	6,296	(240)	28,435	31,011	(2,577)
Operating and Administrative	1,555	1,680	(125)	5,899	6,693	(795)
Finance Expense	1,850	1,946	(96)	9,903	11,070	(1,167)
Finance Income	(53)	(63)	9	(232)	(233)	1
Depreciation and Amortization	1,251	1,253	(2)	6,536	6,590	(55)
Water Rentals and Assessments	368	341	26	1,361	1,369	(8)
Fuel and Power Purchased	431	513	(82)	1,564	2,292	(728)
Capital and Other Taxes	394	402	(8)	1,741	1,671	69
Other Expenses	284	268	16	1,301	942	358
Corporate Allocation	25	25	(0)	89	90	(1)
Total Expenses	6,105	6,366	(261)	28,161	30,486	(2,325)
Net Income before Net Movement in Reg. Deferral	**(49)**	**(70)**	**21**	**274**	**525**	**(252)**
Net Movement in Regulatory Deferral	243	105	138	684	79	605
Net Income (at MH15 Rate Increases)	**194**	**35**	**159**	**957**	**604**	**353**
Additional Domestic Revenue (over MH15 Rate Increases)	168	-	168	2,530	-	2,530
Financing and Capital Tax Savings	2	-	2	544	-	544
Net Income (at MH16 Rate Increases)	365	35	330	4,032	604	3,428
Net Income Attributable to:						
Manitoba Hydro	**387**	**51**	**336**	**4,011**	**607**	**3,404**
Non-controlling Interest	(22)	(16)	(6)	21	(2)	23
Equity Ratio (MH16 at 7.9% Rate Increases)	**14%**	**13%**		**25%**	**14%**	

*MH15 has been restated to reflect Bipole III Reserve Account amortization in Domestic Revenues rather than Other Revenue.

Lower Finance Expense

Finance expense in MH16 is $1.7 billion lower in the 10-year period to 2026/27 in comparison to MH15 due to the extended period of deferred financing charges associated with the 21-month Keeyask delay through interest capitalization ($0.6 billion); lower forecasted interest rates ($0.5 billion); a plan to shorten the average term to maturity for new debt issuance from 20 to 12 years ($0.5 billion); as well as lower finance expense on lower debt volumes associated with projected higher rate increases and savings from Manitoba Hydro's cost reduction program and the beneficial reduction in the compounding of lower debt service costs ($0.8 billion). These reductions to finance expense are partially offset by the increase in projected borrowing and interest payments associated with the increase in major capital project costs ($0.7 billion).

The 21-month delay in the Keeyask in-service date results in an additional $0.6 billion in interest capitalized to the Keeyask project and an equivalent reduction in finance expense. Although the conventional accounting practice of capitalizing interest costs to the in-service date defers the impacts of financing costs to net income and revenue requirement, Manitoba Hydro is still required to meet the related interest payment obligations. When combined with the lost net extraprovincial revenues over the delay period and the $2.2 billion increase in capital cost, further deferral of Keeyask interest charges ultimately translates into higher borrowing and financing costs that must be paid by customers. This can be demonstrated by holding the MH15 3.95% rate increases constant in MH16 and observing the delay in achieving the target 25% equity ratio by seven years to 2033/34 (Appendix 3.4).

As part of Manitoba Hydro's cost reduction plan, Manitoba Hydro plans to shorten the average term to maturity of new debt issuances, thereby further reducing Manitoba Hydro's debt portfolio weighted average interest rate and debt servicing costs. In past forecasts, Manitoba Hydro used a planning assumption whereby all new Canadian debt issuances carried a 20-year term to maturity and corresponding forecasted 20-year average interest rates (the average of the forecasted Manitoba 10 and 30-year interest rates). For MH16, a 12-year weighted average term to maturity and forecast 12-year weighted average interest rates were used, effectively lowering the forecast yield rate on new Canadian borrowings by an average of 50 basis points annually. The financial benefit associated with this forecasting assumption change has the potential to provide

approximately a $0.5 billion savings in debt servicing costs over the 10-year forecast period to 2026/27. Manitoba Hydro's execution of this strategy is dependent on achieving the revenues (i.e. rate increases) and cost savings embedded in MH16.

Manitoba Hydro's Workforce Reduction Plan

Manitoba Hydro's commitment to deliver significant cost reductions has also significantly contributed to the improvement in projected net income. Execution of the cost reduction plan began in February 2017 when Manitoba Hydro announced a plan to reduce its total workforce by 15% or 900 positions and began by reducing the executive leadership team by 30%, as well as a reducing the number of direct reports to the Vice-Presidents by 40%. At the same time, the Voluntary Departure Program launched, targeting to achieve the remaining position reductions. The target 900 positions are projected to be eliminated primarily in 2017/18 and 2018/19 for cumulative additional savings of approximately $900 million by the end of the 10-year forecast period to 2026/27. MH16 assumes that approximately $700 million are operational savings and the remaining $200 million are related to capital.

In addition to position reductions, MH has committed to achieve procurement savings obtained through supply chain management initiatives. As part of its cost containment strategy, Manitoba Hydro is working to accelerate supply chain management initiatives which have been underway since 2014/15 (as discussed in Section 6.2.5 of Tab 6). From 2017/18 to 2020/21, potential cost savings of $150 million have been identified through a variety of strategic sourcing opportunities using industry specific indices (approximately 70% related to capital reductions and the remaining 30% to operational reductions). Categories include construction and infrastructural services, building and facility construction, contractor and professional services, general hardware, fleet assets and repair, and building material and structures. Strategies for sourcing savings within these categories include amalgamation of contracts to capitalize on volume discounts; optimizing total cost of ownership; rationalizing services through identification of discretionary and critical services; specification refinement/rationalization; and reduction of single source contracts through competitive tenders. By the end of the 10-year forecast period to 2026/27, these savings are expected to accumulate to nearly $450 million.

Lower Electric Load Forecast and Domestic Revenues

With the timing of the preparation of MH16, the gross firm energy and total peak included in the 2016 Load Forecast were reviewed and adjusted to reflect lower actual usage and weather data available for the 10 months included in 2016/17, as well as anticipated changes for the 2017 forecast related to lower preliminary population forecasts and reduced expectations for new large industrial loads. However, this adjustment does not factor in other potential changes that will be captured in the 2017 Load Forecast. Such changes include the effect of price elasticity regarding the 7.9% proposed and indicative rate increases included in MH16, other updated economic inputs, or other changes in projected consumption that would result in year-to-year variations from the 2016 Load Forecast.

The reduction to gross firm energy from the 2016 Load Forecast is anticipated to be approximately 1,000 GWh by 2035/36 which is equivalent to the 24th percentile probability point of the 2016 Electric Load Forecast based upon the load variability analysis presented at page 44 of the 2016 Electric Load Forecast report (Appendix 7.1 of Tab 7). The 24th percentile point was selected as a proxy for Manitoba's anticipated future load requirements in the 20th year of the 2017 forecast. The following comparisons are made between the 2015 Load Forecast and the 2016 Load Forecast, including the adjustment discussed above.

- Gross firm energy (before program-based DSM initiatives) in Manitoba is forecast to grow on average by approximately 300 GWh or 1.2% per year over the 11-year forecast period to 2026/27.
- Gross total peak is forecast to grow at the same pace as gross firm energy, by approximately 55 MW or 1.2% a year over the 11-year forecast period to 2026/27.
- Compared to the 2015 forecast, gross firm energy is projected to be about 700 GWh (2.6%) lower in 2016/17 primarily due to the lower residential and commercial market sector load experienced in 2014/15 and 2015/16, along with changes in the large industrials short-term plans.
- By 2026/27, gross firm energy is expected to be approximately 2,100 GWh (6.8%) lower in comparison to the 2015 forecast (including the adjustment from the 2016 Load Forecast), primarily due to the reduced expectations for new large

industrial loads and a decrease in the population forecast lowering the residential and commercial market sectors, representing a reduction of approximately five years of load (where 1 year equals approximately 442 GWh).

- Consistent with gross firm energy, gross total peak is forecast to be about 400 MW (6.9%) lower in 2026/27 than the 2015 forecast or a reduction of approximately five years of load growth (where 1 year equals approximately 80 MW).

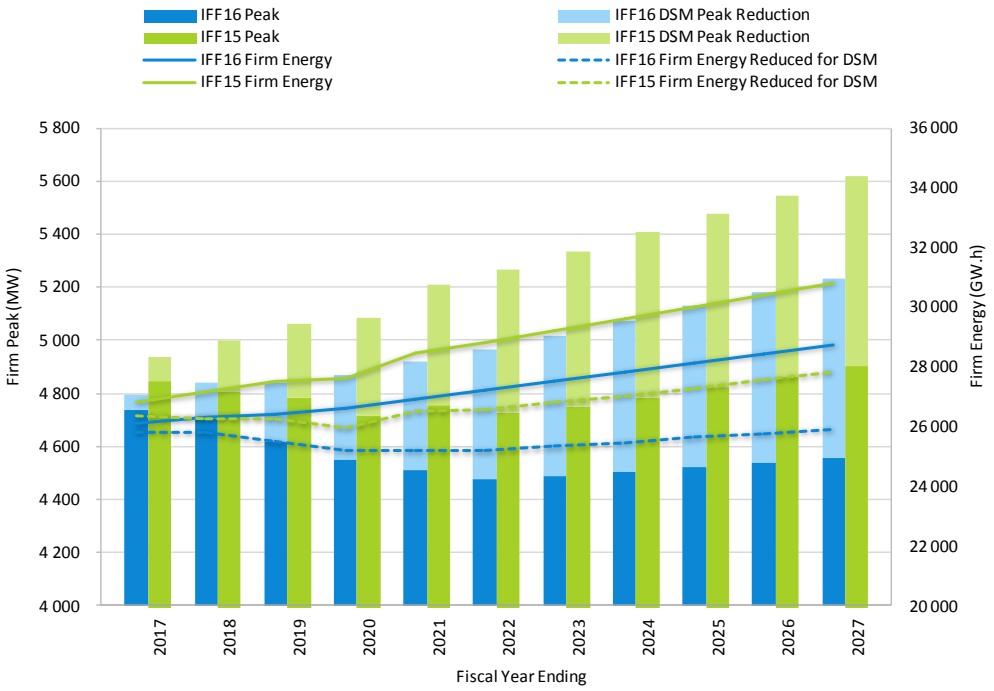
Savings due to DSM programs to date are embedded in the historical data that is the basis for the Electric Load Forecast. The current level of past achieved DSM savings is assumed to remain in place throughout the future. The Electric Load Forecast reflects future DSM savings associated with existing Provincial building codes and improved equipment efficiency standards and regulations (codes and standards). This is the only effect of DSM initiatives that is specifically accounted for in Electric Load Forecast. Future DSM savings arising from future Power Smart offerings and market engagement above the current level and incremental to the codes and standards are accounted for separately in Manitoba Hydro's Power Smart Plan and Resource Planning Assumptions and Analysis included in Tab 7 of this Application.

On March 9, 2017, the Provincial Government tabled legislation to create a new Crown Corporation – Efficiency Manitoba – which will assume responsibility for efficiency initiatives with an initial focus on reducing electricity and natural gas consumption in Manitoba. Efficiency Manitoba will be mandated to achieve specified energy efficiency targets, which are in excess of those embedded in Manitoba Hydro's existing DSM plan. Under the proposed legislation, Manitoba Hydro will also continue to be responsible for the costs of meeting the legislated targets. While it is uncertain at this time what the impacts of Efficiency Manitoba and legislated DSM targets will be, they have the potential to further reduce domestic load growth in that the proposed legislated targets exceed what Manitoba Hydro anticipates achieving under its current DSM plan. Until the new efficiency entity is in place and the first plan is developed, MH16 continues to incorporate the costs and savings reflected in Manitoba Hydro's current Power Smart Plan in the same manner as previous forecasts.

The 2016 Power Smart Plan targets savings similar to that in the 2015 Plan. The 2016 Plan proposes to realize electricity savings of 1,232 MW and 4,506 GWh, natural gas savings of 130 million cubic meters, and combined global greenhouse gas emission reductions of 3.3 million tonnes by 2030/31 (compared to 1,288 MW and 4,619 GW in electricity savings, 118 million cubic meters of natural gas savings, and combined global greenhouse gas emission reductions of 3.3 million tonnes by 2029/30 in the 2015 Plan).

The following **Figure 3.5** combines the forecast gross energy and peak requirements projected in the Load Forecast with the planned additional DSM energy and capacity savings from the Power Smart Plan. Manitoba Hydro's gross firm energy (lines) and peak (bars) are compared to firm energy and peak net of DSM savings (solid lines and bars, respectively), as well as a comparison between the 2015 (green) and 2016 (blue) forecasts. Energy, net of DSM savings, in MH16 shows no growth over current levels by 2027 compared to 0.5% average annual growth in MH15. MH16 capacity, net of DSM savings, is projected to decline by 0.3% over the 11-year forecast period compared to 0.1% average annual growth in MH15.

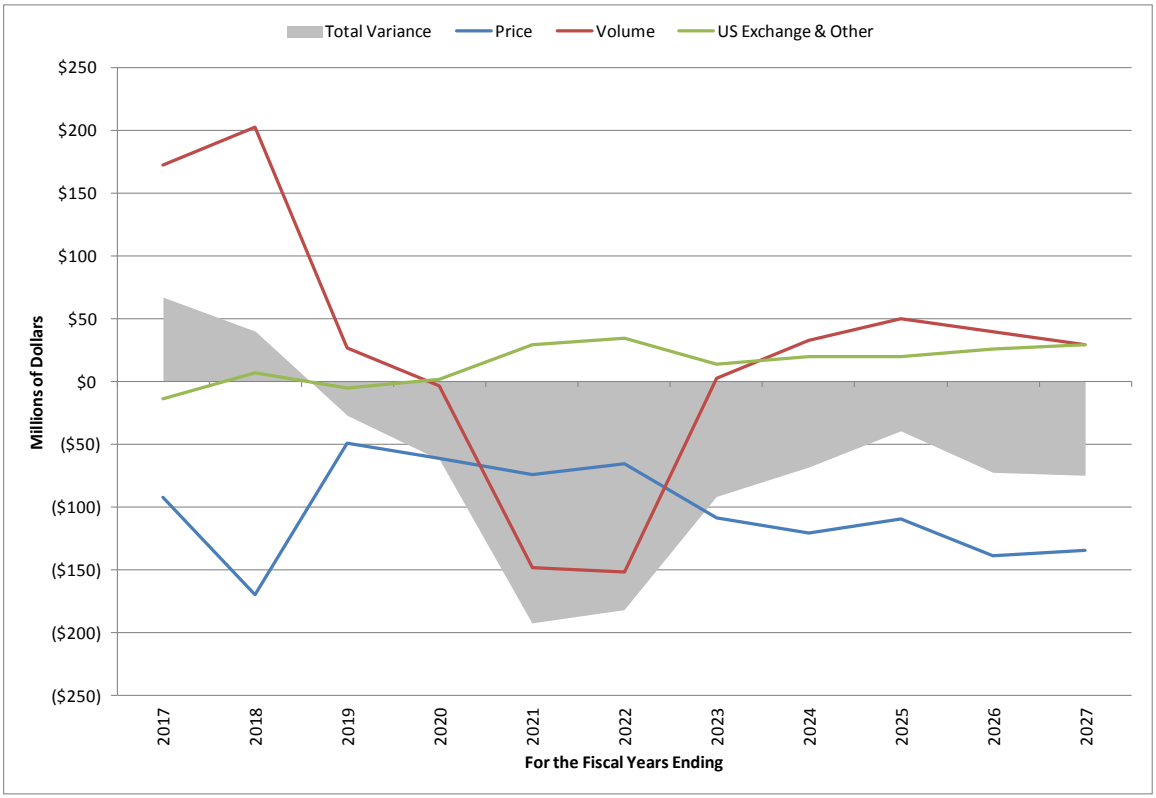
Figure 3.5 Comparison of MH16 and MH15 Firm Energy and Peak



Lower Extraprovincial Revenues

The following **Figure 3.6** shows that MH16 net extraprovincial revenues are $0.7 billion lower compared to MH15 over the 10-year forecast period from 2016/17 to 2026/27 reflected in the grey shaded area ($0.8 billion from 2017/18 to 2026/27).

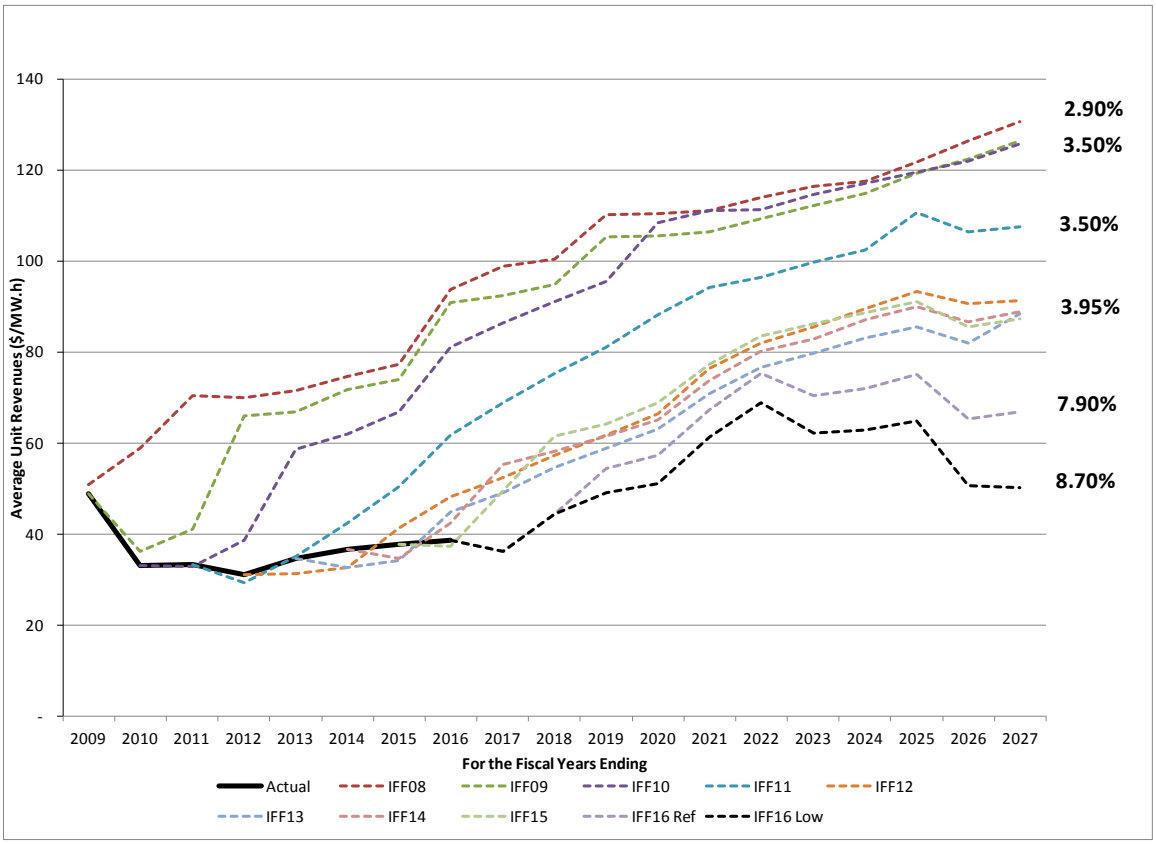
Figure 3.6 – Change in Net Export Revenues in MH16 compared to MH15



The reduction in export prices accounts for about $1.1 billion of the cumulative reduction of net extraprovincial revenues over the 10-year forecast period to 2026/27. MH16 reflects electricity export prices that are lower by approximately 20% relative to the comparable 2015 forecast. The decline to long-term power prices is due primarily to a reduction to long-term natural gas prices and increased renewable development (primarily wind generation) in the MISO market, aided by substantial subsidies. In addition, the premium that has historically been applied to the long-term dependable forecast prices has been removed as the achievability of this premium has reduced significantly in the MISO market. Reflecting the continuing trend of low capacity value, a January 2017 update removed capacity value from the pricing of potential future uncommitted export sales from surplus dependable energy.

The following **Figure 3.7** shows the actual average export prices since 2009 (solid black line) compared to the progression of forecasted average unit revenues since IFF08 (coloured dashed lines) with the projected annual rate increases associated with the respective forecasts.

Figure 3.7 Progression of Forecast Average Unit Revenues Compared to Actual Average Prices



Near term forecasts, particularly IFF12 through IFF15, are relatively accurate as demonstrated by the cluster of dotted lines around the solid black line. Longer term of forecasts prior to IFF12 assumed much higher real price growth.

Compared to IFF08, forecast average unit revenues have decreased by 35% to 60%. Over time as actual prices have remained relatively flat, consultants' forecasts have corrected for the change in natural gas prices, and as a result, the forecast real

electricity price growth has decreased. As expectations for export prices have weakened from forecast to forecast, pressure on domestic customer rates has significantly increased to compensate for lost domestic revenues indicated by the respective rate increase assumptions associated with the forecasts on the right of **Figure 3.7**.

The current reference price forecast assumes moderate real price growth but natural gas futures indicate that the low electricity price trend may continue. However, there is no certainty in the level or duration of low electricity export prices. The IFF16 low price case shown in **Figure 3.7** reflects a scenario in which the current low opportunity prices are sustained and results in 8.7% annual rate increases for five years to maintain comparable forecast equity as the 7.9% base case. By 2026/27, cumulative rates are about 6 percentage points higher.

In addition to lower export prices, **Figure 3.7** shows additional lost net extraprovincial revenues of approximately $0.5 billion compared to MH15 due to the Keeyask 21-month delay. These reductions to net extraprovincial revenues are partially offset by more favourable water flows in 2016/17 and 2017/18 than planned in MH15, as well as more surplus energy available for exports as a result of the reduction in Manitoba Hydro's forecast of Manitoba demand. These changes in volume account for about a $0.8 billion increase in net extraprovincial revenues over the 10-year forecast compared to MH15.

With the reduction in forecasted domestic load and export prices, a higher level of rate increases are necessary compared to previous plans in order to obtain a better financial position. Relying on substantial improvements in export prices or growth in domestic revenues at current approved rates places customers at risk of rate shock if these export prices do not rebound or other risks materialize.

3.2.2 Capital In-Service

While assets are under construction, the capital expenditures and associated financing costs are held in construction work in progress. Once these assets are placed into service, the associated carrying costs (depreciation and finance expense) form part of the Corporation's revenue requirements.

Figure 3.8 provides a summary of the amount of capital that is forecast to go in service, as well as deferred assets that will commence amortization for the first three forecast years as well as the 10-year forecast period. **Figure 3.8** indicates that $0.9 billion, $0.7 billion and $5.5 billion of assets are projected to be placed in-service in 2016/17, 2017/18 and 2018/19, respectively. The most significant asset being placed in-service during this period includes the Bipole III Reliability Project in 2018/19. In this three year period, there is also approximately $1.7 billion of sustaining capital expenditures and $0.3 billion of DSM expenditures that will be placed into service; $0.2 billion of these DSM expenditures will commence amortization.

Figure 3.8 Electric Capital In-Service Amounts

	2017	2018	2019	Cumulative 3 Year Total	Cumulative 10 Year Total
Keeyask - Generation	-	-	-	-	8 726
Bipole III Reliability	19	32	4 801	4 852	4 872
Wuskwatim - Generation	1	11	-	12	12
Pointe du Bois Spillway Replacement	17	-	-	17	17
Manitoba-Minnesota Transmission Project	0	7	-	8	453
Kelsey Improvements & Upgrades	13	7	1	20	20
Riel 230/500kV Station	1	-	-	1	1
Gillam Redevelopment and Expansion Program (GREP)	16	13	74	103	244
Kettle Improvements & Upgrades	21	21	1	42	42
Pointe du Bois - Transmission	9	0	-	9	9
Manitoba-Saskatchewan Transmission Project	-	-	-	-	56
Grand Rapids Fish Hatchery Upgrade & Expansion	-	-	-	-	23
New Generation & Transmission Sub Total	**96**	**91**	**4 877**	**5 064**	**14 476**
Demand Side Management	50	56	99	205	731
Conawapa - Generation	-	-	-	-	380
Other	47	27	27	101	958
DSM & Other Assets Sub Total	**97**	**83**	**126**	**306**	**2 068**
Generation & Wholesale	123	99	105	327	1 151
Transmission	97	166	91	354	1 384
Marketing & Customer Service	339	230	239	807	2 438
Human Resources & Corporate Services	103	60	55	218	618
Finance & Strategy	0	0	0	1	2
Electric Business Operations Capital Sub Total	**662**	**554**	**490**	**1 706**	**5 593**
TOTAL	**856**	**728**	**5 493**	**7 077**	**22 138**

3.2.3 Accounting Assumptions in IFF16

Manitoba Hydro is seeking PUB endorsement of proposed deferral and amortization of costs incurred with respect to Conawapa as well as endorsement of the proposed amortization period for disposition of regulatory deferral accounts, which are included in MH16's DSM & Other Assets capital in-service amounts outlined in **Figure 3.8** above. The annual adjustments to regulatory deferral balances arising in net movement consist of additions to regulatory deferral balances and the amortization of such balances. A positive net movement balance adds to net income, while a negative balance will subtract from net income.

The regulatory deferral account for Electric Operations include Power Smart program expenditures, site restoration expenditures for the remediation of contaminated corporate facilities and diesel generating sites, the Affordable Energy Fund, net asset retirement losses, regulatory costs, and differences in depreciation and overhead capitalized used for financial reporting versus rate-setting purposes.

Treatment of Costs Incurred for Conawapa Generating Station

Manitoba Hydro is seeking PUB endorsement of the proposed inclusion of costs incurred with respect to the Conawapa Generating Station project into Manitoba Hydro's regulatory deferral balances and subsequent amortization.

Manitoba Hydro wrap-up activities with respect to design, consultations and environmental studies following the Province's 2014 direction to suspend development of the Conawapa Generating Station were completed as at December 31, 2016. Manitoba Hydro has ceased capitalization of interest as of the completion date and total costs (including interest) are $380 million, which are currently reflected in Manitoba Hydro's construction in progress balance.

Any short-term decisions as to whether to restart or continue to suspend Conawapa depends on whether or not federal and/or provincial carbon reduction initiatives materialize to the point where a future export sales arrangement can be secured to support the economics of constructing this plant. Since there is significant uncertainty as to the timing of such initiatives and their impact on potential export sales arrangements, no further activities are planned for Conawapa. As a result, it has

become increasingly difficult to demonstrate future benefits to Manitoba Hydro's auditors, and Manitoba Hydro will be required to recognize the $380 million in costs to net income for financial reporting purposes under IFRS. To minimize the impact on customers, Manitoba Hydro is proposing to defer these costs in a regulatory deferral balance and commence amortization over 30 years, subject to the PUB's endorsement following its review of Manitoba Hydro's 2017/18 and 2018/19 GRA. MH16 assumes Conawapa costs are recognized in the regulatory deferral balance and amortization commences effective April 1, 2019.

Regulatory Deferral Account - Depreciation

MH16 includes a regulatory deferral account reflecting the difference between depreciation calculated using the ELG depreciation method for financial reporting purposes and the ASL method used for rate-setting purposes.

In Order 73/15, the PUB directed Manitoba Hydro to continue to use the CGAAP ASL method of depreciation for rate setting purposes until the PUB is satisfied that a change in depreciation methodology is warranted. As Manitoba Hydro uses the ELG depreciation method for financial reporting purposes, MH16 assumes that the differences between these depreciation methodologies will accrue to a regulatory deferral account until March 31, 2023, the fiscal year end of the last Keeyask unit in-service. Thereafter, net income is sufficient to absorb the difference in methodologies without adverse impact to the projected inflationary rate increases.

The regulatory deferral balance for ELG depreciation expenses grows to $300 million by the final Keeyask unit in-service in 2022/23. As a result, Manitoba Hydro is seeking endorsement from the PUB to commence amortization of the ELG regulatory deferral balance over 20 years in 2017/18. Section 10.4.4 in Tab 10 provides additional discussion with respect to Manitoba Hydro's response to the PUB's directive in Order 73/15 related to depreciation.

Regulatory Deferral Account – Overheads not Eligible for Capitalization

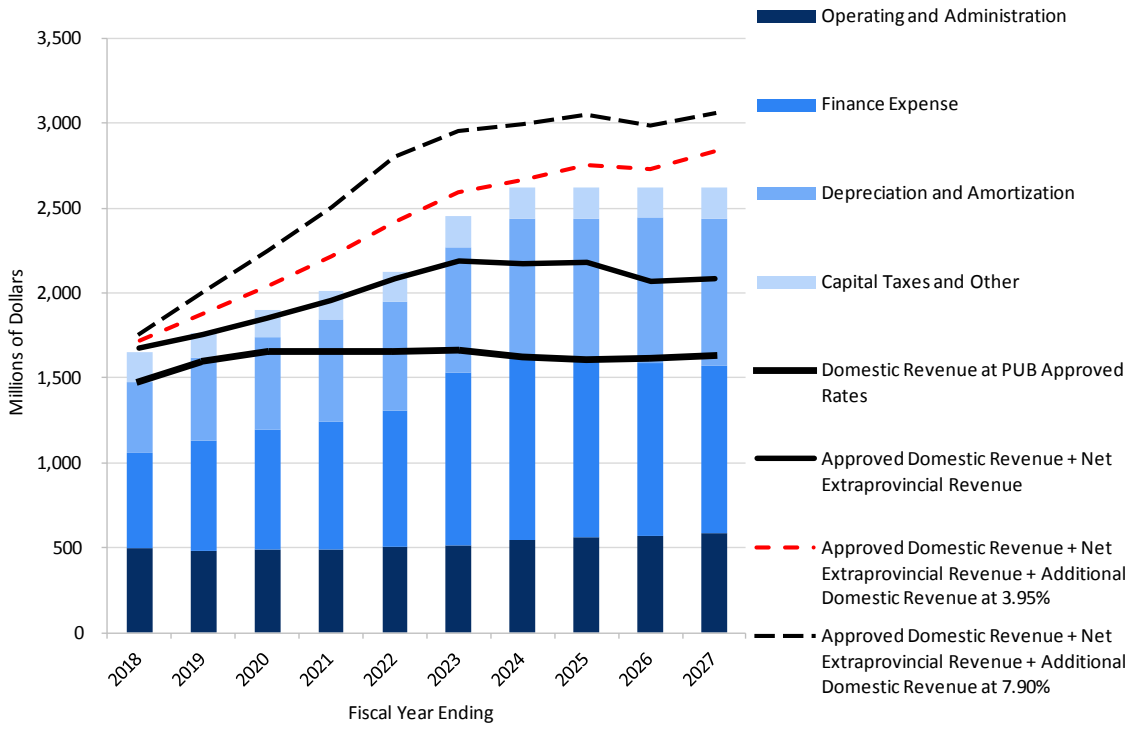
MH16 also includes a regulatory deferral balance for $20 million in annual overhead costs ineligible for capitalization under IFRS to be deferred for rate-setting purposes in accordance with the PUB's findings in Order 73/15. Consistent with the treatment of

depreciation expenses, MH16 continues to defer ineligible overhead costs until March 31, 2023. At this time, the ineligible overhead deferral balance grows to approximately $160 million and Manitoba Hydro is seeking PUB endorsement to commence amortization of this balance over 20 years in 2017/18.

3.2.4 10-Year Comparison of Carrying Costs vs. Revenues

The following **Figure 3.9** compares Manitoba Hydro's electric operations projected carrying costs (O&A, finance expense, depreciation expense, and taxes and other expenses) arising from assets placed into service to the Corporation's projected domestic and net export revenues (extraprovincial revenues less fuel and power purchases and water rentals and assessments).

Figure 3.9 Comparison of MH16 Capital Carrying Costs to Revenues



Manitoba Hydro's costs rise sharply to $2.6 billion over the 10-year period to 2026/27, increasing by about 60% from their current level of $1.5 billion. Despite the significant increase in Bipole III and Keeyask project costs, MH16's carrying costs are lower compared to MH15 ($2.8 billion by 2026/27).

Domestic revenues are insufficient to fully absorb the $1.0 billion carrying cost increase. Over the 10-year period, domestic revenues, including the previous forecast's annual 3.95% rate increases, are barely sufficient to cover carrying costs and do not support equity growth consistent with the growth in assets or net debt, leaving Manitoba Hydro's customers exposed to the significant risks faced by the Corporation.

Manitoba Hydro's previous forecast predicted domestic load growth of 1.6% over the next 10 years, and export price appreciation that would result in a positive forecast net income and equity growth in the longer term. These assumptions allowed Manitoba Hydro to maintain its forecast of even annual rate increases at 3.95% to 2028/29 in order to defer or avoid seeking higher rate increases than what would otherwise be required.

Manitoba Hydro accepted a significant deviation from its financial targets in past forecasts in order to alleviate rate increases in excess of 3.95% to the extent possible. Manitoba Hydro's projected financial results have fortunately benefited from exceptional water flow conditions and the current low interest rate environment. Should these fortunate circumstances suddenly or adversely turn around, or the major projects experience further cost increases, Manitoba Hydro cannot rely on the optimistic anticipation of increased domestic or export revenues given the flat forecast of domestic load and the flatter forecast of opportunity export prices (relative to previous forecasts) to reduce the significant pressure that will be placed on future customer rate increases. The advancement of rate increases in MH16 reduces the future debt burden, thereby, reducing the future rate pressure on customers.

The proposed rate trajectory reflected in MH16, combined with Manitoba Hydro's accelerated cost reductions, will place Manitoba Hydro in a better financial position to deal with significant potential financial risks (drought, rising interest rates and lower export prices) without having to rely on large, unplanned rate increases to sustain operations.

3.3 DEBT MANAGEMENT STRATEGY

The Debt Management Strategy document (see Appendix 3.5) provides information on the historical growth of the Corporation's investment in fixed assets and the corresponding increase in Manitoba Hydro's long term debt. The document also summarizes the statutes that govern the Corporation's financing programs, and outlines the debt management strategies that will address the Corporation's financing requirements for the 2017/18 and 2018/19 fiscal years.

Manitoba Hydro's fundamental debt management objective is to provide low cost, stable funding to meet the financial obligations and liquidity needs of the Corporation.

In order to reduce the interest rate risk on the existing total debt portfolio, Manitoba Hydro will maintain its percentage of floating rate debt within the portfolio at or below 10%. To mitigate the pressure on Manitoba credit spreads, the Corporation will also undertake a variety of debt management activities such as establishing benchmark sized debt issues and diversifying the investor base by continuing to issue Manitoba bonds into international markets. To mitigate liquidity risk and provide financing flexibility to secure debt during periods of constructive investor tone, Manitoba Hydro also intends to maintain unencumbered positive cash balances by securing funds approximately three months in advance of its cash requirements.

With the potential availability of cash following the in-service of new major generation and transmission, an opportunity exists to use this future cash to retire debt at that time. This debt off-ramping is a key factor in the planned reduction in finance expense and the recovery of Manitoba Hydro's financial ratios.